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GOVERNMENT GEOLOGIST



*REPORT on the Blue Tier Mining District and its Tin Deposits.*

Inspector of Mines Office, Launceston,  
February, 1886.

GENERAL GEOLOGICAL FEATURES.

THE prevailing country rock or formation consists of a coarse-grained granite, in which large crystals of reddish felspar (orthoclase) are embedded with grey quartz and blackish mica; this rock is hugely stratified, and frequently the felspars form regular bands or lines, conveying a kind of laminated appearance to the whole formation. In this "primary" rock the *lodes* of tin ore occur, also *dykes* and *belts* of more recently obtruded porphyries, which latter belong to the aplite and protogine series. These dykes are more or less impregnated with fine black tin ores, whereas in the lodes it occurs in regular veins, nests, and bunches in the vein-matter, and they are therefore in a more concentrated form than in the dykes. The ores are chiefly those of oxides of tin (cassiterites) associated, in the lodes more than in the dykes, with copper, iron, molybdenum, pyrites, wolframite, and siderite, some fluor and calc spar and talcose minerals.

The really valuable metalliferous deposits may be classified as follows:—

1. Lodes.
2. Dykes, (indurated or hard.)  
Ditto, (soft.)
3. "Soft Formation," or "Great Fault."
4. Dykes; basaltic or of anamesite. These latter are frequently decomposed near the surface into yellow, brown, or grey soft rocks; underground they are very hard and dense, and of a black colour, enclosing arragonites and leucites.

The lodes and dykes of the two first classes produced, at the surface, through atmospherical and aqueous action, those rich pliocene (older) and pleistocene (recent) alluvial tin ore deposits, which have been wrought in this district for over eight years past with great success, but which are now nearly deprived of their mineral treasures. These would form the 4th and 5th divisions. It may be remarked that the latter extend over considerable areas, and they have produced large returns of tin ore for export.\* †

*Description of Mines and their Deposits according to Classification.*

1. LODES:—Lottah, Full Moon, Hope, Blue River, Wellington, Connelly's Companies, and Cream Creek.

The Lottah Company's ground is very favourably situated for working their lodes, of which there are two or three, on an economical system, on account of the deep valley in which their outcrops are located. About 60 feet above the creek the main adit has been driven along the course of the lode from its outcrop for a total length of 800 feet; and two other tunnels or crosscuts had

\* It may be stated, that information has been obtained from reliable sources to the effect of this Blue Tier Mining District having yielded during the period mentioned over 3000 tons of tin ore, which, at a low computation of Fifty Pounds sterling per ton, has added £150,000 to our exports, or over £21,000 per annum.

† The description of the geological features and location of deposits is almost impossible without a geological plan, to which, as it accompanies this report, attention is repeatedly directed.

also been extended 780 feet in the same manner, and a crosscut 80 feet in length intersected that lode at the higher level. There were no winzes sunk to connect on the underlay of the lode, but two vertical air-shafts are completed; these main workings therefore command about 260 feet of solid ground or "backs" on the underlay, and so far as these tunnels show, the lode extends throughout the full length of the ground and further. Besides the one disclosed in these tunnels there are two others not yet developed, but which exhibit good ore in veins at an altitude which adds over 150 feet to the back available for working. These vein deposits are, on the whole, very regular in their mode of occurrence for an average width of from two to three feet, and they carry a very good percentage of tin ore of a very coarse and brittle description wherever they have been tested. It need scarcely be added that their permanency has been established by the extent of their workings, and by the occurrence in them of the usual percentage of those minerals generally associated with lodes here and elsewhere, and referred to in the first part of this report. As the deposits observe a strongly laminated character in grey and red granite, also protogine wall-rock, it has been found, however, that the darker or black portions are the richest in tin ores. There is scarcely any room for doubting but that, even without proper and effective concentrating appliances, this company has not only proved the extent and value of their lodes, but that they are therefore justified to proceed with the purchase and erection of grinding and cleansing machinery, and thus end their present state of inactivity. As a preliminary, it is here suggested that all these main workings be connected forthwith by means of winzes and passes in order to facilitate the actual mining of ore exclusively.

Attention should also be directed to the fact, that this company holds, so to speak, the key of position of other and deeper adits, by means of which eventually the following mines—viz., Full Moon, Hope, and others in the vicinity—could be worked at greater depths on a very economical scale, and which proprietaries are now prevented in a great measure from doing through their having to work their lodes by means of shafts in a very expensive and tedious manner, owing to the gradual but increasing influx of water at depths.

*The Full Moon Company (late)*—see Plan No. 1—have sunk their principal working shaft to a depth of 120 and another of 100 feet from the surface. At the lower levels water was encountered, which rendered mining operations very expensive. There are two principal lodes dipping towards each other, and these were worked at short distances from the shafts, and the yields have been equal, on average, to those of the ground opened at the higher levels. The deposits, vein and alluvial, yielded large returns for some time, and the former are now turning out, when water is available, payable returns. So far as could be seen, the workings being full of water, the character of the vein-stone from the deeper levels as deposited on the surface was very similar to that from the Lottah Company. The tin ore occurs in coarse crystals in veins and nests, embedded in hard transmuted talcose vein-matter.

It may, however, be remarked that molybdenite and sulphurets of copper were found more frequently in these lodes, and that dykes of "basalt" of a more recent origin than this remarkable set or system of lodes intersected the whole of these metalliferous veins. These deposits, as already mentioned, gave large yields, both from the recent and older formations, as they, in a very few years, gave to a limited number of miners, and, later on, to a company, down to the 100 feet level, 875 tons of ore, at the estimated value of £36,000, of which sum £20,000 was distributed amongst the shareholders as profits, who had commenced with a working capital of but £6500.

In view of these facts it appears as most surprising that both the Lottah and the Full Moon Companies should remain for so very considerable a time at a standstill, so far as their operations on the lode formations are concerned, when it is quite evident that, in both cases, a moderate expenditure, judiciously laid out, would, from all appearances, have sufficed to place them in the dividend list.

*The Hope Company* has opened their mines on the leases, on a formation of a series of tin-bearing veins on the surface, and, as a matter of fact, it may be stated of their three companies,—viz., Lottah, Full Moon, and Hope,—that they occupy positions at different altitudes on the same metalliferous belt traversing that region, the proper development of which, at considerably greater depths, should, for reasons advanced, proceed from the valley in the Lottah ground. The initiation and accomplishment of such a scheme would undoubtedly be fraught with the greatest importance to this otherwise almost depopulated district and the Colony at large.

*The Blue River Company* have found on the north side of that peculiar "soft formation," described further on, a number of parallel running veins—east, west,—extending over a distance of 4 to 6 chains. They are, if anything, of an impure quartzose character, carrying a moderate percentage "rosin" and black tin ore. A great deal of trenching has been done thereabouts, and also two shafts have been sunk to depths from 16 to 25 feet respectively, in order to test same thoroughly, as they occur in soft country, the veins themselves being of a hard character. The one known as No. 3 appears to be so far the most promising of the others, and, to judge from its general character, a greater depth would solve the question of these veins being remunerative in a practical manner, and which should have my approval.



The *Wellington Company* has, by means of a main tunnel, intersected several promising tin lodes, which are decidedly more clearly defined, rich, and contain more quartz and mica than several of the others at Blue Tier, and they give promise to turn out well when once systematically mined, and the cleansed ores have been collected by the more superior concentrating appliances. The first lode, 300 feet from the mouth of the tunnel, is 12 feet in width, exhibits a kind of porphyritic but still laminated appearance, as the various constituents of the lode occur in vertical bands. Several samples were taken from a width of 6 feet from the north wall, and they produced by washing (thus proving the kind nature of this valuable formation) very satisfactory results of samples of coarsish black tin ore. A dyke of hard and black basalt (anamesite) 2 feet 6 inches wide traversed this lode, which strikes nearly due east by west in a north east by south west direction, and similar volcanic dykes are nearly always found in conjunction with permanent formations of a metalliferous description. In the total length of this tunnel of 450 feet from north to south, other lodes have been met with, viz.—the second lode occurs 17 feet to the south of the one just described; it is but 1 foot wide, but it also carries fine ore. At 25 feet further along the tunnel the third lode was found, of a similar thickness, in a soft vein-matter, and of similar quality to the last. Unlike the first lode, which has had a winze sunk upon it for a depth of 80 feet from the surface to and connected with the tunnel, this lode has a shaft but 35 feet sunk, leaving about 50 feet to hole through; the first shaft will facilitate the working of the lode very much at start and after.

A chain wide of dead country follows or intervenes before the fourth and last lode was met with. This partakes more of the nature of an immense "stockwork," as forty feet have been driven in same, but the opposite wall has not yet been reached, though moderately fair prospects of tin ore can be occasionally obtained. It is, therefore, very certain that in these four lodes, though they differ in the tunnel in quality, a very valuable property exists, which, however, has been very much neglected, owing principally to the want of some inexpensive reduction process, which appears to me to be the great *desideratum* on the Blue Tier, through which, if anything, it has simply suffered a relapse from its former mining prosperity by the gradual lessening of the product from alluvial tin mines, and from the want of knowledge to work other deposits of that ore, which require certainly some outlay for shafts, winzes, levels, and machinery, but which, if those things were once supplied, would have given, if not quite, equal yields for perhaps a lesser number of employes, would have been preferable, as the deposits are, so far as my examinations have convinced me, of a reliable permanent character, capable of gradual extension, both of the mines and the machinery to be employed.

The *Cream Creek-Lode*, in the north-western part of the district, consists of a vertical vein of blackish tin ore; and, singularly enough, it was discovered by sinking through granite which caps it. Some experts, not having examined that coarse granite, failed to discern the closer grained apex of a porphyritic dyke in which that lode occurs, and declared the granite as devoid of metalliferous deposits, showing how unwise it is to lay down hard-and-fast rules in these matters when large amounts of money may be at stake. The lode varies from 2 to 3 feet in width, and it carries rich ore, and it is besides remarkable from its outcrop being largely impregnated with black manganese in botryoidal forms.

The *Connelly's Lodes* occur, as per plan, in the north, and at nearly the highest point of the Blue Tier, being over 700 feet above the Blue Tier township (A.). The formation exhibits a series of quartz veins stained green, probably by chlorite, enclosed between two walls which are about 2 feet apart. The tin ore is irregularly distributed, but it is evident that periodically it must have been rich, as the shallow gully alongside yielded 24 tons of pure ore in a short time. There are two outcrops which vary in strike a little, but it is evident that they belong to the same formation.

## 2. Dykes (indurated or hard.)

The *Anchor Company's* (No. 8) mines are situated in the extreme south-eastern portion of the Blue Tier district, and about 500 feet below the level of the Lower Junction Township (B on plan), and it is singular that there is some kind of similarity between its deposits and those at Cream Creek, in the north west. As regards the question of developing this particular concern (Anchor) into a productive mine, much has been said and done, and I offer the following remarks with a view of elucidating the matters and in aiding towards so desirable an end. In this case it is to be regretted that the greater portion of the capital of the Company was lavishly and needlessly expended in the purchase and the erection of very costly, cumbersome, and powerful machinery for crushing and concentration purposes, and by no means perfect in the way of achieving the results aimed at.\* Some allowance would have been made had the management assured themselves as to extent, character, and possible value of their tin ore deposits; but there is no evidence to that effect, so far as I could see. The outcrops of this hard dyke have been laid under contribution, wherever the ore appeared most plentiful, which operations involved a very unsystematic method for supplying, at uncertain periods, the batteries with crushing dirt. This is proved that, in some instances, in order to get at the richer ores, the accumulated *débris* had to be moved again and again at great expense.

\* List of machinery:—One waterwheel, 60 feet diameter by 4 feet 6 inches breast, 40 heads of stampers, 4 classifiers, 8 Lewis's patent buddles, 2 slime-tables, and a number of settling-boxes, tossing-tubs, tyes, spinal buddle, &c., &c.

In order to arrive at some conclusion as to the probable future value of these ore deposits, a very careful examination was made, with the following results; viz.—

The mines, or, more aptly speaking, "faces," consist of open "cuttings" into the sides of narrow gulches, filled at the top end with heavy and large boulders of granite rocks. The tin ore is exhibited exclusively in a hard dyke of quartzose "porphyrite," unmistakably different from the coarse-grained granite enclosing the former. In this dyke occur numerous "slides" and "friction-joints," indicated by striated veins of white steatite, but there is no regularity in the direction or extent observable with these joints. It simply appears as if this porphyritic mass (irregularly impregnated with rich tin ores) formed a huge wedge-like intrusion or upheaval through the coarse and primary granite, in a direction from the east north-east, as the dip is in that direction (see Plan No. 2.) What is termed the "West Face" exhibits at its limits a greenish vein of mineral (chlorite), with an underlie of from 70 to 80 degrees to the south east, whilst the corresponding and opposite wall, not yet quite so well defined, underlies at an angle of but 53 to 60 degrees to the north west, thus indicating a close approach, if not a junction, of both walls at an inconsiderable distance from the surface. The bearings of these walls also vary, that of the western wall being north 74 degrees east, and that at the east wall (Perry's) being north 72 degrees east, making both converge in the east north-east, proving, amongst other things, that the subsequent periodical denudations have, in the gulch, removed the top or "cap" of this dyke, whereby this metalliferous formation was exposed to the prospector and discoverer. Having thus ascertained the position and the limits of this remarkable dyke, it should likewise be stated that, at the then working level at Perry's face, the two walls were 150 feet, whereas, at the surface outcrop of both walls they are over 400 feet, apart. At Perry's face the present main tunnel would command about 80 feet of backs, and less than 45 feet on the "West Face"—Robinson's workings being located on and embracing the north-western remnants of the wall at that part of this dyke. The large boulders, some of which are tin-bearing, are simply fragments forced into their present secondary position by denudation.

*The Workings.*—These have already been referred to in a general way, and they are, with the exception of the tramways and the completed portion of the main tunnel connecting with the batteries, of a primitive description, not calculated to supply the mills, &c. with a regular supply of the better class of ore, as shown all along by the low percentages obtained from large parcels crushed and manipulated upon. During my examinations in February, 1885, it came to my knowledge that a new and, as I found it to be, very promising discovery had been made immediately under Perry's "face," showing quite a change, in a dark blue schistose porphyry of a highly mineralised description, as such minerals had not before been seen in the dyke; they included molybdenites, galenites, iron pyrites, and very rich tin ores. The "joints" and "digs" of this formation were filled with soft mineral matter also charged with very good percentages of tin ore; and it is specially worthy of notice that even better ore was seen under foot for a width of over 9 feet, with indications of widening at greater depths. This new deposit—*within the dyke*—could not be wrought on an extensive scale except by means of an extension of the main tunnel and a winze sunk from the present workings to connect with the former. The new formation is well marked in its footwall, but, so far, the hanging wall had not yet been found. I came to the conclusion that the future welfare of this proprietary entirely depended upon the works suggested, viz., the extension of the main tunnel and the connection of it by means of a winze. That would give about 25 to 30 feet of "backs," which would be quite sufficient, in my opinion, to obtain direct evidence as to the value of this promising discovery, which must give a higher percentage of ore per ton, as the mining expenses are larger on account of its greater hardness to mine it to be remunerative.

On my second visit operations had been suspended at the mines, but I learned that, under a change of management meanwhile, that the ores had been procured wherever get-at-able, and that the main tunnel and the new discovery were still unconnected, thus accounting for the low average yields per ton, which were reported at about one per cent. And in this manner a mining venture which promised so well for the owners, and the stock of which reached high prices, was simply made a large loss to them through, firstly, not ascertaining the extent, character, and average value by means of systematic mining operations; and, secondly, before doing that so very necessary work, to follow the pernicious example set on the West Coast, by purchasing and erecting too powerful and extensive crushing and concentration machinery for the water available on the spot; and as regards the cleansing plant, it has been stated in the press as somewhat defective for saving a similar percentage of ore as is generally achieved by appliances of that kind, but worked upon different principles. Amongst other things, my attention was drawn to a large cutting, which cost thousands of pounds, it was stated, for a return of about ten tons of ore.

*The Blue River Company's* ground is traversed by no less than four dykes of this class, numbered 6, 5, 3, and 4 respectively on the plan. No. 6 is located near the top of Charcoal Gully, and it was traced through the occurrence of "float" specimens, exhibiting acutely angled crystalline tin ores, in a terrace of tertiary drift (older), until the northern wall of this dyke was met with, showing a little fine tin, but as the coarser tin still continues to be found, the southern or opposite wall will in every probability be found more prolific. The No. 5 dyke resembles, in a granite country, a huge bed of hard sandstone some chains in width, carrying, so far as has been ascertained, a very



moderate percentage of ore. The E. L. dyke on L. F. Downing's section observes a due north by south strike for a considerable distance; in a hollow it was proved for a width of 20 feet, decreasing to 2 feet at its southern extremity, where a gradual change takes place from a porphyritic rock into a more crystalline, in which the component parts are very strongly defined as laminated bands of felspar, quartz, and especially fine crystallized tin ores. This appears to be a very promising deposit, and the occurrence of a dyke of basalt cannot be overlooked as an additionally good indication.

As the alluvial tin deposits appear here, and in most other leases, to have had almost exclusive attention hitherto, owing chiefly to the urgent want of an inexpensive reduction plant to separate the ores from their matrices, the development of these tin-bearing lodes and dykes has not been carried on with assiduity and, perhaps, forethought,—excusable indeed in times when pure alluvial tin ores could be and were being obtained at very little trouble and expense—or else, in this instance at least, a test would have been made of the point where the E. L. Dyke and another on H. A. Downing's section (No. 4), bearing S. 41° W. are, from all appearances, likely to form a junction, which is usually favourable to the heavier deposits of ores. This latter formation is 12 feet in width on average, well charged with coarse tin ore; in crossing Velocipede Creek nearly 2 tons of impure ore were obtained in the alluvial in a short time, but it was much interspersed with quartz and porphyry; other tin-bearing veins were also met with in that vicinity associated with large flakey mica.

*The Kent Company* (2) have also traced, through means of their extensive alluvial tin deposits, the ore to at least one of the sources, which consists of a hard porphyritic dyke carrying these ores. It is about 2 chains in width, with a strike of N. 11° W., and it contains irregular streaks and nests of fine ore, so fine, indeed, as to render it very difficult to save it by any kind of concentrator extant. Some ochreous deposits in a gully likewise deserve the attention of this proprietary.

*The Cream Creek Leases.* (1 on Plan)—Messrs. Murdoch and Alexander proprietors—contains some of the richest tin ore deposits in this rich district, and on which a large amount of labour has already been expended, but so far no systematic opening of the permanent formations has been attempted, though, as an inducement, the gravels in the gullies have yielded in a very short period over two hundred tons of ore. This proprietary is suffering from a drawback, the removal of which should not be omitted now that the permanent formations have been defined and found to extend over a considerable area. The want of direct and passable pack-horse tracks or dray roads causes much delay in sending away the ores and in forwarding the supplies to the miners employed in that and the adjacent districts; it would not be very expensive to construct a main track or dray road to connect with the track already made to the Kent Company's mines, and thus establish a route with Blue Tier township and thence to George's Bay.

The formations at Cream Creek (No. 1 on Plan) consist of a large dyke (besides the lode already mentioned), different in its geological and mineralogical character from any other in this district. It has a more crystalline appearance than any other, and permits its component parts to be distinguished without much difficulty, the predominating parts being quartz,\* decomposed grey felspars, mica, and in spots and veins, tin ores, chiefly of the semi-transparent description (wood,) also, in less proportions, sulphurets of copper, iron, and carbonate of iron. In the lower cuttings, nearer the Frome River, the dyke has a bearing of N. 42° E. for a width of over 4 chains, which, however, decreases up the range, a distance of  $\frac{3}{4}$  mile, to 10 feet for a corresponding diminution at the farther extremity of its metalliferous contents; at about midway on the north-western flanks of the range some extremely rich ore was found to permeate this porphyritic dyke. It is, however, to be noticed that the whole dyke formation dips to the north-east, and it is eventually overlaid by a coarse granite (orthoclase) in a very similar manner as noticed at the Anchor mines. From the level of the huts close to the Frome river over 200 feet in height for "backs" can be obtained at the extremity of the dyke on the range, and the whole situation is very favourable for carrying on extensive mining operations, as water can likewise be brought at such a level† as to give sufficient pressure for working motors to be used in connection with crushing and cleansing machinery in future, up to any power that may be found necessary.

## 2. Dykes (soft.)

*The Masher Company* (9 on Plan) have opened a soft tin-bearing porphyritic formation bearing N. 16 degrees east, five feet in width, and dipping to the south. It is principally composed of decomposed and transmuted felspar (steatite) and quartz, the whole dyke being embedded in the usual coarse granite formation of this district: It can be the more easily distinguished from the latter on account of its deep brown colour and soft character. The dyke has been followed, carrying rich tin-stones, for a distance of several chains, but, at a depth of but 18 feet from the surface, the influx of water hindered further progress.

\* It is noticeable, that whenever these dykes become more quartziferous, the tin ore is more abundant, and occurs in coarse crystals or crystalline veins.

† Some 4 to 500 feet above the level near the huts.

*The Camp Creek* (10 on Plan) dyke observes a strike to the north-west. It is about one chain wide, and it presents the appearance of a coarse kind of sandstone in the ordinary granite. Closer examination proves it to be composed of chiefly quartz, decomposed felspar, a little mica, and, so far, a very moderate percentage of black tin ore. There appears, however, some probability of the tin ores becoming more frequent on approaching the Wellington group of lodes.

*The Haley's Dyke formation* (7 on Plan) may be considered as the most valuable of that kind in this district, on account of its general productiveness from an easily worked and friable tin-bearing rock (aplite\*), regularity of strike, and walls of the usual hard granite. This dyke has been traced, with the exception of a not quite clearly defined interruption and lateral displacement by means of the "soft formation," for a distance of about two miles. This remarkable dyke occurs in the hard country, measuring from four feet to one chain in width, and whereas the somewhat indistinct "bedding" joints of the enclosing granite are north 11 degrees east, the dyke itself strikes on the average north 4 degrees west. The enclosed tin ore, which is of a fine crystalline character, deep black in colour, more or less impregnates the whole formation, which, being very friable, permits the hewn-out rock to be at once treated in the sluice-boxes, whereby but one-eighth of the residues—harder fragments—remain as non-dissolvable by water. The dyke is marked at each wall by a kind of a soft selva or "dig," and passes gradually into the enclosing granite. The extension along its strike would alone prove its permanency to great depths, in conformity with other similar ore deposits, though it may become eventually harder, and necessitate the use of machinery for reducing same; but as the ore is already very fine, and a considerable percentage of the "slimes" is even now lost in sluicing, the introduction of self-regulating "rollers" or other appliances non-productive of slimes would appear as preferable to the ordinary stamp-heads in batteries.

The following proprietaries hold possession of portions of this Haley's Dyke; viz.—Haley's (late), Haley's Extended, Blue River, Lottah Extended.

With reference to the question of working this rich dyke to the best advantage, it is very doubtful whether the Haley's Company could have succeeded in making their venture a remunerative one, judging from the manner in which their principal workings have been laid out, and to a great extent completed. The mining operations were of so simple a character that with ordinary skill large returns of tin ore could have been produced whenever water was available—in fact, with that requirement supplied, this mine should have been amongst the dividend-paying concerns from almost the beginning. It cannot be pleaded that the extent and value of this formation was not known at the time, because the dyke crops to the surface all throughout the leaseholds, except in a gully where a thin stratum of alluvial—rich just there—covered the same; besides that, a shaft was sunk at that time 10 chains south from that gully, in excellent tin stuff, to a depth of over 20 feet, and an adit was started under the then management along its course to the south, by means of which only about 30 feet of backs would be obtained, which, in practice, is quite insufficient to recompense the owners for the outlay and to leave an adequate profit upon the transaction. It may be stated that I deem it my duty to call attention to these cases of want of foresight, skill, and practical experience, because the mining interests of this Colony have suffered so much from same as to damage the mineral resources we undoubtedly possess in quite an undeserved manner.

In order to illustrate the manner in which, in this case, from all appearances, the lack of practical knowledge led to the loss of a rich mine to those who had invested in a *bona fide* manner, the plan and section (No. 3) is added to this report, as taken from actual survey. As stated before, that adit was commenced *on the course* of Haley's Dyke, and after driving some 60 feet, for some unaccountable reason the former course (south 10 degrees east) was altered to south 12 degrees west, or direct into the hardest country in this district.

Three hundred and forty feet were thus driven, at a cost scarcely less than £4 10s. per foot, and connected with a shaft 30 feet deep, also sunk in the hard rock at similar cost per foot; after that the adit was continued for 60 feet south 20 degrees east, when in a total of 200 feet the southern shaft, sunk in the richest portion of the dyke, would have been met with. In other words, nine chains or thereabouts were left standing of this valuable dyke, and the money was spent in driving and sinking 430 feet, in the aggregate, in the hardest country, thereby and in other respects, without the slightest advantage, crippling, if not exhausting, the resources of the Company, and leading to the collapse and loss of a valuable mine possessing every advantage for economical working. Having been there in February and December last year, the product of the mine, as at present worked by *two men only*, viz., one to break out the dyke stone and wheel it to the sluice-box, and one man sluicing, averaged one bucket of pure ore per diem, or in value to about £2 13s. for their day's labour. Had the useless working in hard rock not been carried out, and the capital expended instead in the reservation of water, the Company would have derived immediate results from their property commensurate with the number of men employed in the mine and at the sluice-boxes.

\* "The term 'aplite,'—a plutonic rock, more recent, as all the rest of porphyritic dykes on this field,—is applied to a rock composed principally of quartz, a little mica, and a greenish decomposed felspar, and more or less tin ore,—black in colour."



The Haley's Extended Co., north of the last described but now defunct proprietary, as it has been sold and re-bought by some of the original owners, has proved the continuation of the dyke to the north, in which direction the Blue River Co. have in a like manner succeeded in discovering tin ore in this dyke. In the Haley's Extended leases the dyke averages one chain in width, of which the central portion, being also softer, appears to be the richest in ore.

To the south of the late Haley's Co.'s holdings the Lottah Extended Co. have likewise traced this stanniferous dyke for a considerable distance, and it assimilates geologically and mineralogically to the other portions mentioned above; one of their shafts was sunk to a depth of 60 feet, proving the dyke to be, at that depth, still as rich in ore as anywhere else on its course. Owing probably to the interference or contact with a basaltic dyke bearing south 60 degrees east, this (Haley's) dyke assumed a different appearance, becoming more quartzose in character, and a rough test gave at the rate of  $7\frac{1}{2}$  per cent. of fine tin ore to the ton.

### 3. The "Soft Formation," or the "Great Fault."

The Blue Tier Company (IV.) were the first to discover, near the head of a tributary of the Blue River, this singular formation; at that spot the actual width of it has not yet been ascertained, as between wall and wall, and the whole of it consists of a soft clayish felspathic mass, white to reddish in colour, interspersed with quartz veins stained green in places—where the tin ore chiefly occurs—by chlorites. The percentage of tin ore is very encouraging for this kind of formation, seeing that but little has been done beyond the cutting of a few trenches, some of them over 30 feet long, and small shafts 8 to 10 feet deep, to develop the same. The formation exhibits a peculiar soft ochreous outcrop, chiefly beneath the alluvial, which has been removed since, leading to its discovery, and samples tried in the pan gave up to 4 ozs. of very pure ore, and for this and other reasons it deserves more attention than what has been at present bestowed upon it. Occurring, as it does, between two hard granite walls, its singular appearance attracted early attention on account of the vivid colours exhibited, which include the deep brown (ochre), yellowish, bluish-grey, mottled white to flesh colour and green (chlorite), and the whole of which has proved to be tin-bearing for a distance of three miles and a half.

Having closely examined this formation in all its ramifications from the Wellington Company's sections to those of Thomas Haley in the east, or numbered I. II. III. IV. V. on the plan, it appears to me that the terms "vein" or "dyke" are inappropriate, and that therefore, in my opinion, it constitutes a break or "fault" (disruption) of the country rocks, causing what to us is the more important matter, the severance of a number of tin-bearing lodes and dykes of porphyry, such "break" taking place at a more recent period than those older and permanent ore deposits. The soft nature of this formation would thus be readily accounted for, as it is the product of extreme friction of the hard rocks on either side of that divisional joint, productive of immense heat, during which process the present quota of tin ores were obtained from the stanniferous lodes and dykes disrupted; the ochreous substances and the acidic water oozing from this fault at various places indicate at deeper levels the existence of deposits of sulphurets associated with tin ores. The closer connection of the Wellington lode with this soft formation has been satisfactorily proved, as their principal lodes occur within the lines of same, and others may yet be found. It cannot be doubted but that this "fault" will eventually become the means of discovering other not yet known ore deposits, and as a secondary consideration, prove the Wellington, the South and Blue River lodes on the north to belong to a parallel group of deposits, the "heave" or "throw" accounting for the difference in their present position by means of that "fault."

### 4. Dykes (Basaltic or of Anamesite).

These occur in conjunction with, but are of more recent origin than any of the tin-bearing lodes, veins, and dykes, and, in general, they resemble the dyke in the adit driven at Mount Victoria by the Crown Prince G.M. Co. and, more so, those in the Sandhurst and Castlemaine mining districts (Victoria). In the two last-named places these dykes are regarded with considerable favour by mining experts as leading to rich metalliferous and mineral deposits. As the only point of volcanic eruption in this locality is found at Mount St. Michael, the dykes will have to be attributed to that "vent" in regard to their origin. They occur at the Full Moon, Wellington Lodes, and the Haley's (Lottah Extended), and Blue River dykes of porphyry.

A peculiar feature obtains in this district,—viz., the occurrence of hard highly quartzose and coarsely micaceous bands of rocks of a crystalline character, and very easily to be distinguished from the adjacent granite. With the gradual wearing away of the softer granite these bands remained, and, in some places, marked F on the plan, they form obstructions or "bars" to the general drainage of the country, in this manner preserving on their upper sides the older pliocene stanniferous gravels intact, which, however, the more recent drainage has in most parts obliterated, and substituted the recent pleistocene gravels. In some parts of the Wyniford River (*d* on plan) the recent drainage of the country has formed new and more recent channels, leaving the pliocene gravels *in situ*.

For instance, in the creek below the Full Moon these deposits (*a a a* on plan) are very extensive,

and, so far, have not been exhausted, as the drainage is difficult on account of the bar, over 40 feet high; but the ore is well distributed through this lake-like formation, at the northern and eastern margins of which the tin becomes scarcer, and is replaced by titaniferous iron: in fact, the tin ores disappear east of the line drawn on the plan. The same features were, in a minor degree, observed at *b b*; but at *c c* these deposits were very rich, and they occupied a large area of ground only partly workable, on account of water.

With regard to these "pliocene" deposits of tin ore,—occurring as they do in a fine gravel of quartz nearly of uniform size, and the absence of any fossiliferous leaf-beds by means of which they could be classified for place geologically,—it is somewhat doubtful whether they are not of marine origin, of a formation when these parts were submerged beneath the sea.

The recent (pleistocene) deposits, as the result of the wearing away, decomposition, and subsequent denudation of the lodes and dykes described in this Report, are not only very extensive in filling all the water-courses in their vicinity, but also have enriched the principal rivers taking their rise at the Blue Tier. For instance, the following heads of rivers and their tributaries were examined, which, though consecutively worked for eight years, have yet a deal of profitable tin-wash left in them,—viz., the Ransom, Wyniford, Frome, and Weld Rivers.

What appears to be a very extensive tract of unexplored country was seen between the Lower Junction township and Weldborough (Thomas's Plains). The pliocene gravels, as disclosed in the flanks of the mountains and in the cuttings for the main road north of the Cambria leases, are overlaid by thick sheets of basalt, and, as it is a well known circumstance that several rich alluvial (tin) creeks take their rise (see plan) east, north, and west of same, there is every appearance of an extensive sub-basaltic pliocene stanniferous deposit occurring there not yet touched by the miners. It would be useful, and in the direction of opening our mineral resources, if a thorough practical and scientific exploration of that "unknown country" was undertaken by the Government, the expenses for which would, by all appearances, be soon reimbursed to them from the income derived from the miners, who would, if my premises were found correct, of which there can scarcely be any doubt,—as proved in the very similar discovery of the sub-basaltic tin "lead" from near Brothers' Home towards the Pioneer Claim, Ringarooma,—soon take up the land for energetic and extensive mining purposes.

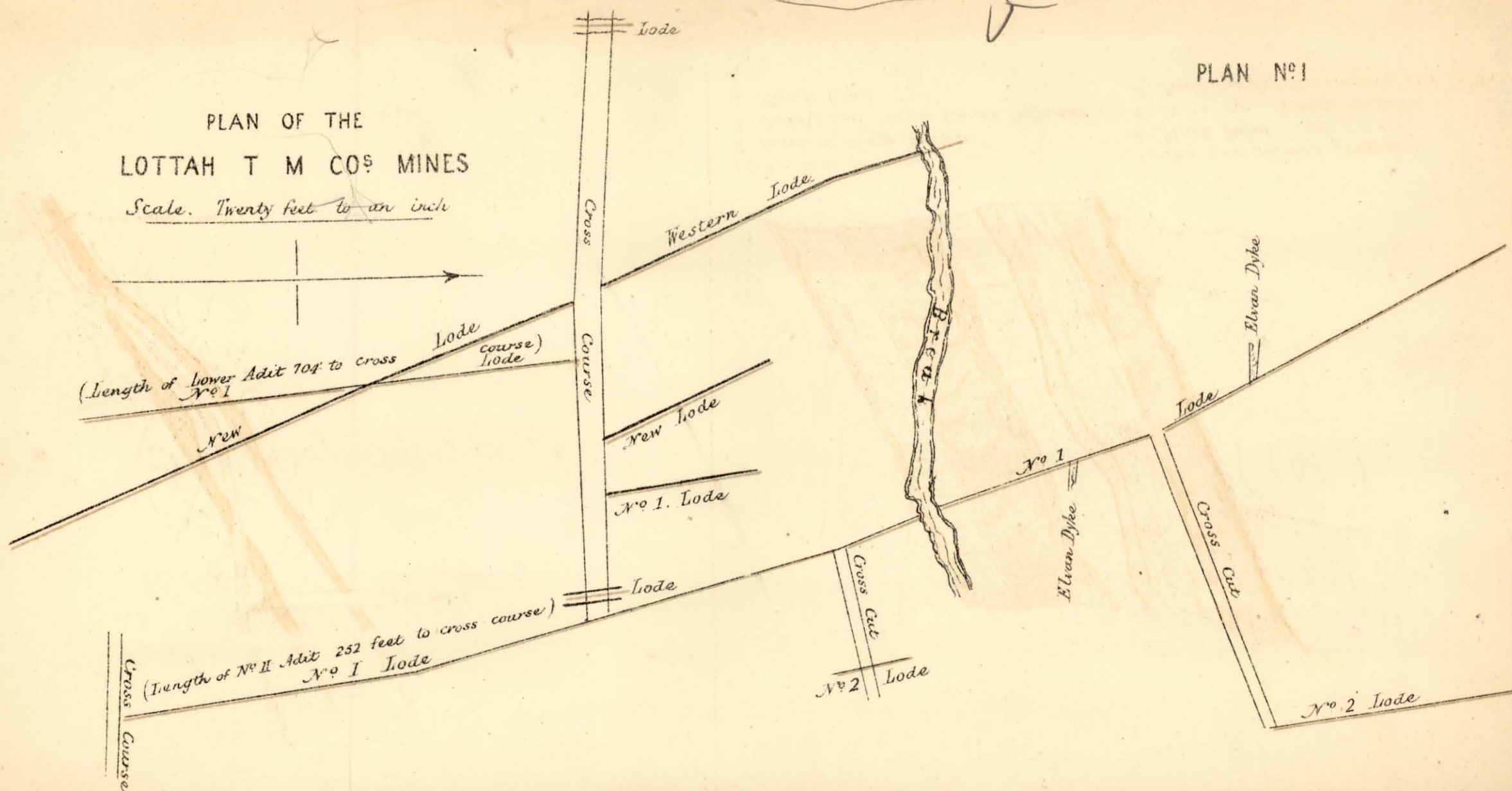
In concluding this report on the Blue Tier Mining District, and taking at the same time a comprehensive view of its many and quite undeveloped tin ore deposits, it will be consolatory to find that, although the erewhile so easily obtainable alluvial deposits have been nearly exhausted at the Blue Tier proper, there remain others of the same class not yet touched, and also others of an extent, permanency, and value which, if at once subjected to systematic mining operations, would give to this district that settled mining population which all permanent mineral and metalliferous deposits contrive to do, and thus settle the district for a long time to come. The only two drawbacks at the Blue Tier have been, and are now,—firstly, that it has suffered from the same intermittence in mining operations as the rest of Tasmania, arising from spasmodic attempts by speculators to float worthless mining ventures, and from excessive market operations, superadded to mismanagement; secondly, the want of a regular and copious supply of water; but that difficulty is gradually disappearing with the progressive exhaustion of the alluvial tin deposits; and if the present owners of mines in this district would take full advantage of the very favourable conformation of this mountainous country traversed by deep valleys, and adopt a general system of driving deep adits in such localities as nature has provided in contiguity of lodes and dykes, there is, in my opinion, ample scope for the initiation of a to-be-maturely considered scheme for unwatering those stanniferous formations to great depths at moderate expense, and then to work the same on a comprehensive system by means of several main adits. This would also reduce the present difficulty and the expenditure necessary for bringing down the cleansed ores from high altitudes, as the mouths of the adits would necessarily be situated at a much lower level.

G. THUREAU, F.G.S.



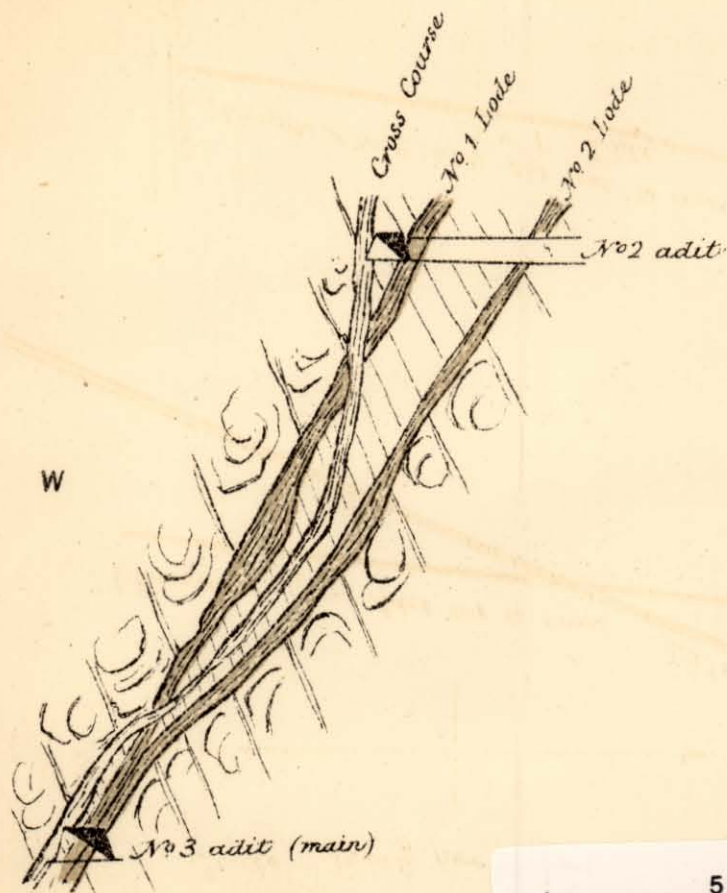
# PLAN OF THE LOTTAH T M CO'S MINES

Scale. Twenty feet to an inch

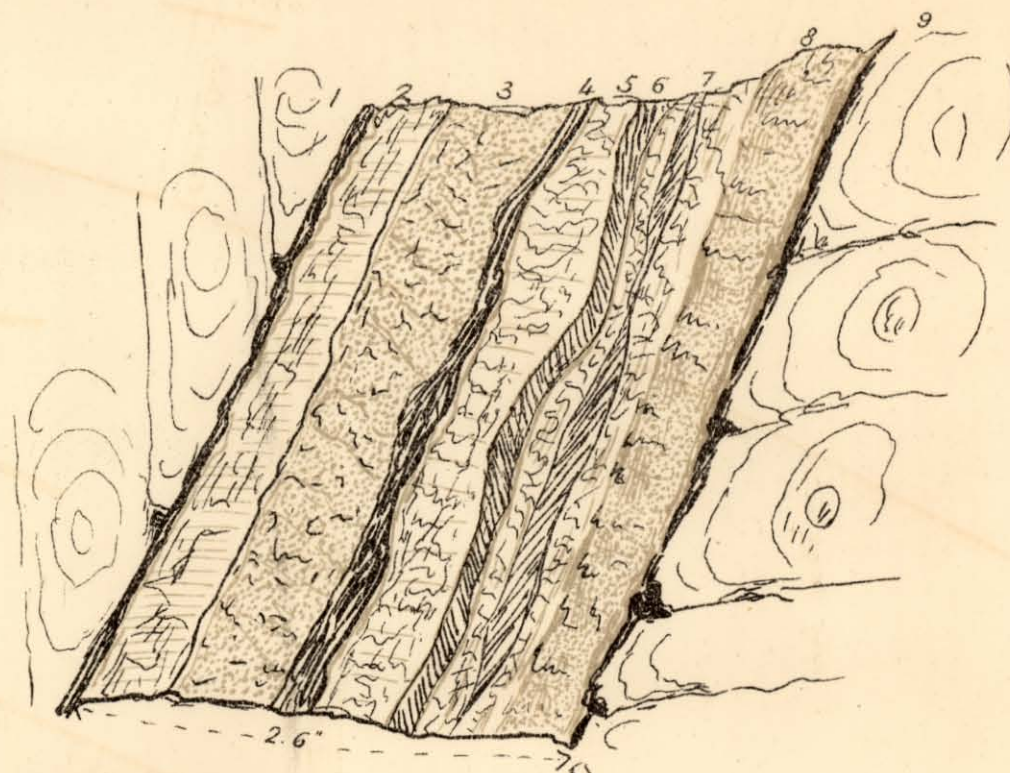


PLAN No 1

## CROSS SECTION OF LOTTAH LODES



## CROSS SECTION OF LODE AT END OF NO:2 ADIT

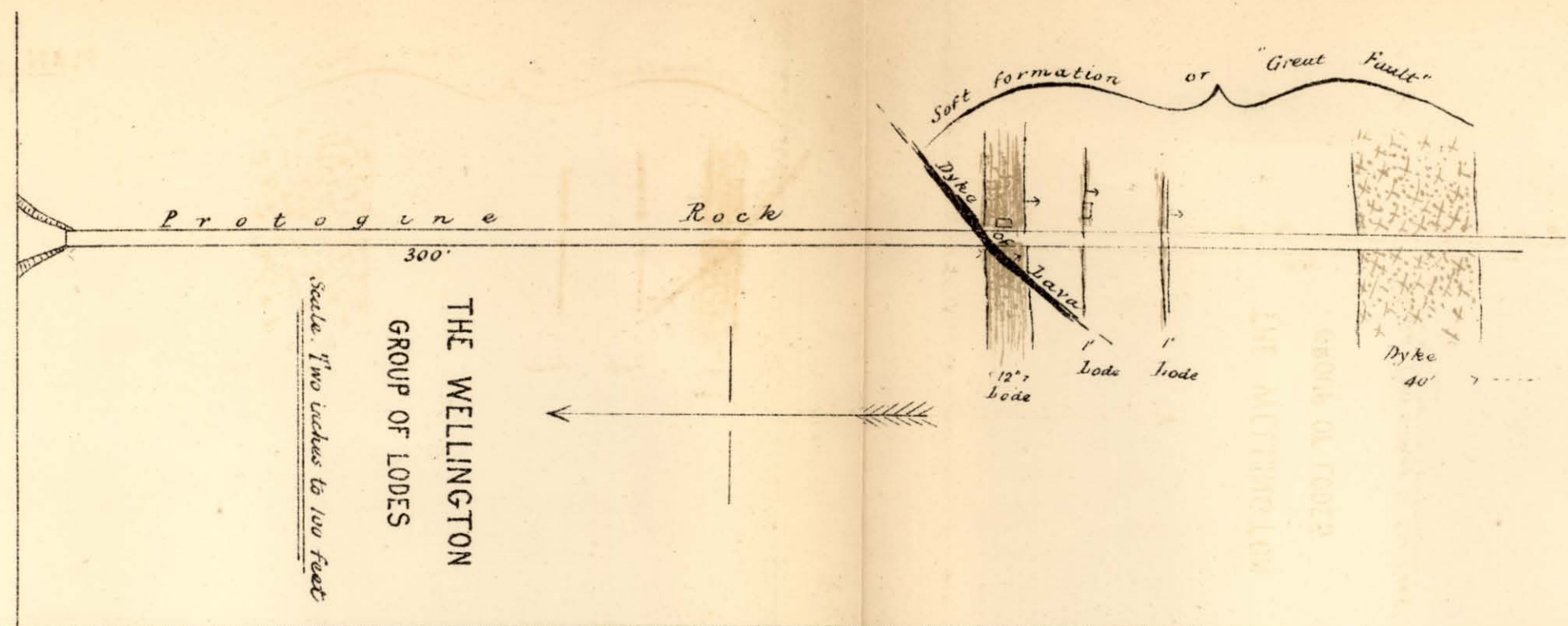


- 1 & 9. Red granite.
2. Band of black granite.
3. Quartz and large tin ore crystals.
4. Black band.

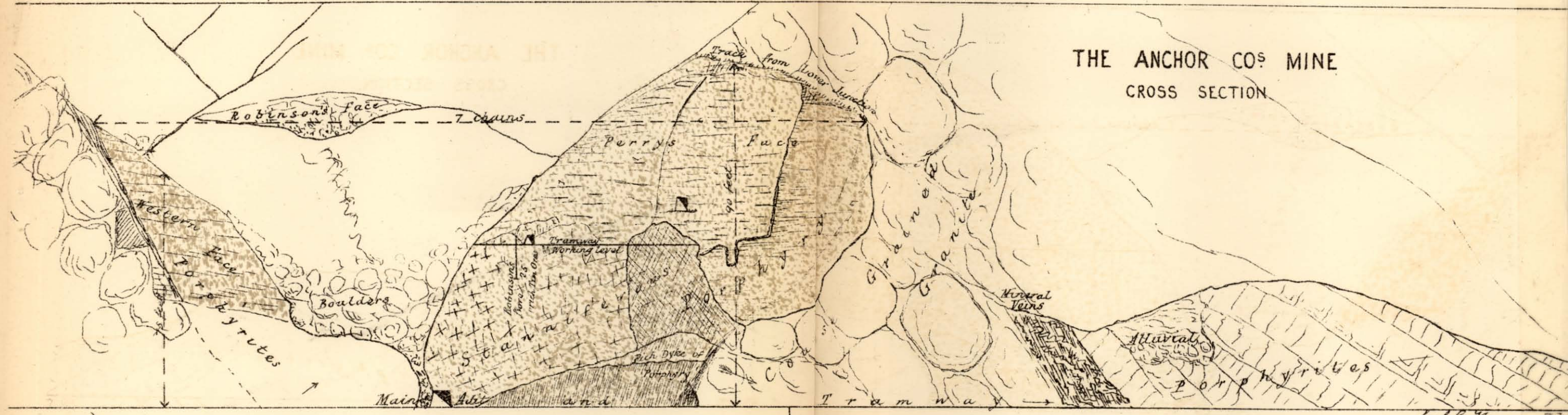
5. Grey fine grained granite.
6. Black band.
7. do. do. schists enclosed
8. Black porphyritic country rich in tin ore



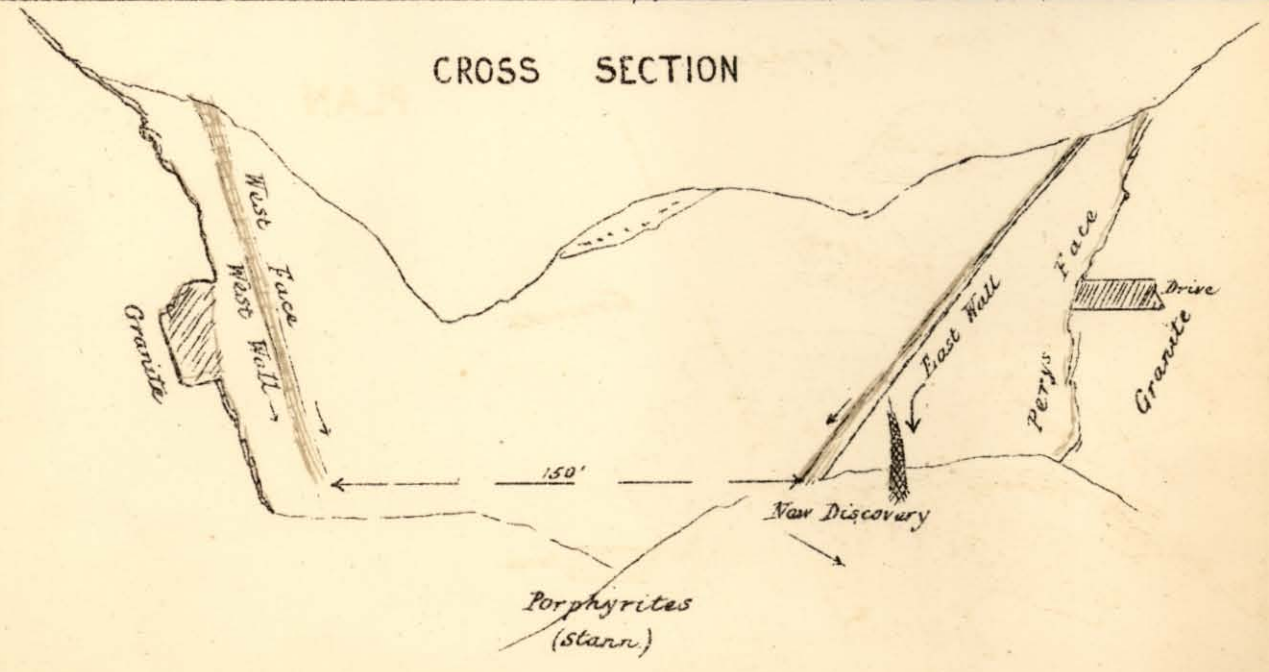
PLAN N° 2.



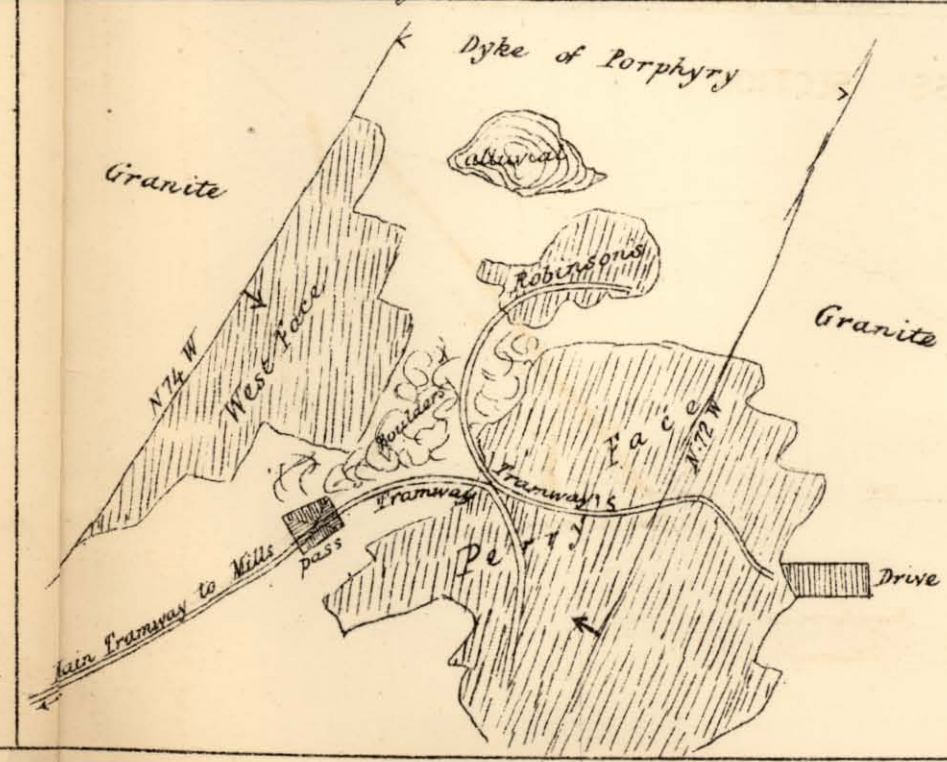
THE ANCHOR CO'S MINE  
CROSS SECTION



CROSS SECTION



PLAN



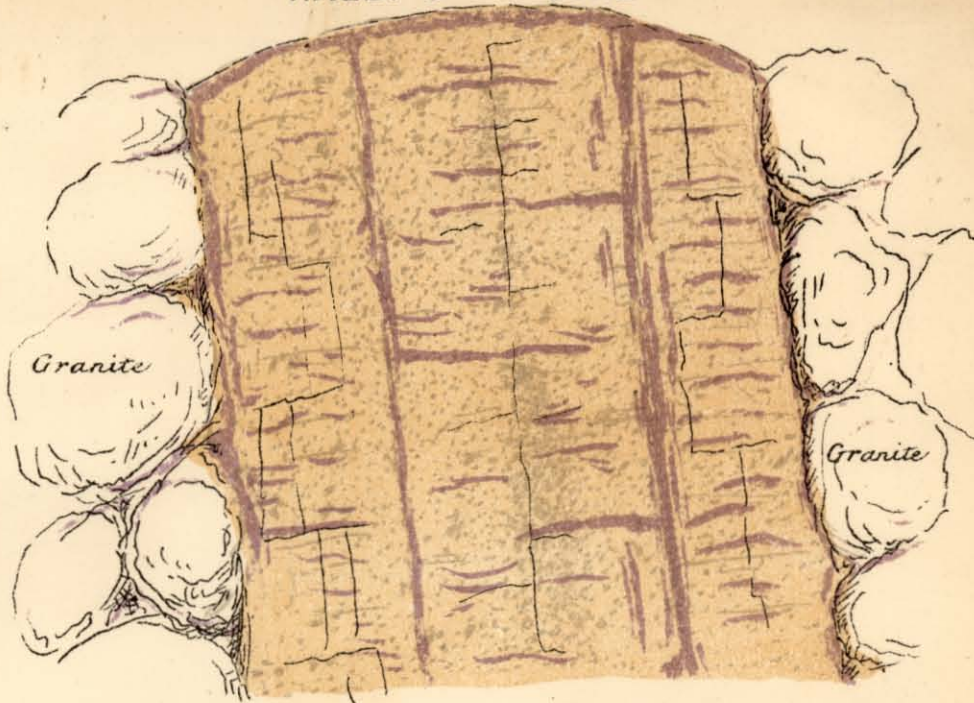


# CREAM CREEK DYKE

*Longitudinal Section*



# HALEY'S DYKE



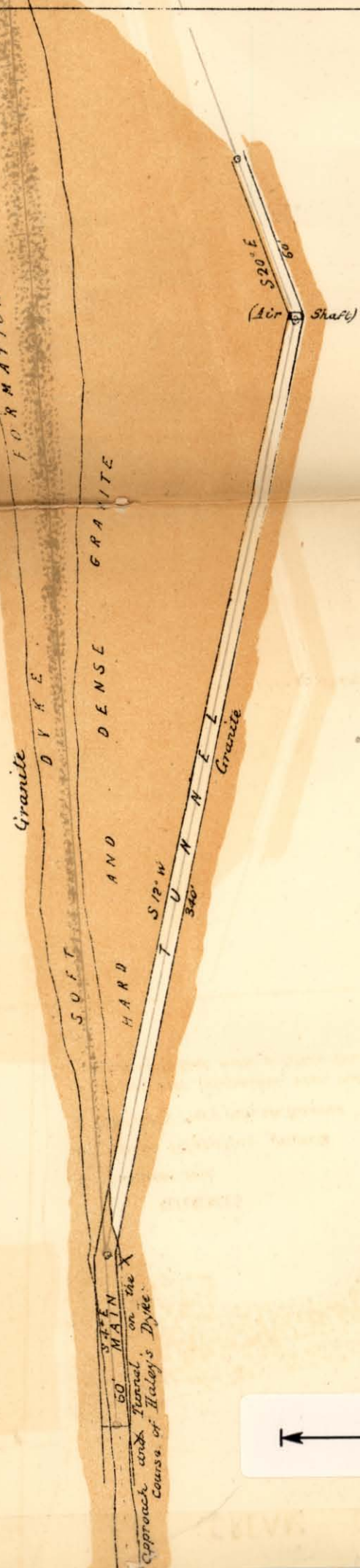
## THE HALEY'S DYKE

SURVEY PLAN AND  
LONGITUDINAL SECTION OF  
MAIN TUNNEL

*Scale. Two inches to one hundred feet*

*Leat. S. Thurman F.S.S.*

*Photo-lithographed at the Crown Lands Department Hobart*



5 cm

PLAN No 3.



66

# GEOLOGICAL SKETCH PLAN OF THE BLUE TIER MINING DISTRICT AND ITS TIN DEPOSITS.

Scale 20 Chains to an inch.

John G. Thompson F.G.S.  
Surveyed on February 1886

## REFERENCE

- GRANITE
- ADITS
- BASALTIC PLATEAU  
Overlying Stanniferous Gravels
- SHAFTS
- BASALTIC DYKES
- SURVEY STATIONS
- OLDER STANNIFEROUS GRAVELS  
(Pliocene)
- RECENT STANNIFEROUS GRAVELS  
(Pleistocene)
- PORPHYRYTES  
(Stanniferous)
- LODES OF TIN ORE
- APLITE (Stanniferous)
- LODES OF TIN ORE Imbedded  
in Granite & associated with Schists
- PORPHYRY (Proterogine)  
Dykes
- QUARTZOSE & MICACEOUS  
VEINS (very dense)
- PORPHYRITIC DYKE (APLITE)  
Blue River Co (Stanniferous)
- GREAT FAULT (Soft formation)  
Stanniferous

