As directed, a brief visit has been made to Renison Bell with the object of acquiring a superficial knowledge of the characteristics of the lode series for the purpose of advising upon the project of a comprehensive report upon the economic prospects and possibilities of the ore occurrences.

The country is principally occupied by sandstones, slates, quartzites, and grits of the sedimentary series; dolomites and siderites; brecciated derivatives of shear zones; and the igneous intrusive gabbros, serpentines, and porphyries, quartz-porphyry being genetically related to phases of mineralisation. Fissuring, shearing, strata displacements, channel mineralisations, mineral replacements, mineral impregnations of zonal slates, and mechanical enrichments, have combined to produce a complex system of primary and secondary occurrences of ore upon which several geological reports have been compiled. Progressive mining developments, productive disclosures, and investigational operations have been of value in assessing the genesis and characteristics of the occurrences of ore but a diversity of opinion is to be encountered in correlating the series and the application of further techniques may modify previous designations of the zones of mineralisation.

The major lode systems conform with N.W. - S.E. planes of fissuring, with intersectional mineralisation in distinct relationship to cross planes. Lateral persistence of ore, exclusive of the intersectional planes, has yet to be revealed in isolated association with the cross fissurings. The primary lodes are to be regarded as pyritic infillings and replacements conformable with phases of silification and precipitation of cassiterite. Mineralisation, including the sulphides and tin-oxide, has penetrated the slates adjacent to the major lode planes, and has resulted in zones of mineralisation of appreciable width but affected in lateral continuity by a maze of structural deflections. Authorities have classified the pyrite-cassiterite occurrences into lodes and sills and although there has been a general acceptance of this classification, future investigations may reveal some modifications in the genesis and structure of the occurrences. The economic mineral has been the tin-oxide and the pyrite occurs principally as primary phrrhotite, iron pyrites, and marcasite, - the marcasite being an alteration production of the pyrrhotite.

Exclusive of strata impregnations, the pyrite forms massive occurrences, characterising the series, and agencies of oxidation and denudation resulted in a sequence of gossans, sub-sulphides, and sulphides with detritals and weathered slates, occurrences of each carrying primary precipitations or secondary depositions and concentrations of tin-oxide, the latter being of mechanical origin. Siliceous association with the pyrrhotite, either as veins or silica-skeletons, appears to have been regarded as of immediate importance to the degree of concentration of tin-oxide in the primary sulphides and it is generally presented that, conversely, the dense non-siliceous pyrrhotite is of no economic importance.

The past history of mining has been, primarily, concerned with the recovery of tin-oxide from the zones of oxidation, including detritals from the denudation of outcrops and gossans of the ore bodies, in situ; and, secondarily, with the recovery of tin-oxide from the sulphides by calcination and gravity concentration but

several factors contributed to a collapse of the latter operations.

Much consideration has been given to the industrial utilisation of the sulphides but no development has materialised and the economic mineral of the area has been cassiterite.

The future of the area is related to continued development and exploitation of gossans and zones of weathering in which, latter, natural concentrations of tin-oxide have ensued and possibilities and economic importance of the sub-sulphide zones and exploitation of mixed, light, and dense sulphide ores for the contained tin-oxide and the preservation and diversion of the pyritic gangue to by-product industries to maintain a maximum ore value.

Differences of opinion prevail in regard to the possible exhaustion of gossans and zones of mechanical concentrations of tin-oxide in weathered strata. A comprehensive survey would better reveal the extent to which activities in those zones could be sustained or accelerated.

Exploitation of the pyritic zones for the contained tin-oxide and recovery of the sulphides for industrial utilisation are directed to reducing the loss of the gross content of tin-oxide and the aversion of wastage of pyrite that accrued during calcination and gravity concentration.

The principal reports of economic moment, available for perusal, are those compiled by M.R. McKeown in 1927 and 1933. The reports are of a comprehensive nature, covering the mines, ore occurrences, diamond-drilling results, tonnages, values, and mining and metallurgical practices, but the prepared plane and charts are not available and as these may have been of inestimable value in assessing the merits of the computations, the published results are to be considered with reservations pending investigational confirmation. The reports allow the association of very low values with the non-siliceous primary sulphides and that higher and payable tin contents occur in ores relatively high in silica, but adds that the high tin-silica relation is subject to more exceptions than the converse. In general, the occurrence of the tin, in the lodes, is considered to be somewhat erratic, in places, and rapid variations in value occur quite apart from the influence of faults, while narrow veins of appreciable richness have an important influence on the value of the ore in bulk. The 1927 report sites the Renison Bell reserves in terms of proved and probable ore but the 1933 report modifies the appilation to probable and possible ore. The former report presumes to eliminate ore assaying less than 0.47% Sn, and; without cognisance of the ore bodies at the Cable, Dalcoath, Lucks and other workings, which are presented as offering attractive possibilities for increased tonnages; an appreciable tonnage of proved and probable ore is sited with an assay range of 0.84 to 1.38% Sn. The 1933 report presents the following computations:-

Brumby and Evenden's Workings	Possible ore	100,000 tons:	Assay Value 0.900% Sn
South Workings	Possible ore	28,000 tons:	Assay Value .977% Sn
Battery Workings	Probable ore	119,700 tons:	Assay Value 0.715% Sn
Renison Bell Main Lode	Probable ore	20,000 tons:	Assay Value 0.841% Sn
Renison Bell Main Lode	Possible ore	104,300 tons:	- -
Renison Bell Blow Lode	Possible ore	106,000 tons:	Assay Value 0.877% Sn

The results are observed and recorded with reservations and, in the absence of a check examination, it is not proposed to present any destructive or constructive comments on a report, computations, and deductions, which must have occupied an appreciable amount of time and labour in the compilation. It is desired, however, to infer that if an assessment of that nature can be applied to the workings itemised, then a very large tonnage of ore must be added for the remainder of the known exposures in the series, and that if the content of metallic tin in the economically exploitable zones averaged on a similar basis, the total tonnage of ore could not be disregarded.

The prospectus issued by the Renison Associated Tin Mines refers to 500,000 tons of ore, of an average value of 0.88% metallic tin, being practically proved, and that a conservative estimate of four lode systems, covered by the leases, would place the tonnage at 2,000,000 with an estimated content of 0.68% metallic tin.

It must be conceded that the publications present a low-grade proposition of large tonnages of ore of a value sufficient to command an investigation into the merits of the computations and deductions and into the possibilities of economic exploitation.

In addition to the properties occupied by the Renison Associated Tin Mines, leases are held by the Anglo-Tasma Development Company, Tasmanian Amalgamated Tin, and J.A.G. O'Dea, embracing sections of the Renison Bell and Dreadnought-Boulder zones of mineralisation. Preparations for productive operations are being made by the Anglo-Tasma Development Company and the Tasmanian Amalgamated Tin and it is understood that these operations are to cover the oxidised and sulphide zones. To what extent separate or collective operations would best serve the interests of the field, consistent with the establishment of economic tonnages of ore and values, is a matter for consideration.

In the absence of an intimate knowledge of the occurrences of ore, reports and publications must be approached with caution, but the preceding observations, following a brief visit to the field, are recorded to produce the conclusion that disclosures by past developmental and productive operations, the magnitude of remaining exposures and the reports and publications upon the prospects and possibilities of the Renison Bell ore occurrences merit a comprehensive examination of the series irrespective of what conclusion may evolve upon the economic importance of the ore occurrences. An investigation of this nature would involve:-

A detailed survey of the field, covering zones of mineralisation, lodes, and exposures of ore to produce a better conception and correlation of the series.

An assessment of tonnages, values, and distribution of values as applied to oxidised and sulphide zones and the prospect of each zone as seperate entities,

and

Cautions investigations and deliberations regarding the cassiterite-pyrite bodies, to, at least, determine the possibilities of a minimum tonnage of a value sufficient to warrant the inception of collective or selective mining or both.

The zones of oxidation present no greater problem than experienced hitherto and no further preliminary comment is necessary except that detailed investigations might be directed to adding, if possible, to productive prospects and possibilities.

The sulphide zones present a different problem, and the prospects and possibilities are related to:-

1. The quantity of ore available as a proved minimum, sufficient to substantiate industrial exploitation.

   The average bulk and zonal percentage of tin per ton of ore and the economic distribution of values.

   The monetary value per ton of ore, bulk and zonal, based on ruling and perspective metal prices with compensations for market variations.

   The application of collective mining by surface or underground practices or both.

   The application of selective mining by surface or underground practices or both, to eliminate poor zones; and the economics of tonnages, values, and mining practices.

2. Development of metallurgical practices for a maximum recovery of tin-oxide.

   Recovery and industrial utilisation of the pyrite, to produce a maximum ore value.

   The economics of metallurgical practices.

3. The relation of operative, power, maintenance, administrative, and general costs, and revenue charges, to gross and recoverable values.

4. The assessment of mean ore grades to cover metallurgical losses and satisfy the requirements of the preceeding three factors.

It would be fallacious to presume, even approximately the period that would be occupied in making an investigation for the purpose of a comprehensive report to cover the preceeding factors. The absence of detail plans; covering workings, lodes and surface exposures; presents an immediate necessity for a comprehensive survey. Upon the completion of this, a reconnaissance for an assessment of ore tonnages and values could be made for the purpose of confirming or refuting published tonnages and values and for assessing a tonnage of ore of sufficient economic importance to merit an equitable scale of productive mining.

Should investigations economically favour tonnages and values, based on the first and fourth factors, the Department would be justified in proceeding with, encouraging, assisting or facilitating investigational operations to determine the absolute possibilities of practices covered by the second factor, but it would be desirable to eatablish, at least, a minimum tonnage of ore of a grade and disposition to warrant exploitation on the basis covered by the first factor before proceeding with a solution of the metallurgy of the ore.

Without accepting reports compiled by engineers, not attached to the Department, as a basis for deduction,

it is difficult, from a brief visit, to attach economic importance to the sulphide zones and a comprehensive examination, under Departmental control, must precede a recommendation or opinion upon the economic prospects and possibilities of the occurrences of ore. The collection and collaboration of data, even on a modified basis, would occupy an officer and assistants for a period of months, and it would be inadvisable to impose restrictions upon the time necessary for a completion of the investigations, if such are to be undertaken.

No criticism or reflection is being made upon any published reports concerning tonnages and values, and, at this stage, no comment is being made upon the results of experimental tests, by oil flotation, conducted for a separation of the pyrite from the tin-oxide and gangue, and the concentration of the tin-oxide from the gangue, as it is definite that this report is purely an intimation, based on a superficial knowledge of the lode systems, of the factors essential for a determination of the economic importance of the occurrences of ore and the recording of an expression of opinion in favour of a comprehensive examination of the series.

The question of the production of sulphur, acids, pigments, or other industrial utilisation of the pyritic content of the ore has been the subject of several reports and investigations could be made to determine the extent to which the pyrite could be industrially absorbed to the benefit of the gross or net value of the ore, but observations are not being recorded thereon as such a project is beyond the confines of the object of this report.

Productive operations are being pursued by the Renison Associated Tin Mines on gossans, and the Company appears to have been convinced in regard to the economic possibilities of the sulphide ore as a pilot flotation unit has been acquired for experimentalpurposes in developing a metallurgical practice on the basis covered by the second factor of this report upon the sulphide zones.

It is recommended that a comprehensive examination, as outlined, be undertaken.

The Department may now consider the merits of proceeding with the investigation and, provided the results favour the economics of the ore occurrences, of encouraging, assisting, or facilitating an expansion of mining activities and the development of improved metallurgical practices for a maximum and economic recovery of tin-oxide and the industrial utilisation of the sulphides on the basis presented.

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INSPECTORS OF MINES

Mines Office,
Launceston.
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