

TASMANIA.

REPORT

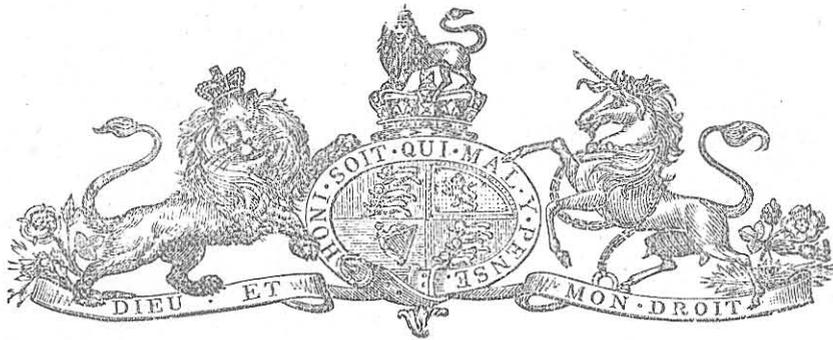
OF THE

SECRETARY FOR MINES

FOR

1896-7,

INCLUDING THE REPORTS OF THE COMMISSIONERS OF MINES,
THE INSPECTORS OF MINES, THE GOVERNMENT GEOLOGIST,
THE MOUNT CAMERON WATER-RACE BOARD, &c.



Tasmania:

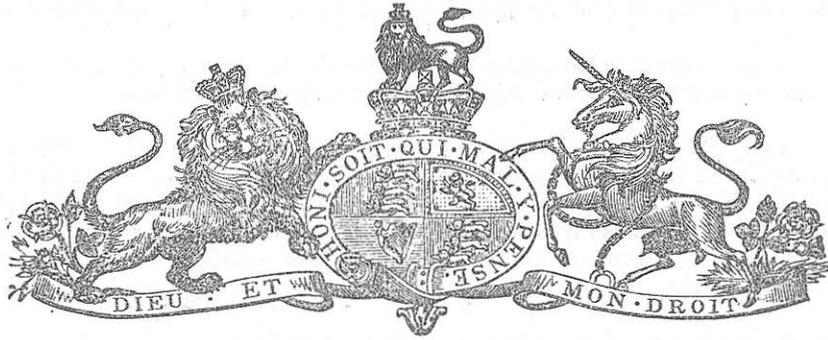
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1897.

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REPORT OF THE SECRETARY FOR MINES.

Mines Department, Hobart, 31st July, 1897.

SIR,

I HAVE the honour to submit my Report of the Mines Department for the year ending 30th June, 1897.

Appended will be found Reports from the various Commissioners of the condition of the Mining Industry in the Divisions under their charge; the Reports of the Inspectors of Mines; the Annual Report of the Government Geologist; the Annual Report of the Mount Cameron Water-race Board; and the Government Geologist's Reports—

- (1.) On the Lefroy Gold Field.
- (2.) On the Scamander Mining District.
- (3.) On the Mineral-bearing Country between Corinna and Waratah.
- (4.) On the Shepherd and Murphy's Tin Mine, Bell Mount;

with Returns of the operations of the Diamond Drills, together with Tables showing the yield of Gold, Tin, and Coal; the number of persons engaged in Mining; the number of Leases and Area of Land held under Lease for Mining purposes; the number of Mining Companies registered during the year; and the net Revenue paid into the Treasury from Mines.

The hopeful opinion which was expressed of the mining industry in last year's Report has been fully borne out by the results of the past twelve months' work. Unfortunately a revival in mining is always attended with the flotation of numerous companies for purely speculative purposes, which does much to discourage the investment of capital in legitimate mining ventures, but on the whole a more healthy tone now prevails, and a great deal of real prospecting and development work has been done during the year, with encouraging results. The most notable feature of the year's progress has been the marked success which has attended the skilful treatment of the Mt. Lyell ores, and this has caused increased attention to be paid to other large bodies of low grade ore which are known to exist in various parts.

Although there has been a slight falling-off in value in gold and tin this has been more than made up by the increased output from the West Coast District, and, for the first time in the history of the Colony, copper forms an important item in the mineral exports. The total value of metals and minerals raised during the year has exceeded £760,000, out of which dividends to the amount of £166,447 have been paid, exclusive of the first dividend of the Mt. Lyell Mining and Railway Co., amounting to £44,220, which was payable on July 1st, 1897.

Energetic work is going on at several of the mines in the immediate vicinity of Mt. Lyell.

The narrow gauge railway from Zeehan to the N. E. Dundas District has been completed to a distance of 13½ miles. It is contemplated to extend this line to the Rosebery Field. The construction of this light railway has been amply justified, and it is likely to prove of great value to the District.

The construction of this line has not yet been begun, but it is anticipated that an early start will be made. This will lead to increased prospecting, as the route runs through very promising mineral-bearing country.

During last session of Parliament a Bill was passed giving a company powers to construct a railway from Glenora to Mt. Lyell, but active operations have not yet been started.

- Zeehan.** This field is fully maintaining its reputation, and one very satisfactory feature is that preparations are being made at several of the mines for deep sinking. This is a most important step, and the ultimate permanence of the field largely depends on the results obtained.
- Dundas.** Although only two mines in this field are at present exporting ore, active exploratory and development work is going on at several others with encouraging indications.
- North-East Dundas District.** At Mount Read steady work is still going on, and some very rich ore has been obtained. Connection with the N.E. Dundas Tramway will, probably, soon be made. In the neighbourhood of Ringville, several of the Curtin-Davis group of mines have ore stacked ready for shipment as soon as connection is made with the tramway. In the Rosebery District active development work is being carried on, and the Tasmania Copper Company are making preparations for the erection of extensive reduction works.
- Corinna to Waratah.** A little prospecting is still going on in the neighbourhood of Corinna. At the Rocky River considerable activity prevails, and work has lately been resumed on a large deposit of low grade ore on the Savage River. Attention is being again directed to the Heazlewood and Whyte River fields, and a little ore is being raised. Between the Whyte River and Mount Bischoff, the Magnet Silver Mine promises, with energetic development, to become a large producer of silver-lead ore.
- Mount Bischoff.** The output of the Mount Bischoff Mine is still maintained. Up to June 30 this Company had distributed £1,465,000 among its shareholders, and still continues to pay regular monthly dividends. Very little tin has been raised in this district during the year outside the parent mine. Work has lately been resumed at the old Silver Cliff Silver Mine.
- North-West Coast.** A trial shipment of iron ore from the River Blyth has lately been made, and it is hoped that this may lead to the regular working of the extensive deposits known to exist there. A little coal is still being raised from the Mersey and Dulverton Mines. In the vicinity of Middlesex and Bell Mount prospecting is still being carried on, and a little bismuth ore has been sent away.
- Beaconsfield.** The Tasmania Mine is still the principal gold-producer in the Colony, and the yield shows no sign of falling off. During the year, £36,242 have been distributed in dividends, bringing the total amount paid to shareholders up to £652,517.
- There is a probability of some of the outside mines being thoroughly tested by the introduction of English capital.
- Attention is again being directed to the utilization of the asbestos which is known to exist in considerable quantities in the vicinity of Beaconsfield.
- Lefroy.** Very little gold has been raised from this field during the year. Two of the companies, with commendable energy, have sunk to a depth of over 1100 ft., and although payable stone has not yet been found, there is sufficient improvement to warrant the expenditure of further capital in proving the reefs of this field at a greater depth, and Mr. Montgomery's Report should act as a further incentive in this direction.
- North-Eastern District.** Considerable prospecting and development work has been done on the various gold mines in this district, with fairly satisfactory results. The output of alluvial tin ore has been rather less than usual, owing to scarcity of water and the low price of tin; but extensive deposits are still known to exist, and a slight rise in the price of the metal and more abundant supplies of water would lead to much greater activity, with largely increased output.
- Eastern District.** Scarcity of water has also affected the output of alluvial tin ore in this district. It is satisfactory to note that extensive plants are being erected to work the tin lodes of the Blue Tier on a large scale.
- Scamander.** Very little progress has been made on this field during the year.
- Mathinna.** The New Golden Gate mine is still looking well and paying regular dividends. In seven and a half years this company has paid £148,800 in dividends. A good deal of English capital has been invested on this field, and a large amount of work done, with but little success up to the present.
- Mangana.** Active prospecting work is also going on at Mangana, but so far no important discoveries have been made.
- Mount Nicholas Coalfield.** There has been a considerable increase in the output of coal from the Cornwall and Mount Nicholas Coal Mines during the past twelve months; and another discovery of good coal has recently been made about three miles from St. Mary's Railway Station. Unfortunately these mines are situated too far from the seaboard to enable them to export at a profit, and the demand is therefore limited.

The foregoing matters are here mentioned to show that the mining industry is progressing. Fuller details are given in the attached Reports of the various Commissioners.

Active prospecting has been carried on in various parts of the Colony throughout the year, but there are still large tracts of promising country which are practically inaccessible, and it is highly probable that many valuable discoveries will be made as the country is gradually opened up by tracks and rail or tramways. Prospecting.

No candidates for examination for Mine Managers' Certificates have presented themselves during the year, but one First-class Service Certificate has been issued. The warning given last year may here be repeated, that probably at no distant period every person in charge of a mine will require to be the holder of a certificate of competency, and more attention should be paid to these examinations by intending mine managers and those who are at present uncertificated. Mine Managers' Examination.

Experience has proved that certain modifications of our mining laws are advisable, and steps are being taken to remedy any defects during the present Session of Parliament. Mining Laws.

The School of Mines which was established at Zeehan a few years ago is still making steady progress, and its sphere of usefulness will continually increase, as apparatus, mineral collections, &c., are gradually acquired as funds will allow. In 1896 a grant of £100 was made by Parliament, and in 1897 this was increased to £200. Competent instructors have been secured, and classes are held in Mathematics, Elementary Applied Mechanics, Mechanical Drawing, Mine Surveying, Chemistry, Chemical Analysis, Assaying, Mineralogy, Blow-piping, Ore-dressing, Engine-driving, and Management. Arrangements have also been made for holding annual examinations under Government supervision. This institution is likely to prove of great service to the colony, and is deserving of every encouragement. Schools of Mines.

The yield of gold for the year has been 56,875 ozs., as against 63,861 ozs. for the previous year, a decrease in value of £23,341. This decrease is due to the falling off in the Lefroy yields, which this year amounted to 1785 ozs. as against 10,160 ozs. for the previous year. Beaconsfield produced 35,934 ozs., and Mathinna 16,117 ozs., as against 33,686 ozs. and 15,663 ozs. respectively for the year ending June 30, 1896. Mineral Production.

The output of silver ore for the year was 21,123 tons, valued approximately at £232,350. The figures for the previous year were 21,360 tons, valued at £213,600, so that though there has been a decrease of 237 tons, the average value per ton has considerably increased. Silver.

There has been considerable falling off in the output of tin ore for the last two quarters, but the returns for the whole year show an increase of 309 tons on last year's figures. Tin.

The output of Coal has increased by 10,400 tons. Coal.

1928 tons of Blister Copper, valued at £128,032, have been sent away. Copper.

The Colony, for departmental convenience, is divided into Districts as follows:—The Northern and Southern, comprising the country on the right and left banks of the River Tamar as far west as the River Forth, and on the east to the Scottsdale District, with such mineral country as there is in the southern portion of the Colony, and includes the gold-fields of Beaconsfield, Lefroy, and Lisle. The North-Eastern District comprises the whole of the north-eastern country, including several important tin-fields, with the gold-fields of Waterhouse, Warrentinna, and Mount Victoria. The Eastern District comprises the eastern portion of the Colony, and includes the tin-fields of Weldborough, Blue Tier, Gould's Country, Ben Lomond, and St Paul's River, the extensive coal-bearing country around Fingal and Seymour, with the gold-fields at Mathinna and Mangana. The Western and North-Western District embraces the wide area of country extending from the River Forth northwards and southwards to the sea; it includes the celebrated tin deposits at Mt. Bischoff, the River Iris, an extensive area of tin-bearing country at Heemskirk and Cox's Bight, the silver-fields at Heazlewood, Zeehan, and Dundas, the gold-fields at Mount Read, Mount Lyell, and the Linda, with other more or less important centres. Division of the Colony.

During the year the Department, and I may say the mining community of the Colony, have sustained a very severe loss in the removal, to a more lucrative post in New Zealand, of the Geological Surveyor, Mr. A. Montgomery, M.A. This officer was most capable; he was gradually acquiring a good knowledge of the geology of this Colony; he spared no pains to do justice in his descriptions of the various parts of the country he was called upon to visit and report upon; his services and his wide knowledge of the country were of great value to the mining industry; he had the fullest confidence of the Government and the Department. His successor, Mr. J. Harcourt-Smith, a graduate of Cambridge University, was selected, in March last by a Board appointed for the purpose, out of ten first-class applicants. He has had several years' experience at Frieberg, Clausthal, and elsewhere, and holds a good record for his work in this Colony. So far, Departmental Staff.

his reports give evidence of ability. The only other changes have been the appointment of two junior clerks in the Launceston and Strahan offices respectively.

It affords me great pleasure to record my thanks to the various officers of the Department for the loyal, able, and willing assistance afforded through the year.

The Report of the Board which has control of this Race is annexed.

Details of the work done with these machines are appended.

In conclusion, I have much pleasure in reporting that the progress made during the year points to the continued and increasing prosperity of the Mining Industry.

I have the honour to be,

Sir,

Your obedient Servant,

F. BELSTEAD, *Secretary for Mines.*

The Honourable the Minister of Mines.

REPORTS OF COMMISSIONERS.

Mr. Commissioner GLOVER writes:—

IN my last annual Report on the Mining Industry of the Northern Division, I had occasion to record the fact that the three dividend-paying mines at Lefroy had reached the limits of the surface productiveness, which have hitherto restricted profitable work on the reefs at Lefroy, namely, a depth of about 400 feet; and that the proprietors had adopted the wise resolve to test the mines to whatever depth might ultimately be necessary to restore them to a productive and more permanent condition. I have now the satisfaction to report that this salutary object is still being persistently carried out by two of these mines, namely, the "New Pinafore" and "Volunteer," which, up to the present, have reached to the depths of 1150 feet and 1140 feet respectively. And, although the object sought has not yet been attained, sufficient improvement of the lodes is manifest to justify and encourage the continuance of the work of deep sinking. Moreover, as this is an operation in which long periods of expensive "dead work" must necessarily be undergone, rendering the question of pecuniary means an all-important factor, it is a most fortunate circumstance that the New Pinafore proprietors are able to avail themselves of the gold contained in the vast accumulation of sand and pyrites—the battery "tailings" of the past 18 years—by extracting the gold by the cyanide process, the necessary apparatus having been duly provided. The Volunteer proprietors are also erecting similar appliances for a like purpose. There is, therefore, every reason to expect that the question of greatest importance to the mining prospects of Lefroy will, at length, be definitely settled. The other mining operations on this field, with the exception of the "Golden Point and Crown," are little better than ineffective and useless prospecting operations, by means of local capital and penny "calls," which are totally inadequate for any effectual development at Lefroy; though it is said that some four of these are about to be amalgamated for more effective work.

On the Beaconsfield Goldfield, some eight or nine months ago, much local excitement was caused by the discovery of rich alluvial deposits of coarse gold at Eaglehawk Gully, Salisbury. The locality proved to be a very narrow gully, affording room for very few persons, but much ground was marked off in the neighbourhood for leases and prospecting claims overlapping each other in every direction, and giving rise to the usual disputes and litigation. This "rush" has now been worked out as regards alluvial gold, but it has resulted in some 400 ounces being added to the Beaconsfield yield for the year, and prospecting is still proceeding in search of the lodes from which the gold had been derived.

Perhaps the most important event, in its bearing upon the effectual development of these goldfields, is the immediate prospect of the importation of English capital for the working of the claims adjoining the Tasmania mine on the south east, arrangements having been entered into by which a working capital of £40,000 is to be provided at once. The return of the documents, duly executed, which were sent to England with the transfers of leases, &c. for the purpose, is daily expected, when the English company will commence work at once. Seeing that ample English capital is the only effective means for the development of these goldfields, the importance of this

project being carried out cannot be too highly estimated. The question of the recovery of the gold hitherto lost in the sand and pyrites of battery "tailings" is now receiving practical attention at Beaconsfield, as well as at Lefroy. The Tasmania Company's chlorine works are now in full operation, the yield being about 2 ozs. to the ton, at a cost of a little over nineteen shillings an ounce; and an association has recently purchased from the Company the accumulated tailings from the upper (or Florence) battery—some 20,000 tons—and having erected the necessary appliances, are now treating the material by the cyanide process. In the neighbourhood of Beaconsfield a new direction of enterprise has recently taken place, the object of which is to utilise the asbestos which has been known to exist there for many years. The promoters of this project a short time ago obtained a prospecting area of 400 acres, but were very shortly sufficiently satisfied with the results to induce them to alter their tenure for the more permanent one of leases. The principals in this project are at present in New Zealand, but it is expected that operations of some consequence will shortly become apparent. For the past year the yield of Beaconsfield was 35,934 ounces of gold, value £132,738.

Golconda, Denison, &c. still continue to engross the attention of prospectors, some 30 persons being at present occupied there, principally engaged by associations. Ever since the discovery some 16 years ago of a quantity of rich specimens in Panama creek, the locality has from time to time become the scene of prospecting labours in the hope of finding the lode from which the specimens were derived, but without success until five months ago, when the discovery was made of a reef about two feet wide showing gold at the surface of many ounces to the ton, but decreasing as depth was attained, and prospectors are now busily engaged in exploring the neighbourhood. There are several highly promising claims at Golconda which are at present the subject of negotiations for the aid of English capital, such being the only mode of development upon which reliance can be placed.

The old alluvial goldfield of Lisle has nothing to present worth recording, though it still continues to keep about 40 men, who are principally attached to small farms, and who supplement their income by gold-digging on the old workings.

Middlesex and Bell Mount present nothing worthy of notice, being principally occupied by prospectors, as to the result of whose labours nothing has transpired.

Mr. Commissioner O'REILLY reports:—

Gold.—During the past year at Mount Victoria gold-mining operations have been principally confined to preparatory work in opening out the mines by driving, &c., and considerable progress has been made in that direction. A good deal of prospecting work has also been done, with satisfactory results. On the whole, the prospects of this field are considered very encouraging, and such as to warrant expenditure of capital in its development, confidence being expressed in its future advancement. About 40 miners are now employed in this locality.

North-Eastern
Division.

But slow progress has been made at Warrentinna since my last report. There are several known reefs on a few of the principal claims, which give promise of richness to pay handsome returns if a sufficient amount of capital were expended in sinking on them to a proper depth. It appears to me that the prospects of the place fully warrant such expenditure. All the past yields of gold from this field have been won from shallow workings, and were considered of a payable character. The Derby Gold Mining Company are driving a considerable distance to cut the reef on their claim at a low level and I trust that this company's enterprise will be fully rewarded.

It is to be regretted that at Waterhouse nothing in the way of mining has been done during the year. The known reefs in this locality have never been properly prospected to a sufficient depth, owing to the large quantity of water that flows into low-level sinkings there. The expenditure required to supply a powerful pumping plant prevents persons with a small amount of capital from undertaking mining operations at this place, but the locality appears to me worthy of the attention of those who could afford an expenditure in the direction I have indicated.

In the Mount Cameron District, the Portland Gold Mining Company are sinking on a reef which, although small, gives promise of much richness, and is considered in its present state payable. It is expected that the further working of this mine will lead to a larger body of lode being found to exist of similar character.

On the whole, I consider the prospects of the gold mining industry in this district fairly satisfactory. I have no doubt that during the coming year a considerable advancement in its condition will be observable.

Tin.—The past year has proved a very trying one to claimholders, not only through the low price of tin ruling in the market, but also through the almost unprecedented dry season since the new year, and consequent shortness in the supply of water for the mines. Up to the present time, since January last, the reservoirs or dam sites in the Mount Cameron District have remained quite

dry, a state of things not before experienced, consequently the claims dependent upon such sources of water supply have remained unworked; but, as it may be reasonably expected that the winter rains will now soon set in, an improved condition in the state of mining in that locality will begin.

In the Upper Ringarooma locality there are but few miners at work, principally about Mount Maurice and the Cascades Range, under Miners' Rights. On the old established claims at Branzholm, Derby, Moorina, and Pioneer active mining operations are continued, and on the whole the yields are considered satisfactory. A good deal of preparatory work has been done also in the way of removing the large deposit of surface matter that overlies the deposit of tin. The want of a full supply of water for hydraulic sluicing is much complained of, and it will be necessary that further efforts and enterprise should be exhibited to obtain an adequate supply by tapping new sources.

So long as the price of tin ore keeps at a low figure, I cannot look forward for any material improvement in the state of mining in this district. With a moderate advance in price a revival or return of prosperity would set in with largely increased numbers engaged in carrying on mining operations, as these are extensive areas of tin deposit of moderate richness which, at current rates for tin, would barely pay wages to mine, but with an advance in prices of ore would ensure profitable returns. It is satisfactory to observe that the tin market has an upward tendency, which it is to be hoped may continue.

Notwithstanding the drawbacks to mining in this district before referred to, it is gratifying to find that, on the whole, the yield of tin ore for the past twelve months has been satisfactory, the quantity raised being 1052 tons. The average number of men employed at mining—Europeans, 193; Chinese, 244.

Mr. Commissioner Dawson reports:—

Eastern
Division.
Alluvial Tin.

The yield of tin ore from the alluvial has been less than usual, but this may be accounted for by the want of water. It has been one of the driest years we have had for the last 19 years, thereby precluding men working under their Miners' Rights from even making half wages during the year. The same reason also applies to holders of Mineral Sections, who in great measure, like the holders of Miners' Rights, have to depend on storm waters. Now that the long drought has broken up, miners are again at work with a good supply of water. I therefore venture to think that the next quarter's returns will show an increased yield.

Lode Tin-
mining.

On my last visit to the Anchor Tin Mine I was informed by the Manager, Mr. W. H. Wesley, that they will not make a start crushing until they have their 200 head of stamps ready for work, which I fancy will not be much before the end of the year. I was very much struck with the magnitude of the work now going on at the Anchor Mine. All the machinery appears to be of the very best description, and quite up to date with all the latest improvements. The erection of this splendid mass of machinery certainly reflects the greatest credit upon all concerned.

Mr. Deedes, the Chairman of Directors of the Anchor Company, has purchased a claim called the Liberator, situated not far from the Anchor, the Manager of which is preparing to erect a 20 head battery similar in every way to the Anchor plant. The Australian Mine (late Puzzle) is now in course of re-construction under the new management, the whole of the machinery erected by the late management not being considered satisfactory.

When the three companies that I have referred to make a start, it will certainly prove whether the large masses of low grade tin stuff that abounds on their several claims will pay by being treated by improved machinery.

Gold.
Mathinna.

I have lately visited Mathinna, and have nothing very special to report as to this industry. The Golden Gate Company is still paying uniform dividends, and the mine is still looking well. The company are now erecting plant to treat the large quantity of tailings that have for years been accumulating at the mine.

The English Prospecting Association has done a large amount of work in deep sinking both north and south of the Golden Gate, but up to date has not met with any marked success. Prospecting is still actively going on in the vicinity of Mathinna by various prospectors.

Mangana.

On my last visit to Mangana, on 14th June, I found work going on actively at the New Sovereign mine which is being thoroughly prospected under Mr. J. Goodall as Manager. Other claims are being prospected, but up to date nothing has been discovered to call for any special remark.

Gold obtained from the alluvial is practically a thing of the past.

Silver.

At the Scamander prospecting is still going on but only on a limited scale. Mr. Harcourt Smith's report supplies more reliable information than I can give as to the Scamander silver sections.

The Mount Nicholas and Cornwall mines are now and have been for several months fully employed. The output of coal shows a marked increase. The coal, too, keeps up its quality, as the extra demand for it proves. Coal.

Another discovery of good coal has been made about three miles from the St. Mary's Railway Station, and is now being prospected by the proprietary. The several tests made with this coal have proved very satisfactory.

Without being over-sanguine, I am of opinion that should we get the usual winter rains mining matters in this district will show a marked improvement during the next quarter.

Mr. Commissioner HALL reports:—

During the past year mining has made steady and important advances in prosperity.

The older mines, such as the Western, Silver Queen, Oonah, Montana, and Comet, have regularly kept up their usual monthly output; but where there is most food for congratulation is in the new mines that are opening up in the vicinity of Zeehan and in the Dundas District, particularly in the latter. Western
Division,
Northern
portion.

Silver-lead.

The total amount of silver-lead ore sent from the Zeehan Railway Station during the year is 20,994 tons, value, approximately, £227,000, to which each of the following mines have contributed £15,000 or over:—Western, 4092 tons, value £56,000; Silver Queen, 5207 tons, value £50,560; Montana, 2582 tons, value £42,530; Oonah, 2050 tons, value £29,800; and Comet, 2417 tons, value £15,000. The balance of the amount exported has been produced in varying quantities by the following mines:—Silver King, Mount Zeehan (Tasmania), Silver Queen Extended, New Mount Zeehan, Tasmanian Crown, Junction, M'Kimmie, Empress, Smith's Section, Montagu, West Comet, Comstock, Bell, South-West Curtin-Davis, Western Extended, New Tasmania, and Kozminsky. Zeehan.

The greatest depth yet reached on the field is at the Western Mine, where the main shaft is down 515 feet. To that depth the lode shows strong well-defined walls, with no appearance of falling off in width, but whether or not it is ore-bearing is not yet shown. This mine, to facilitate its operations, is obtaining one of the most modern and approved air-compressor plants for driving rock-drills.

At the Montana new pumping and winding plant is being erected to enable sinking to a depth of 1000 feet. The plant will be completed in about three months, and it is the company's intention to ascertain as speedily as possible the value of their lodes at that distance below surface. This company and the Oonah are each erecting concentrators, and expect to have them in running order in about three or four months.

After being idle for a considerable time the Empress (formerly the Grubb's S. M. Co.), Oceana, and the Mariposa, have resumed work. The Oceana have erected a compact and substantial pumping and winding plant, which was built at Salisbury's Foundry, Launceston. The main workings, and also those of the Mariposa, are connected by tramway with the Strahan-Zeehan railway at Argenton.

The Comet and M'Kimmie mines are at present the only ore-exporting mines of this part of the District. The concentrators from the New Tasmania Mine at Comstock have been removed and re-erected by the Comet Company near the Maestries' Railway Station for its own use. The M'Kimmie Company has recently erected a pumping and winding plant. Dundas.

There are many sections in the vicinity of Dundas on which vigorous work is being done, and which have every indication of ultimately becoming valuable mines.

The Mt. Reid Mine employs at present only two or three men, work having temporarily almost ceased. During the year a good deal of work was done in exposing the large lode formation, and proving it for some distance down. A large amount of work has been done at the Hercules, and some very rich ore was lately obtained, assaying, in silver contents, over 3000 ozs. to the ton. Altogether about 100 men are now employed on the different Mt. Reid mines. Mount Reid.

The Rosebery District employs about 80 men. The Tasmania Copper Company's mine is being rapidly developed, and is expected to become one of the most valuable in the District. It has about 1500 tons of ore stacked, and men are engaged clearing sites for reducing works, tramways, &c. Rosebery.

The mines of the Curtin-Davis group are showing a great deal of activity, and over 150 men are employed hereabouts. The Curtin-Davis Proprietary Co. have a large quantity of ore stacked on the mine, and are sending 1000 tons to Europe for experimental purposes to test its value. Ringville.

and the best methods of treatment. This will be the first ore carried from Ringville over the N. E. Dundas tramway. The South-West Curtin-Davis Company have nearly completed an aerial tram, in two sections of a total length of 20 chains, to connect the mine workings with the North-East Dundas Tramway.

This Company has sent away a parcel of about 20 tons of ore, and has about 50 tons on hand to be exported as soon as the aerial tram is completed.

In this district several new and most promising lodes have lately been discovered, and are now being explored. There is every indication that the district will be very prosperous and valuable, and as the various mines are developed will add largely to the West Coast mineral output.

The rails on the North-East Dundas Tramway are now laid for a distance of about 13½ miles from Zeehan, and have passed the township of Ringville.

Altogether the outlook for the whole district is most encouraging. The mines I have mentioned as having exported ore during the past year will more than keep up the output in the coming year, and there are others that are nearing that stage of development that will enable them soon to become exporters. There are many which are now only in an early stage of development, but which will, when sufficiently advanced, add very largely to the mineral wealth produced in the district.

Gold. Small quantities of gold (totalling 180 oz.) have been obtained from the Ring River and vicinity. Most of the surface ground has been worked out, and there does not seem much probability of any increase in the returns for next year.

Tin. Tin has practically ceased to be a product of the district. The present low price does not allow of sufficient profit to induce search for it.

Coal. A seam of brown coal discovered over four years ago, three or four miles south of Argenton, has been receiving attention lately, and efforts are being made to form a small company to work it. It is said to be a good clean household coal, burning freely, and throwing out a good heat.

Western
Division,
Southern
portion.

Mr. Commissioner FOWELL writes:—

I HAVE the honour to submit my Report on the progress of the Mining Industry in the Southern portion of the Western Mining District for the year ending 30th June, 1897.

The Mount Lyell Company's Mine of necessity takes premier position. During the past year the system of treatment of the ore has been completed so far as to render it a marketable commodity, in the form of "Blister Copper."

Three furnaces are now in full working order, and two more will soon be completed. So much has appeared in the public print during the past twelve months about this mine and the treatment of the ore that it seems needless for me to enter into particulars, and I will confine myself to assuring you that what is written about it is not exaggerated, and that by thoroughly skilful treatment and judicious management, this mine has, and moreover, doubtless will, continue to realize all that was anticipated from it. As regards the outside mines (as they are termed), during the past year more real work has been done.

The following Companies have come directly under my notice as having done good work in endeavouring to develop their properties.

Mount Lyell Comstock (late *Tasma*).—On this section prospecting is now being carried on.

Tasman Lyell.—This lease surrounds the Comstock. Considerable prospecting has been done on it; but this, with all other leases in its vicinity, are very much handicapped for want of a roadway, or what would be better, a tramway to carry goods and machinery.

I do most respectfully recommend that during the coming Session some steps be taken to lay down a tramway from the road between Queenstown and Gormanston, crossing the Mount Lyell Haulage Line, to this and adjoining mines.

North Lyell.—This Company has systematically prospected their property, and the result is, so far, very encouraging.

The existence of a large body of ore has been proved, and of a similar nature to that of the Mount Lyell Mine. There is every prospect of this Company soon coming to the front, and rapidly developing their property.

Lyell Tharsis.—This property adjoins the North Lyell on the south, and work is being done on it.

West Lyell.—Considerable prospecting during the past year has been done, the leases are at present protected, and the Company intend resuming operations shortly.

Prince Lyell.—The holders of this lease are now in treaty with a foreign syndicate to carry on the development of their mine. Over £2000 have been spent in prospecting.

Central Mount Lyell.—During the past year this property has been tested by the diamond drill and found to contain similar deposit to that on the Mount Lyell Company's; but, unfortunately, in putting down the last bore, the drill got fast, and operations for the time being have been suspended.

South Lyell.—This Company are prospecting their ground with a considerable amount of energy by trenching, driving tunnels, and sinking, and it is to be hoped their efforts will meet with the success they richly deserve.

King Lyell.—The work on this claim has been continued steadily during the year, and a considerable amount of copper ore has been won. Prospecting is also being carried on by tunnelling, and with good results.

Lyell Pioneers.—The deposit on this property is very similar to that on the King Lyell. The Company have done a considerable amount of work, and I understand are now arranging to continue to do so on a more extended scale.

Besides the properties above-mentioned, others have shown their *bona fides* by working, notably the Linda Lyell.

The gold industry has not progressed so well, the principal reason being, I believe, want of capital to prospect at a depth, which in this District is essentially necessary.

A great assistance would be given if a sum were voted, as was done some eight or nine years ago, to assist.

The Strahan Prospecting Association, Princess, Woody Hill, Macquarie, King River Sections, and the Guilfoyle all require assistance, and if it could be given this particular branch of our mining industry would receive such a stimulant that good must result, and the amount advanced fully repaid by giving employment and encouraging enterprise.

Alluvial mining has been carried on to a limited extent, the principal reason being that the amount of labour called for by the Mount Lyell Company has induced the alluvial miners to take work instead.

From the above statement it can be clearly seen that the mining industry in the southern portion of the Western District is gradually but surely progressing; much remains yet to be done, but, from what is already known, it is evident that the Western District will in the near future prove to be one of the richest in the Australian Colonies, and will be capable of supporting a large population.

Mr. Registrar Tegg reports:—

As regards the mining industry in this division during the last twelve months, I think that on the whole there has been a slight improvement, but still, taking into consideration the large area of known mineral-bearing country in this division, mining still seems very much at a standstill. By those most concerned, this condition of things is attributed chiefly to the want of tracks and roads and to the very high cost of getting the ore away.

North-
Western
Division.

It may be taken for granted that roads and tracks are badly needed, and also that the present heavy packing and railway charges are likely to seriously affect the mines' margin between profit and loss; but still I am inclined to believe that the want of sufficient capital to develop the mines has had more to do with it than anything else, for, perhaps, with one or two exceptions, none of the mines are as yet sufficiently developed to be in a position to produce ore regularly. No doubt in the past a large amount of money has been spent on mining in this division, but it appears to have been spread over too large a surface, whereas if spent on two or three of the best properties the results perhaps would have been different.

The output of this metal is not what it was formerly; but this, I understand, is caused chiefly by the low price.

Mount Bischoff Company's Mine.—There is no falling-off here, the regular output being maintained.

Stanhope and Waratah Alluvial.—The results have been hardly payable, the low price of tin affecting both severely.

West Bischoff.—This is still idle.

Silver.

Heazlewood and Whyte River District.—At the Magnet Mine (late Godkin) they are busily employed sinking shaft and driving for bottom of winze in No. 5 level. The prospects of this mine, I understand, are improving.

The Mount Stewart and Confidence Mines are still being worked, and the Mount Stewart mine has just sent four (4) tons of ore away. At the Confidence several tons of ore have been raised, but none sent away.

Work is still being carried on at the New Silver Cliff, about two miles from Waratah, and some rich ore has been got.

But by far and away the best silver section at present in this division is the Magnet Mine (Bell's Section), about six (6) miles from Waratah. It is the best developed property, and has a large show of very rich ore, but it is worked on too small a scale—some half dozen tributors—to be of much benefit to any one. If worked on a large scale it would, no doubt, soon make a name for itself.

Gold.

Alluvial.—This is patchy and found in rich pockets, but those engaged, though the number is not nearly so large as formerly, make a fair living.

Lode.—The Rocky River G.M. Co.—This property takes a leading place. Some six months ago they started to drive on a lode. At first it was but a few inches wide, but widened to eight (8) feet with clear walls; this continued to 45 feet, when the lode pinched, but made again. A winze is now being sunk on the lode, and is down 20 feet, and the lode is 15 feet wide and much more solid, and carrying nice-looking copper pyrites. A few more feet will reach the level of the Whyte River, and below water-level a great improvement is anticipated.

Lucy Spur G.M. Co.—Here they are putting in a 200 feet tunnel to cut a lode found in the higher adit, which carried good gold and copper oxide in patches.

The Savage River G.M. Co. now have their tunnel in some 300 feet, and native copper has lately been found on this section in the drive.

The Rocky River Limited Prospecting Association have driven 50 feet on their section, the whole face of the drive being gossan, pyrites, and quartz, from which assays of silver and copper have been obtained.

Specimen Reef G.M. Co.—This Company at present are driving through blasting ground to reach a point under which a rich chute of gold was obtained in the upper levels.

Rio Tinto G.M. Co.—The whole of the work here is being confined to driving a deep-level adit to test a pyrites formation, 380 feet in width. This formation has been cut at a depth of 200 feet, and the Company are now engaged in driving across it. So far 30 feet has been driven, and one vein of highly payable ore has been cut. The prospects of this mine are encouraging.

Little or nothing is being done on the Long Plains Section.

ANNUAL REPORT OF THE CHIEF INSPECTOR OF MINES.

Mines Office, Launceston, 28th July, 1897.

SIR,

I HAVE the honour to report having taken up my duties as Chief Inspector of Mines in March last; but, owing to accumulation of office work and work as Government Geologist, I have not yet been able to visit many of the important mining centres.

Mining Accidents.

The number of accidents reported for the year ending June 30, 1897, I regret to say, shows a considerable increase on last year's figures, the total being thirty-eight, of which seven were fatal, as against twenty-three, including seven fatal, for 1895-6. Of the seven men killed, five were Europeans and two Chinese; and of those injured one was a Chinaman and the rest Europeans.

Two accidents to timber-cutters, one fatal and one serious, were not, strictly speaking, mining accidents, and of the rest several were so trivial as not to have needed reporting; but mining managers, who are only required to report accidents attended with serious injury, naturally prefer to err on the safe side.

The causes of accidents were as follows:—

Fall of Earth, &c.—Five accidents come under this heading, including two fatal ones to Chinese who were working alone in alluvial claims: one of these was due to a log rolling over on to the man from the top of the face, and the other to the earth giving way in a face which had been dangerously undermined. Of the men injured two were Europeans and one Chinaman.

Falls of Coal were responsible for serious injury to two men and the death of another. In the latter instance the accident was due to the man's own negligence in not putting in timber as ordered, and in the former case every precaution appears to have been taken.

Falls of Rock in Underground Workings.—Seven accidents. Two men were rather seriously injured by a piece of rock falling down a man-way which they were ascending; the other five accidents were very slight.

Falling Trees.—As mentioned above, one man was killed and another seriously injured through being struck by falling trees when cutting timber.

Fall from Ladder, &c.—Three rather serious and one slight accident were due to falls of various kinds.

Collapse of a Pass.—One man was killed by a pass collapsing as he was going to the assistance of his mate, who was drawing the logs at the bottom of the pass. The practice of drawing timbers from disused passes cannot be too strongly condemned; but the men were their own masters, and no blame could be attached to anyone else.

Cage Accidents.—One man was killed and another slightly injured through attempting to enter the cage while in motion. Another man received severe bruises about the head through being struck by the cage. All these accidents were due to carelessness on the part of the persons injured.

Bucket Accidents.—One man was incapacitated for work for some weeks by being jammed under the centres of a shaft while being drawn up in a bucket. Another man was killed through the bucket on which he was standing falling away when about to descend. In this case action is being taken against the mining manager for allowing the bucket to be used for raising and lowering men.

Explosives.—Two accidents arose from this cause. One man lost two fingers through a detonator exploding in his hand; another received a cut in the forehead when returning to a supposed missfire a few minutes after lighting the fuse. This accident might have been much more serious, and proceedings are being taken against the offender for a breach of Clause *g*, Sub-section II., Section 102 of "The Mining Act, 1893."

Breakage of Ropes, &c.—Three accidents, one rather serious, happened through ropes and chains giving way, but no blame was attachable to anyone.

Machinery in Motion.—Two accidents, one resulting in a broken arm and the other very slight, were due to this cause.

Runaway Truck.—A lad had his leg badly broken through the truck on which he was riding getting beyond his control and colliding with another truck on the Montana tram, Zeehan.

Various Causes.—One man had his toe crushed when assisting to shift some heavy machinery, and another received slight injuries by being jammed by a piece of timber which he was helping to land underground. A lad employed as battery feeder had his hand badly crushed while changing a shoe, through using his hand to shift the bumper instead of using the bar provided for that purpose.

In the majority of these cases the accidents were either due to carelessness on the part of the men injured, or were such as could not have been foreseen, and in only the two instances mentioned was it thought necessary to take legal proceedings.

The Mining Act, 1893.

Great laxity is still shown in many instances by mine-owners neglecting to register the names and addresses of mining managers, as required by Section 91. I have had considerable difficulty and a great deal of unnecessary correspondence in obtaining plans and sections of mine workings in accordance with Section 97. In future this will be more strictly enforced.

The General Rules under Section 102 are, on the whole, fairly well observed, but great carelessness is sometimes shown in the handling and storing of explosives, and the practice of using the bucket for men to ride up and down on is somewhat common in the smaller mines. Many managers seem to be under the impression that the bucket may be used for such purpose if safety straps are provided; whereas Sub-section xx expressly forbids it, except for the purpose of effecting repairs to the shaft and in cases of emergency. Attention has also had to be drawn to Sub-sections XL. and XLI. requiring a regular weekly record of the state of the workings, &c. to be kept, and a copy of the Act to be kept at the mine in addition to copies of the General Rules being posted up.

Inspector Harrison's Report on the West Coast District is enclosed herewith.

I have, &c.

J. HARCOURT SMITH, *Chief Inspector of Mines.*

Inspector HARRISON (stationed at Zeehan) reports:—

“In submitting my annual report to you I regret to state that the accident list is again a heavy one, being as follows:—Fatal, 2; serious, 7; not serious, 12; total, 21.

One of the fatal accidents was that of John Lee, a miner, who lost his life in endeavouring to save his mate, who got caught by a run of mullock while drawing timber out of an old pass in the Junction Mine. The other was J. Williams, who attempted to get into a cage in the Queen Extended Mine while in motion. He was badly crushed against the opening set and died in a few hours. He stated it was entirely his own fault.

By far the principal portion of the accidents are attributable to men's own carelessness.

Complaints.

A number of complaints have been received and attended to.

Safety appliances.

Cages and ropes have been submitted to the usual tests, and several of the latter condemned.

Legal proceedings.

In only one instance was it necessary to take legal proceedings. This was against an engine-driver for getting drunk and using abusive language.

Explosives.

We have now three magazines on the field; they are kept in good order. The time has now arrived when arrangements should be made for the storage of explosives at Mount Reid, Ringville, Dundas, and Gormanston.

General remarks.

Although at one or two of the Zeehan mines there has been a falling off in returns, still the output from the field has been well maintained, the amount of ore sent away from the Zeehan Railway Station for the 12 months being 20,993·25 tons, valued at £226,514. The success attending pyritic smelting at Mount Lyell has caused considerable activity to be displayed in opening up the large formations at the Rosebery, Colebrook, Curtin-Davis, and Mount Reid Districts, although I fail to see that much can be done towards the development of the Rosebery and Colebrook fields until rail accommodation is obtained. In the Lyell District the regularity with which the big mine is being worked must be very gratifying to all concerned. Some of the mining companies in the immediate vicinity are now preparing to prove the value of their properties in a systematic manner. At the South Lyell a good main shaft has been started, and machinery erected, capable of going to a considerable depth. The West Mount Lyell people have also started a main shaft. At the North Lyell the late developments are of a most encouraging nature.

In the Tyndall District there are quite a number of shows waiting to be opened up when a motive power can be obtained. Amongst them is the Harris Reward; this is a splendid prospecting show, but the water difficulty has stopped sinking to any depth. I understand the Manager has prepared estimates for bringing in water from the hills as a motive power, and is now consulting with his Directors on the matter. In all directions from Zeehan prospecting is being pushed ahead. In the Renison Bell group and the West Coast Prospecting Association good work, with fair results, is being done. At the Western and Montana mines preparations are being made for deep sinking; at the latter mine a very powerful pumping plant is in course of erection. In conclusion, I may state that everything points to this West Coast becoming an immense mining field, carrying a very heavy population.

ANNUAL REPORT OF THE GOVERNMENT GEOLOGIST.

Mines Office, Lannceston, 28th July, 1897.

SIR,

I HAVE the honour to report, that since my appointment in March last I have visited and prepared Reports on the Scamander Mining District, the Mineral District between Corinna and Waratah, and the Shepherd and Murphy's Tin Mine, Bell Mount. With this is also presented Mr. Montgomery's exhaustive Report on the Lefroy Gold Field, which has already been published.

Diamond Drills.—No work has been done with either drill since I took charge, but the following particulars as to the work done previously are taken from records in this office:—

No. 1 drill was occupied until October 27th, 1896, in boring for coal at Sandfly.

Sections of No. 2 bore, and of No. 3 bore down to 591 feet 11 inches were published in last year's Annual Report. No. 3 bore was continued to a depth of 626 feet 4 inches, the 34 feet 5 inches

not included in published section being through dark jointy sandstone, sometimes micaceous, carrying occasional veins of calcite. Boring became so bad that this had to be discontinued on 20th July, 1896, without passing completely through the measures. No. 4 bore was started on 16th September, and on October 27th boring was discontinued at a depth of 358 feet, the last 9 feet 2 inches being through greenstone. A section of No. 4 bore is appended hereto, together with table showing the work done by the drills since 1882.

The net result of the borings showed that the quantity of coal in the Sandfly Company's property is much less than was anticipated from the outcrops, and it is very doubtful whether it would pay to do any more work on this field at present.

No. 2 drill has not been in use during the year.

Both drills are in a very bad state of repair.

I have, &c.

J. HARCOURT SMITH, *B.A., Government Geologist.*

REPORT OF THE MOUNT CAMERON WATER-RACE BOARD FOR THE YEAR ENDING 30TH JUNE, 1897.

3rd July, 1897.

SIR,

WE have the honour to present the Report of this Board for the year ending the 30th June, 1897.

This Board has met as frequently as occasion required.

The staff consists of a Manager and three watermen and channel-keepers.

The duty of the Manager consists of the entire charge and supervision of the Race, which, with its branches, is thirty-three miles in length. He keeps all accounts, weighs the tin raised under the royalty system, and collects and accounts for the royalties thereon, prepares plans and specifications for all works of construction and maintenance, levels head and tail races for customers when required, and generally manages and supervises all matters connected with the safety and efficiency of the Race. His salary is £350 a year, with a cottage; he is expected to keep a horse, which is partly used for conveying tools and materials used on the works.

The duties of the watermen and channel-keepers are to distribute water to the customers, to do all work necessary night or day for the preservation of the safety of the Race, and for cleaning and keeping the same in order. Their duties are of a responsible nature, and any neglect of them would involve the Board in a loss which might entail hundreds of pounds to make good. Their pay is 8s. per day, with a cottage. The Board is of opinion that, considering the responsible nature of their work, the high cost of living, and the isolated lives of the men, these rates of pay are by no means excessive, and that any reduction would be false economy, and would not secure the watchfulness and care which is absolutely necessary.

The Race is in fair order; the flumings upon the old portion thereof, which, owing to the advanced state of decay into which they had lapsed, were the cause of a very considerable and increasing loss of water, and consequent diminution of revenue, are in process of being gradually replaced by earth channels, which work, when completed in a few months hence, will increase the revenue and add very materially to the safety of the whole work.

This work has been somewhat costly, but no doubt it has been true economy to have undertaken it, and when complete the cost of maintenance will be much lessened.

Owing to the low price ruling for tin during the whole year, the revenue, which is governed by the price of tin, has fallen considerably. This factor, coupled with the loss of water through the decayed flumings above referred to and the exceptional dryness of the season, have had the effect of reducing the per-centage of interest upon the cost of construction to 9s. 3d. per cent. for the year 1896-97 from 20s. 3d. per cent. for 1895-96. It is satisfactory, however, to note that there is no material falling-off in the quantity of tin won or in the number of miners employed.

It is also gratifying to find that the ground worked during the year maintains its average richness, and that the whole of the water brought in by the race has been used.

The Statistics for the year are as follows:—

Average per week of claims supplied	18
Greatest number supplied in any one week	22
Present number supplied	14
Total number of heads of water supplied	4766
Tons of tin ore raised	133
Average number of miners employed—18 Europeans; 43 Chinese.....	61
	£ s. d.
Total receipts for the year	850 11 6
Cost of maintenance and management	773 15 0
Paid to Public Debts Sinking Fund, 1896	156 12 5
Total cost of purchase and construction.....	33,900 4 9
Rate (for the year 1896) of interest upon the cost of purchase and construction	9s. 3d. %

F. BELSTEAD, *Chairman of the Board.*

C. O'REILLY,
SAMUEL HAWKES,
JOHN SIMPSON,
J. HARCOURT SMITH, } *Members.*

The Honourable the Minister of Mines.

DIAMOND DRILLS.

Statement of Work done to 30th June, 1897.

Year.	Locality.	Direction of Bore.	No. of Bores.	Total Distance bored.	Average cost per foot, inclusive of Labour and Fuel.
No. 1. DRILL.					
				feet.	£ s. d.
1882-3	Back Creek—For Gold	Vertical	7	1330	0 10 9
1883	Lefroy—For Gold.....	Ditto	4	1011	0 5 3
1884	Tarleton—For Coal	Ditto	1	401	0 5 6
1886	Longford—For Coal.....	Ditto	2	1585	0 4 0 $\frac{1}{2}$
1886-7	Harefield Estate—For Coal.....	Ditto	1	725	0 6 5
1887	Cardiff Claim, Mount Malcolm—For Coal	Ditto	1	562	0 17 11 $\frac{3}{4}$
1888	Killymoon Estate—For Coal	Ditto	1	504	0 4 7 $\frac{3}{4}$
1888-9	Seymour—For Coal.....	Ditto	5	2266	0 7 8 $\frac{1}{2}$
1889	Beaconsfield (Phoenix G. M. Co.)— For Gold	Ditto	1	781	2 0 2
1890					
1890	Beaconsfield (East Tasmania G. M. Co.)— For Gold	Ditto	1	978	0 14 9 $\frac{1}{2}$
1891	Spring Bay—For Coal.....	Ditto	4	937	0 6 10
1891	Ravensdale—For Coal.....	Ditto	1	114	0 11 1 $\frac{1}{2}$
1891-2	Back River, Prosser's Plains—For Coal	Ditto	2	854	0 6 1 $\frac{3}{4}$
1892-3	Lefroy (Deep Lead Syndicate)—For Gold	Ditto	4	979	0 15 9
1893	Lefroy (East Pinafore Co.)—For Gold ...	Ditto	1	317	0 10 3
1895-6	Sandfly—For Coal	Ditto	4	2130	0 11 5
TOTAL			40	15,474	
No. 2 DRILL.					
1882	Beaconsfield—For Gold.....	Horizontal, underground	1	68	No record.
1883	Mangana—For Gold	Ditto	1	546	0 15 1
1884	Guy Fawkes Gully, near Hobart—For Coal.....	Vertical	1	612	0 5 6
1885	Malahide Estate, near Fingal—For Gold	Ditto	5	1397	0 5 6
1886	Carr Villa, near Launceston—For Coal...	Ditto	1	571	0 5 4
1886-7	Waratah (Mount Bischoff Alluvial T. M. Company)—For Tin	Ditto	7	1548	0 6 1 $\frac{1}{2}$
1887	Waratah (Mount Bischoff T. M. Co.)— For Tin	Ditto	7	841	0 11 8
1887	Ditto	Horizontal, underground	1	53	0 7 8
1888	Old Beach—For Coal	Vertical	1	593	Abt. 0 10 9
1888	Campania—For Coal	Ditto	1	600	0 7 7 $\frac{1}{2}$
1888	Richmond—For Coal	Ditto	1	500	0 5 1 $\frac{3}{4}$
1889	Back Creek—For Gold	Ditto	4	787	0 8 5 $\frac{1}{2}$
1891	Macquarie Plains—For Coal	Ditto	2	989	0 4 5 $\frac{1}{2}$
1891	Jerusalem—For Coal.....	Ditto	1	344	0 4 9 $\frac{1}{2}$
1892	Langloh Park—For Coal.....	Ditto	4	1249	0 5 3 $\frac{1}{4}$
1893	Southport—For Coal	Ditto	1	612	0 5 3
1894	Zeehan (Tasmania Crown S. M. Co.)— For Silver	Horizontal, underground	2	319	1 0 2 $\frac{1}{2}$
TOTAL			41	11,629	

Aggregate number of bores 81
 Total distance bored..... 27,103 feet.

J. HARCOURT SMITH, B.A., Government Geologist.

Launceston, 27th July, 1897.

APPENDIX.

No. 1.

COMPARATIVE Statement of Gold won during the Years 1880, 1881, 1882, 1883, 1884, 1885, 1886, 1887, 1888, 1889, 1890, 1891, 1892, 1893, 1894, 1895, 1896, and the first Half-year of 1897.

YEAR.	QUANTITY.	VALUE.
	ozs. dwts.	£
1880	52,595 0	201,297
1881	56,693 0	216,901
1882	49,122 6	187,337
1883	46,577 10	176,442
1884	42,339 19	160,404
1885	41,240 19	155,309
1886	31,014 10	117,250
1887	42,609 3	158,533
1888	39,610 19	147,154
1889	32,332 13	119,703
1890	20,510 0	75,888
1891	38,789 0	145,459
1892	42,378 0	158,917
1893	37,687 0	141,326
1894	57,873 0	217,024
1895	54,964 0	206,115
1896	62,591 0	237,574
1897 for first half-year.....	26,749 0	100,308

No. 2.

RETURN showing the Quantity of Gold obtained from Quartz during the Years 1880, 1881, 1882, 1883, 1884, 1885, 1886, 1887, 1888, 1889, 1890, 1891, 1892, 1893, 1894, 1895, 1896, and the first Half-year of 1897.

YEAR.	QUANTITY.	VALUE.
		£
1880	34,345 ounces	130,622
1881	45,776 "	174,956
1882	36,215 "	137,183
1883	36,672 "	138,060
1884	30,540 "	114,630
1885	33,266 "	124,234
1886	25,004 "	87,516
1887	33,427 "	123,453
1888	34,156 "	126,139
1889	33,069 "	116,517
1890	17,829 "	64,184
1891	33,659 "	126,221
1892	34,386 "	128,947
1893	30,163 "	113,111
1894	52,239 "	195,896
1895	51,628 "	193,605
1896	59,453 "	222,948
1897 for the first half-year.....	25,540 "	95,812

No. 3.

QUANTITY and Value of Coal raised during the Years 1880, 1881, 1882, 1883, 1884, 1885, 1886, 1887, 1888, 1889, 1890, 1891, 1892, 1893, 1894, 1895, 1896, and the first Half-year of 1897.

YEAR.	QUANTITY.	VALUE.
	tons.	£
1880	12,219	10,998
1881	11,163	10,047
1882	8803	7923
1883	8872	7985
1884	7194	6475
1885	6654	5989
1886	10,391	9352
1887	27,633	24,870
1888	41,577	37,420
1889	36,700	33,030
1890	50,519	45,467
1891	43,256	38,930
1892	36,008	32,407
1893	34,693	27,754
1894	30,499	24,399
1895	32,698	26,159
1896	41,904	33,523
1897, for first half-year	20,700	16,560

No. 4.

COMPARATIVE Statement of Tin exported from Tasmania during the Years 1880, 1881, 1882, 1883, 1884, 1885, 1886, 1887, 1888, 1889, 1890, 1891, 1892, 1893, 1894, 1895, 1896, and for the first Half-year of 1897, compiled from Customs Returns only.

YEAR.	TONS.	VALUE.
		£
1880	3954	341,736
1881	4124	375,775
1882	3670	361,046
1883	4122	376,446
1884	3707	301,423
1885	4242	357,587
1886	3776	363,364
1887	3607 $\frac{1}{2}$	409,853
1888	3775 $\frac{1}{4}$	426,321
1889	3764	344,941
1890	3209 $\frac{1}{4}$	296,368
1891	3235	291,715
1892	3174	290,083
1893	3128 $\frac{1}{2}$	260,219
1894	2934	198,298
1895	2726 $\frac{3}{4}$	167,461
1896	2700	159,036
1897, first half-year	1142 $\frac{1}{2}$	70,122

No. 5.

RETURN showing the Number of Persons engaged in Mining during the Years 1880 to 1896 inclusive, and first Half-year of 1897.

YEAR.	NUMBER.	YEAR.	NUMBER.
1880	1653	1889	3141
1881	3156	1890	2868
1882	4098	1891	3219
1883	3818	1892	3295
1884	2972	1893	3403
1885	2783	1894	3433
1886	2681	1895	4062
1887	3361	1896	4350
1888	2989	1897, first half-year	4178

No. 6.

RETURN showing the Number and Area of Leases held under "The Mining Act, 1893," in force on 30th June of each year since 1892.

Nature of Lease.	In force on 30th June, 1892.		In force on 30th June, 1893.		In force on 30th June, 1894.		In force on 30th June, 1895.		In force on 30th June, 1896.		In force on 30th June, 1897.	
	NO.	AREA.										
		Acres.										
For tin, &c. at a rental of 5s. an acre.....	1857	89,962	1547	71,279	997	45,532 $\frac{3}{4}$	720	31,207	738	33,077	1150	56,493
For coal and slate, at 2s. 6d. an acre rent...	47	6874	57	8963	23	4231	37	6551	37	5946	38	6105
For gold, at a rental of 20s. an acre.....	489	4606	501	4801	374	3532 $\frac{3}{4}$	455	4366	602	5712 $\frac{1}{2}$	615	5789
Water Rights, Mineral and Gold.....	173	812 sluice-heads.	185	890 sluice-heads.	198	866 sluice-heads.	176	755 sluice-heads.	160	808 sluice-heads.	155	774 sluice-heads.

No. 7.

RETURN of the Number and Area of Leases under "The Mining Act, 1893," in force on the 1st July, 1896, issued during the Year ending 30th June, 1897, cancelled during the Year ending 30th June, 1897, and remaining in force on 30th June, 1897.

Nature of Lease.	In force on 30th June, 1896.		Issued during Year ending 30th June, 1897.		Cancelled during Year ending 30th June, 1897.		In force on 30th June, 1897.	
	NO.	AREA.	NO.	AREA.	NO.	AREA.	NO.	AREA.
		Acres.		Acres.		Acres.		Acres.
For Tin, &c., at a rental of 5s. an acre	738	33,077	619	33,025	207	9609	1150	56,493
For Coal and Slate, at 2s. 6d. an acre rent	37	5946	2	59	1	200	38	6105
For Gold, at a rental of 20s. an acre	602	5712 $\frac{1}{2}$	252	2300	239	2223	615	5789
Water Rights, Mineral and Gold ...	160	808 sluice-heads.	23	38 sluice-heads.	28	72 sluice-heads.	155	774 sluice-heads.

COMPARATIVE Statement of Net Revenue from Mines, being Rents, Fees, &c. paid to the Treasury for the Year ending 30th June.

YEAR.	AMOUNT.			YEAR.	AMOUNT.		
	£	s.	d.		£	s.	d.
1880	8944	5	11	1889	17,254	9	0
1881	20,936	5	5	1890	26,955	4	9
1882	23,077	1	9	1891	37,829	16	5
1883	15,439	14	5	1892	17,568	18	4
1884	6981	11	10	1893	16,971	9	2
1885	11,070	5	7	1894	15,323	1	9
1886	12,523	10	4	1895	20,901	13	2
1887	14,611	11	5	1896	25,631	0	3
1888	23,502	8	4				

The above Statement does not include Stamp Duties upon Transfers of Leases and Registration of Companies, or the Tax payable upon Dividends, from which sources large sums are derived.

TOTAL Number and Area of Leases in force on 30th June, 1897.

MINERALS.	NUMBER.	AREA.
		acres.
Gold	615	5789
Silver	811	43,142
Tin	264	8756
Coal.....	26	4066
Iron.....	8	455
Limestone	9	1199
Lithographic Stone	2	417
Slate	3	840
Nickel	5	292
Wolfram	2	160
Galena.....	7	435
Bismuth	1	80
Precious Stones	1	80
Copper.....	43	2369
Copper Pyrites	6	307
TOTAL	1803	68,387

AVERAGE Number of Miners employed during the Year ending 30th June, 1897.

	Europeans.	Chinese.
Northern and Southern Division	970	...
North-Eastern Division	256	244
Eastern Division.....	630	82
North-Western Division	284	...
Western Division	1837	...
	3977	326

LEFROY GOLD FIELD, TASMANIA.

REPORT ON THE GEOLOGICAL STRUCTURE AND MINING DEVELOPMENT.

By A. MONTGOMERY, M.A., M.E., late Geological Surveyor.

Auckland, N.Z., 9th March, 1897.

SIR,

I HAVE the honor to forward to you the following Report on the Lefroy Gold Field, with accompanying illustrative plans and sections, embodying the results of observations taken during my geological survey of the district carried on at intervals during 1895 and 1896. The long delay in furnishing the Report is due to my leaving the service of the Government of Tasmania in November last and going to another colony, the pressure of business consequent on the change having made it quite impossible for me to write it sooner. The fieldwork of the survey was completed in October, 1896, and this Report therefore will only be up to that date, unless a later one is specially mentioned.

The object of the survey was to collect such information relative to the goldfield as would be useful in furthering its industrial development and to report the same for public use. Owing to my leaving the service of the Government of Tasmania at somewhat short notice, I regret to have been unable to accomplish this object as thoroughly as I should have wished, not having had time to search through old reports and newspaper files for full information as to workings which have been abandoned, or to engage in the extensive correspondence necessary to elicit particulars of the past history of various ventures from many persons on whose kind assistance reliance could have been placed. It is hoped, nevertheless, that this Report will greatly facilitate the task of getting a complete account of the mining operations in the goldfield, by pointing out the matters about which information is deficient, and by locating the position of the various workings. The latter have been very fully surveyed, and are shown in more or less detail on the plans herewith.

The district has been previously reported upon officially by Mr. G. Thureau, F.G.S., late Government Mining Geologist, in two Reports, entitled "On the Mineral Resources and Permanency of the Lefroy Gold Field," of date 29th April, 1882; and "On the Future Prospects of Deep Mining of Gold-bearing Quartz Lodes at Lefroy," dated September 25th, 1883. As both of these are now scarce and almost out of print, they are freely quoted from in this report in order that the information in them may be made more readily available. An *interim* Report on the Lefroy Gold Field by the present writer was also published in 1896, but the ground traversed by it is now more fully covered in this one. My Report, dated 15th August, 1894, on the Back Creek Gold Field also contains matter useful to be borne in mind when considering the Lefroy district, the two fields being adjacent and very similar in their geological structure.

Situation.—The Lefroy Gold Field is situated near the north coast of Tasmania, about seven miles east of the estuary of the Tamar (Port Dalrymple). It is reached by good roads from the towns of Launceston and George Town, being thus very easily accessible.

Topography.—The shape of the surface of the ground is shown on the accompanying General Plan of the District, much attention having been given to mapping the topographical features as correctly as could be done in the time at my disposal. The altitudes at various points marked on the plan are from measurements with an aneroid barometer, and are only claimed as approximately correct, the readings having frequently been taken in changeable weather, when barometric levelling showed very variable results. They are useful also as showing the parts of the district actually visited during the survey, and in those portions where no levels are given the topographical features are only roughly sketched in, and are not so reliable as in the closely surveyed parts.

It will be seen from the map that the principal portion of the field lies in the head of the basin of Blanket Creek, this containing all the more notable mines. In the south-west part and also along the western edge of the field, however, some of the lodes outcrop on the fall to Slaty Creek. The extreme south portion drains into the Fourteen Mile Creek, an affluent of the River Tamar, and the south-east and eastern parts are in the basin of Back Creek. The dividing ridge between the Blanket Creek basin and those of the aforesaid neighbouring streams is generally fairly high, from 400 to 700 feet above sea level, and can readily be traced on the map; it is broken by a low saddle near the old Prince of Wales mine. From the dividing ridge the ground rapidly falls to swampy flats along the creeks mentioned, some of which are little more than 100 feet above the sea. The Lefroy Post Office is about 390 feet above sea level.

Though the district is fairly hilly, none of it is difficult country for making roads, and transport of machinery to the various mines has usually been a very simple matter. Woodcutters getting timber and firewood for the mines have made innumerable cart tracks all over the field.

The country is covered with open eucalyptus forest, with light undergrowth of tea-tree, fern, and heath, thick green bush being only found in some of the deeper and more sheltered gullies at the head of Back Creek and Slaty Creek. In the neighbourhood of the Town of Lefroy and of the principal mines the timber has been greatly thinned out, but both firewood and mining timber are still plentiful within reasonable distances.

Geology.—The main geological features of the Lefroy District and the surrounding country were shown as early as 1865 in the late Mr. Chas. Gould's map of the Den goldfield, an examination of which shows that several of the best known Tasmanian formations are represented in the vicinity. As geological changes must have exercised an influence of some sort on the auriferous character of the lodes, it will be of interest, and possibly, in some ways, of practical importance, to trace them somewhat closely.

The general "country" of the Lefroy field is slate and sandstone of most probably Lower Silurian age, but few, if any, fossils have been found which would enable the age of the formation to be definitely determined. The strata have been folded strongly by lateral crust-pressure, and now are found dipping at all angles from horizontal to vertical. Along the main ridge to the east of the field,—the same which terminates at the coast in the Fourteen-mile Bluff,—I have noticed the beds dipping vertically, but in the principal mines they lie pretty flat, the dip as a rule being from 15° to 30° . Owing to numerous small bendings I have been unable to make out if there are any main anticlinal axes traversing the field. The main ridge on the east side of the field is generally pretty hard country, with much firm black slate, hard sandstone, and occasionally bands of quartzite and hornstone (dense flinty fine-grained rock.) The high ridge on the west side of the goldfield is also composed of hard slate in great part, some of it, near the George Town road, having been quarried many years ago for paving and building purposes. The general strike of the strata is about N.W. and S.E., and it will be noticed on the topographical map that there are several well marked ridges which follow this course. The main ridges on each side, both east and west, of the goldfield also have this general trend, the harder bands of rock having resisted the erosive agencies that have cut deeply into the softer ones. It may here be pointed out that all the lodes which have been of much value lie in a central band of softer country running north-westerly between the two above-mentioned hard bands on the east and west sides of the field, and that while strong in the central area they become pinched and die out both east and west as they get into the hard flanking bands of country. To the south of the field also the favourable softer country appears to be covered by harder strata.

In my report on the Back Creek Goldfield it was noted that in the Australasian Slate Quarry and elsewhere the slates had a cleavage across the bedding planes of the strata, giving them an appearance of being nearly horizontally laminated, while in reality they had a high angle of dip; this same feature is seen in parts of the Lefroy field, especially in the range on the eastward side of it. In measuring the dip of the strata care has therefore often to be exercised that lamination due to slaty cleavage is not mistaken for the true bedding lamination.

Though I have been unable to get decided evidence of larger synclinal and anticlinal foldings of the strata, it is quite evident nevertheless that a very considerable thickness of the Lower Silurian formation is exposed at surface in this field, but the similarity of the beds throughout the whole region and the repetition of them due to faulting along the lines of lodes render it impossible to estimate at all closely what thickness the horizontal section discloses, though probably it is some thousands of feet. It is manifest therefore that enormous erosion of the Silurian strata has taken place since these were folded to their present angles of dip, and that consequently the country now at surface and containing the auriferous lodes was formerly deeply buried. Though we cannot tell at what period the lodes were formed, it is pretty certain that they were formerly much more deeply buried in the country than we now find them, prolonged erosion having removed immense masses of superincumbent rock. This is to be borne in mind in discussing the question of the apparent occurrence of the gold only in the superficial parts of the reefs.

The next formation in point of age after the Lower Silurian found in the Lefroy District is granite, a small area of which is found to the south-west of the field in the flats towards the head of Slaty Creek. It is noteworthy that in many of the best known goldfields of Australia granite is found penetrating Lower Silurian strata, giving some colour to the hypothesis that the lodes have been formed in fissures caused by plutonic fracturing of the country during the period of the outpouring of lavas of which the granites are the deep-seated representatives. From the fact that in Tasmania at Middlesex and Mt. Agnew the granite formation penetrates the Upper Silurian rocks, it is probable that we must refer its age to the end of the Upper Silurian epoch. As the granites are throughout the colony overlaid by the beds of the Permo-carboniferous system, it is plain that they are much older than these.

Touching the time of formation of the auriferous lodes, it may be mentioned that at Golconda quartz reefs containing gold traverse both Lower Silurian strata and granite, being thus plainly younger than the latter, while the common occurrence of reef quartz in the Permo-Carboniferous beds shows that lodes existed before these were laid down. We must not of course conclude that all our auriferous lodes are younger than the granite and older than Permo-Carboniferous, as they might be of very different ages in different localities, still such evidence as there is appears to point to their having been formed soon after the granite extrusions, about the close of the Upper Silurian period. In Tasmania the Permo-Carboniferous beds are generally very nearly horizontal, and show only rarely any considerable amount of induration and metamorphism, and this only when in close proximity to eruptive masses of greenstone; and they very seldom indeed carry quartz veins or anything approaching true lode matter, so it is clear that the auriferous lodes were formed before they were laid down. The lodes are therefore of very considerable antiquity, dating back to probably Devonian time or earlier. I wish to lay some stress on this, as it bears upon the question of the gold in the reefs lasting in depth.

The Permo-Carboniferous and Mesozoic Coal Measures are not seen in the Lefroy goldfield itself, but occur close by in the Tippagory Hills and at Mount George, also to the south east towards Karoola and Lilydale on the Scottsdale Railway. At one time they no doubt covered the Lefroy District as well, but have been entirely removed by denudation. The existing surface of the Silurian formation is probably not more than 1000 feet below what was the surface when the Permo-Carboniferous beds began to be deposited.

The Greenstone formation (diabase and dolerite) which succeeds the Coal Measures throughout Tasmania, is also seen at the Tippagory Hills, along the Tamar, and on the George Town Road, but does not come into the Lefroy field proper.

In Tertiary times the District has seen several important geological changes which must be referred to in order that the distribution of alluvial gold in the field may be understood. The history of the field in this period is quite similar to that of the Back Creek District described in a former Report, and evidence of corresponding movements of elevation and subsidence of the land all along the north coast of Tasmania is given in my Reports on the Beaconsfield Goldfield, the Gladstone District, Thureau's Deep Lead, the Table Cape District, and the Corinna Goldfield. In Miocene (probably) time the general level of the north of Tasmania, irrespective of the lowering of the surface by subsequent denudation, must have been some three hundred feet or more higher than at the present day. The deep valley of the South Esk, now filled—at Longford, for example—to a depth of a thousand feet with Tertiary sands and clays, was then cut out by the running streams and passed to the west of the Lefroy field at the foot of the Tippagory Hills. The old channel is traceable now as a wide belt of alluvial matter to the west of Slaty Creek, running along the flats to the east of Tippagory and crossing near Mt. Direction over to the Tamar valley. The Tertiary beds at Windermere and Dilston also belong to the filling of this old valley. The present outlet of the Tamar River through the rocky gorge of the Whirlpool Reach is of much later date of formation. At the same time that the Esk Valley was being cut out by erosion another deep gully was formed along the course of the present Blanket Creek, and yet another along Back Creek. Borings with the diamond drill have shown that these old valleys are as much as 250 feet below the present surface. At this time the Lefroy field must have consisted of high steep ridges and deep gullies. The gullies are now much filled with alluvial deposits, and the hills have doubtless been much worn away by the prolonged erosion to which they have been subjected, so we may assume that the ridges were much higher and the main gullies much deeper than those which we now see. The surface must at that time have presented a very rugged aspect. At a later period, however, a slow subsidence of the north part of Tasmania began, and the streams began gradually to fill up the valleys which they had eroded. As the subsidence went on the valleys became more and more filled up and the coast line receded inland further and further, till finally a more or less even beach covered the place formerly ridges and gullies. During this time also there were numerous outflows of basalt, which ran down into the gullies and there formed solid sheets of hard black rock. The sections obtained in the diamond drill borings at Back Creek and Blanket Creek prove that there was a succession of these basaltic flows, and that time enough elapsed between them to allow of the accumulation of considerable thicknesses of sedimentary material. The subsidence of the land and consequent burying of the old surface under masses of detritus must have gone on until the greater part of the Lefroy District was buried deep under alluvial gravels and sheets of clay and sand, for further inland in the neighbourhood of Launceston, and as far south as Campbell Town, we find that the accumulation of sediments went on until the mass was over 1000 feet in thickness, these Tertiary deposits being now found up to about 700 feet above sea level. At the time when the subsidence attained its maximum only the highest hills about Lefroy could have been uncovered by water.

At length, probably about the end of the period of volcanic disturbance to which the flows of basalt are due, the subsidence came to an end, and a slow movement of elevation of the land took its place, causing the sea to recede and exposing a dry surface once more. This appears to have gone on to within quite recent geological times, if not even now in progress, but the elevation was not so

great as the preceding subsidence, and consequently we now find the bottoms of the old river valleys of the George's River, the Ringarooma, the Deep Lead at Beaconsfield, the Tamar River, and the Lefroy and Back Creek leads, all far below sea level at their seaward outlets. As soon as the surface was again exposed to the action of running waters the great mass of loose gravels and clays became greatly cut into by watercourses, and there was an extensive sluicing off of them back into the sea again. The direction of the watercourses would naturally be on the whole seaward, but their exact position would be due to quite fortuitous circumstances of the configuration of the surface at the time, and would not be sensibly affected by the presence of older water-channels buried deep below them. Instead of these old channels determining the course of the new ones, they to some extent prevent the formation of new ones by affording a subterranean outlet for water falling on surface, and so prevent it from exercising an erosive action. This is probably one cause of the phenomenon so often seen in deep alluvial goldfields of the deepest leads lying under hills. Though on the whole the present Lefroy streams follow pretty closely the older valleys, there are several good examples of existing hills covering deep channels, the gravel hill south of the East Pinafore shaft, the boulder hill between the junction of the Back Creek and Piper Roads, and that to the west of the Monkland mine, being cases in point.

The erosion of the surface has gone on constantly since it appeared again above the sea, and the greater part of the gravel covering has been sluiced away, so that now we only find traces of its former presence in detached patches left here and there on the slopes of the hills. As these usually carry some gold, and sometimes have been payable to work, they have attracted much attention from miners, and much wonder has often been expressed at the occurrence of rounded waterworn stones on hillsides where there are no streams to account for them. As the above explanation shows, they are only small remnants of a once much more extensive formation.

It may here be useful to digress to point out a consequence of the above series of geological actions which has often led to much useless work and frustrated hopes. The gravels spread over the field were all more or less auriferous, and as they became sluiced away by natural processes the gold became concentrated in watercourses and on the bedrock where the gravel had lain. In prospecting the hillsides it has been again and again assumed that gold found in the surface soil must necessarily have come from reefs in the vicinity, when in many cases it must be only the remains of a destroyed gravel bed. In such instances it has been frequently a puzzle to the prospector that the gold is much waterworn, but when the explanation is given it is seen that this is only what might be expected. In tracing trails of surface gold to their source on slopes where there has been no space for the metal to become abraded by water action, the only indication of their having come from a reef close at hand that is worth relying on in this field is that afforded by sharp unworn edges and adhering pieces of quartz. The trail must be of "reef gold," as miners call it, not waterworn gold.

There has been a large amount of erosion of the surfaces of the Silurian rocks since they have been denuded of their alluvial covering, and in consequence of this we often find large quantities of angular quartz in the soil, and in the valleys there are very considerable deposits of this material, often but little waterworn. These more modern angular and sub-angular quartz gravels are easily distinguished by their shape from the older alluvial gravels, in which the majority of the stones are very thoroughly rounded. The beach gravels, as is natural, have the stones very thoroughly smoothed and rounded, much more so than those belonging to the "leads" which have only been worn in running streams. A comparison of the degree of attrition exhibited by a gravel deposit will often give much useful information as to whether it belongs to the old leads (river gravels), the beach gravels, or the modern little worn detritus. The two latter sorts of deposits are much less likely to carry payable gold than the old concentrated gravels of the deep leads. The angular quartz in the surface soil is very easily accounted for. The bedrock is full of "leaders" and small veins and bunches of quartz, and as the slate or sandstone matrix weathers down to form soil, these are set free in profusion. The rains keep washing away the light clay and sand, and in course of time the surface becomes covered with the residual quartz, a foot of the surface in depth representing perhaps ten feet or more of the original matrix. There is a natural process of concentration of the indestructible quartz. This also is carried in time into the watercourses, and being hard resists breaking, and at the same time abrades and breaks up softer material, the result being that we find the greater part of the gravel to be composed of quartz, even though it forms only a small percentage of the total rock from which it is derived.

While the quartz is thus preserved and concentrated on account of its hardness and resistance to chemical change, any gold that may be in the surface soil becomes likewise concentrated and preserved by reason of its great weight, its metallic nature, and its chemical indestructibility. Sinking always to the bottom of any stream into which it is carried, it is greatly protected from the wearing and pounding that the quartz gravel receives, and therefore the latter must wear away much faster in proportion than the gold does. Prolonged sluicing of the auriferous material in watercourses and streams therefore result in the concentration of the gold from a large area into a comparatively small bulk of gravel. The more thorough the concentration and the greater the bulk treated, the more likely is there to be payable gold in the streams.

These well known principles are here reiterated for the purpose of introducing the subject of the alluvial deposits of the Lefroy field from an economic point of view, and discussing the likelihood more particularly of the deep leads being payable, the consideration of this question being best undertaken at this stage while the geological history is fresh in mind.

Alluvial Gold Deposits.—Like most goldfields, the Lefroy District was first opened as an alluvial diggings, and though this branch has never been of importance compared with the reefing, a certain amount of it has been done more or less continuously, and a good deal of gold has been raised. Practically all the work has been shallow, the shafts rarely exceeding twenty feet in depth, and most of it has been round the heads of the deep leads.

Not much digging has been done on Slaty Creek or its branches. The creek running from Section 317-93G up to the old Rob Roy Mine has been worked in several places, but is poor, and a little gold has been got in some of the other branches. The large creek in Section 238-93G has also been worked with some little success. In both these instances the gold is mostly little water-worn, and the quartz gravel or "wash" is very angular, pointing clearly to both being derived from the adjacent reefs rather than from older alluvial deposits. From Section 160-93G to 182-93G there is, however, an interrupted line of heavy water-worn boulders, many of them granite and conglomerate, which is said to have yielded a very little gold, and which is clearly an old terrace or beach deposit. The same gravels are seen again on the George Town Road, close to Slaty Creek bridge. Very similar conglomerates occur near Lilydale, but whether they come from a rock in the neighbourhood or are derived, as is more probable, from old Permo-Carboniferous conglomerate deposits, I am unable to say. These boulders are unlike any of the "wash" I have seen in Lefroy, which is all quartz and sandstone, except in a small patch on Section 119-93G, which appears to be at the head of the Pinafore branch of the Blanket Creek lead. It is most probably a beach deposit, the boulders being of rock quite foreign to the locality, and being on both sides of the high divide between Slaty Creek and Blanket Creek. Possibly they were brought down from the vicinity of Mount Arthur into the old Tamar River, and thence distributed along the beaches near its mouth. They are not therefore likely to be worth working for gold, beach deposits being rarely sufficiently well concentrated for gold to be profitably extracted from them.

Blanket Creek and its branches have yielded the bulk of Lefroy's production of alluvial gold. The position of the more important workings is marked on the general plan of the District, and it is obvious that in the majority of cases the gold was got in the heads of leads running into the deep sub-basaltic channel of the Lefroy Main Lead. Beginning at the north we first find the Old Pinafore lead, worked in Sections 83-93G and 155-93G. This has been very thoroughly rooted up for about two to three chains in width, but going to the north-east the ground became deep, and finally basalt was struck, after which the lead was not followed further. At the south-west end the old gravel deposit becomes washed out, but reappeared again as a shallow patch towards the south-west of Section 156-93G; the wash in this lead contained large well-rounded boulders. From its termination south to the New Pinafore shafts a good deal of gold has been washed out of a wide flat patch of very angular quartz debris, evidently shed from the New Pinafore lode. While the Old Pinafore lead probably derived its gold from the Chums lode in great part, from portions which once stood much above the existing surface and have been completely washed away, the angular "wash" seems likely to have come from the New Pinafore reef quite as much as from the Chums' line. We have here an instance of the modern angular "wash" being gold-bearing, and lying close to an older well water-worn gravel.

The next alluvial workings worth noticing are in Section 119-93G, already referred to as carrying granite and conglomerate boulders, similar to those on the fall to Slaty Creek; some fairly coarse gold was got in these workings. Two small shafts marked on the plan to the north-west of the alluvial diggings are sunk in gravel, much of which is well rounded and of the beach type, and probably there is here a river gravel in the gutter of the lead with beach gravel overlying it. This place appears to be most probably the head of a large branch of the Blanket Creek Main Lead (Lefroy Main Lead), which has been traced up from the East Pinafore shaft into Section 847-87G. In the S.E. angle of 372-87G one of the West Pinafore shafts proved the alluvial matter to be about fifty feet deep, but the gutter was not cut. The basalt comes up close to this shaft. This branch of the main lead was also struck in a cross-cut north from the old Golden Era shaft, and has been well proved by costeening on Sections 363-87G and 974-87G. Except in the shallow workings at the head of the lead, the centre of the lead or gutter has never been seen.

On Section 746-87G there was some gold got in shallow workings at the head of a small gully which cuts the Bendigo Reef, the gold being just below the outcrop of the reef and evidently derived from it; but these diggings were quite unimportant.

Similarly on Section 245-93G there was a good deal of digging near the outcrop of Bain and Richards' reef, but in this case it is probable that most of the gold came from older gravels which have been entirely removed.

Along Sludge Creek, from Section 848-87g southwards, there has been much digging, some of the gold being derived, doubtless, from the outcrops of the Morning Star, Native Youth, and Golden Point and Crown lines of lode, but probably in the main belonging to the older river system, and therefore possibly brought down for some distance. There is a line of deep alluvial ground running up the Sludge Creek valley, but older than the present creek. It is cut by the George Town Road, and in the cuttings shows soft clays mixed with a good deal of sand, from which springs of water issue, much to the detriment of the road. At the north end the lead disappears under basalt.

A little alluvial work has been done on Section 332-93g on modern surface drift carrying a small amount of gold. In the branches of Sludge Creek running up through Section 1029-87g to the Windermere mine there has also been a little digging.

Towards the south-east corner of Section 248-93g a lead known as "Kerrigan's" runs right across the spur on which the road from Launceston comes into Lefroy, showing very plainly the difference that there must have been in the former shape of the surface and the present one. This yielded some fair returns of gold. The "wash" was well waterworn. The lead goes down into deep ground under the Recreation Reserve, and plainly belongs to the pre-basaltic system of leads. Another little branch has been worked in the south part of 178-93g.

One of the best alluvial gullies on the Lefroy field has been that known as "Poverty Gully," running from near section 1015-87g into 91-93g. From the way in which this goes down to the deep ground at Blanket Creek I am disposed to surmise that it belongs to the older system of leads, but it might quite well be a modern one. It possibly is a modern watercourse which has become the receptacle for the gold from a quantity of older gravels now removed. Such older gravels are seen close by on Section 234-93g, where there is a spur with a heavy covering of beach gravel upon it.

In the flats up Blanket Creek, above the bridge on the Piper Road, gold may be got in wash up to 16 or more feet in depth which belongs to the older river deposits. Basalt comes in on the east side of these gravels, and it appears most probable that they are on the margin of a lead which runs up the eastern side of a steep slate spur east of Section 261-93g. On this side the ground is very deep, and the gravel, of beach type mainly, runs southward to a point near the S.W. corner of Section 108-93g. Close to where it gives out there is an old shaft, said to be 70 feet deep, sunk all through gravel.

On the east side of the Blanket Creek valley I do not know of any alluvial workings worth referring to.

At the head of Back Creek there are some patches of alluvial workings all on the older gravels belonging to the Back Creek deep lead. One of these is near the east boundary of Section 232-93g, and near it the creek itself has yielded some gold, no doubt derived from the older gravels. On Section 132-93g and on the adjacent block purchased by R. L. Davidson there is a gravel hill in which shafts over 40 feet in depth have been sunk without reaching bed-rock, and some gold has been obtained. The gravel on surface is most likely of beach origin, but under it are layers of silt, clay, and sand, and the gutter, which has not yet been seen, will probably contain river gravels. This lead runs through Woodward's farm into the main Back Creek lead. From 132-93g up to the Vidette mine some alluvial workings on a small creek are probably on gravel of more recent deposition.

On Section 377-93g there is a wide deposit of somewhat shallow gravel, which has been worked a little, with very poor results, by the Lefroy Hydraulic Sluicing Association, No Liability. This gravel probably belongs for the most part to the later stages of filling of the Blanket Creek valley, and very probably much of it was laid down later than the basalt flows, so is not likely to carry much gold. In gutters in the bed-rock there is, however, a chance that there may be richer deposits.

Looking at all the alluvial deposits as a group, it is at once visible that all the important leads have gone down into the deep ground under the basalt where they could not be followed without good machinery for pumping water. It is also worth noting that gold has been found, in amount worth working, in every place where we come upon the ancient river gravels. The extent of these old gravels that we have been able to get at is, however, very small, and it is not generally recognised that for the amount of gravel available the returns of gold have been fairly good. It is clear that we have only been able to get at short pieces of several branch leads, and the inference is that there must be a great deal of gold in the main lead. This is the main sluice into which all these little leads have discharged, and which has received the material from a large extent of known auriferous country. It is possible and probable that the drainage area of the old creeks was much more extensive than that of those we now have, and that much of the country to the south of Lefroy, now covered with alluvial matter of Tertiary age, yielded gold to these old streams. The field even as we know it, however, is full of proved auriferous reefs, and an immense amount of denudation.

of these must have gone on in the early Tertiary days when the ridges were steep and the gullies deep. Conditions were then much more favourable for wearing down the rock and concentrating the gold in the main gullies than they are now. There is every reason to believe, therefore, that the main lead will contain gold enough to be worth working, and it seems to me quite a fair mining enterprise to thoroughly test the matter.

The main lead and its principal branches are covered with basalt, and their positions are marked in on the general plan of the district with approximate accuracy. The plan also shows the position and altitude of the shafts and bores which have been put down to test the deep ground. It will be convenient to note the results obtained at each of these separately, as follows :—

(i) *Rock shaft*, near south boundary of Section 692-93G.—Close to Diamond Drill bore No. 1 of the series put down in 1883. Altitude of surface 254 feet above sea level. Mr. Thureau in his Report of Sept. 29th, 1882, says of this :—“ A shaft had been sunk to a depth exceeding 100 feet through hard basalt without reaching either the wash or the bedrock.” Elsewhere in the Report the depth is given as 102 feet.

(ii) *Golden Era shaft*, 305 feet above sea level.—This is shown on the general plan on the centre of the boundary line between Sections 373-87G and 821-87G. Mr. Thureau, in the above Report, refers to the deep ground thus :—“ At the 170 feet level, in prospecting for auriferous quartz in a north-easterly direction from the shaft, the black clay (diluvial) was broken into at a distance of 340 feet of said shaft. The clay referred to varies in colour from black to brown, in which flakes of grey slates and fragments of fossilised woods (lignites) are embedded. The company continued their main drive at nearly the same level in this wash for 60 feet farther, when they again met with the rising Silurian bedrock. Several shafts were sunk below the level in this deep diluvial channel, by means of which it was ascertained that the bottom existed some 15 feet lower, or about 185 feet from the surface. The gravelly wash is yet irregular, very large rounded boulders, chiefly of quartz and sandstone, occur above and below the lignites, demonstrating very considerable fluvial action in pre-historic geological times. The pan prospects obtained from the western sides of the channel were satisfactory, as they gave coarse heavy gold of a very high quality, the other residues being chiefly composed of iron pyrites, which are prevalent in the lower stratum of the wash.” The work was carried on under great difficulties with ventilation and water, and had eventually to be suspended.

(iii) *East Pinafore shaft*, 291 feet above sea level.—This shaft was sunk to a depth of 191 feet by the Company, mostly through hard basalt, often scoriaceous, and then a diamond drill was put on to bore for the bedrock. It passed through 12' 4" of rubby basalt, 16' 2" of hard basalt, 8' 6" of brown clay, fine gravel, and decayed wood, and 8' 0" of gravelly wash, “ floating reef” (i.e., fragmentary lumps of bedrock) and wood, and struck soft slate bottom at 236' 1" from surface. The shaft was afterwards sunk deeper, and the wash was found to contain payable gold, but was dipping out of the shaft, the gutter being still deeper. Some alluvial work was then done from the shaft, and some fairly good wash was obtained, but there was much water to contend with, and the Company discontinued trying the wash, and went on with work on the Pinafore reef. The prospects of alluvial working were generally considered favourable if a shaft were put down in a better place for working the wash, and powerful pumps were provided.

Rock shaft, No. 2, 209 feet above sea level. About 5 chains N.W. of the N.W. corner of 89-93G there was a shaft put down near Blanket Creek to try to get into the deep ground. After passing through some 70 feet of soft black sandy material containing lignite, basalt was struck, and also a great deal of water, and work was abandoned. I am not at all sure that the depth quoted is correct, but otherwise the facts are fairly so.

DIAMOND DRILL BORES, 1883.

No. 1 BORE.

254 feet above sea level, near south boundary of Section 692-93G. The following Section was obtained :—

Strata.	Thickness.		Total Depth.	
	ft.	in.	ft.	in.
Surface clay, earth, &c.	8	6	8	6
Rubby basalt	12	6	21	0
Basalt	154	6	175	6
Sandy clay, brown clay, and wood	16	6	192	0
Wash	0	6	192	6
Sandy clay and floating reef	27	6	220	0
Sandstone bottom	26	0	246	0

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No. 2 BORE.

194 feet above sea level. Near N.E. corner of Section 1003-87g.

Strata.	Thickness.	Total Depth.
	ft. in.	ft. in.
Clay	3 0	3 0
Gravel and clay	9 0	12 0
Rubby basalt	10 0	22 0
Basalt	141 4	163 4
Black clay	1 8	165 0
Brown clay	2 0	167 0
White sandy clay and fine gravel	2 6	169 6
Floating reef, gravel, and sand	13 8	183 2
Brown clay and wood	2 6	185 8
Sandy clay and wood	20 4	206 0
Sandy clay.....	14 0	220 0
Slate boulder.....	0 6	220 6
Sandy clay and fine gravel	29 6	250 0
Sand and gravel	4 0	254 0
Slate bottom (not altogether certain, as no core was got)	10 0	264 0

No. 3 BORE.

211 feet above sea level. About 4 chains S.S.W. of S.W. corner of Section 88-93g.

Strata.	Thickness.	Total Depth.
	ft. in.	ft. in.
Clay	6 0	6 0
Soft rock and clay.....	14 0	20 0
Basalt.....	150 9	170 9
Black clay	3 0	173 9
Brown clay	6 6	180 3
Floating reef and fine gravel	4 0	184 3
Clay and fine gravel.....	4 0	188 3
Clay and wood	6 0	194 3
Floating reef, gravel, cement, and wood.....	6 0	200 3
Brown sandy clay	18 0	218 3
Sand, clay, floating reef, and gravel	4 0	222 3
Sandstone bedrock.....	16 0	238 3

No. 4 BORE.

197 feet about sea level. 164 links N.W. from N.E. angle of 81-93g.

Strata.	Thickness.	Total Depth.
	ft. in.	ft. in.
Clay	9 0	9 0
Rubby basalt	21 0	30 0
Basalt.....	96 6	126 6
Basaltic clay	16 0	142 6
Brown and black clay, wood, and fine gravel	1 0	143 6
Wash (gravel)	4 6	148 0
Vesicular basalt.....	3 3	151 3
Basalt, some of it vesicular	30 3	181 6
Basalt.....	14 0	195 6
Basaltic clay	0 6	196 0
Black clay	3 0	199 0
Brown clay	21 10	220 10
Sandy clay.....	1 0	221 10
Gravelly wash	3 6	225 4
Pipe clay	15 0	240 4
Sand and wood	3 0	243 4
Gravelly wash and wood	4 10	248 2
Gravel	0 6	248 8
Sandy clay, gravel, floating reef, and wood	8 0	256 8
Gravelly wash	6 10	263 6

It was not certain if this bore reached bottom. Some gold is reported to have been got in the lowest gravel.

DIAMOND DRILL BORES, 1892.

No. 1 BORE.

163 feet above sea level. About six chains S.E. of S.E. angle of Section 892-876.

Strata.	Thickness.		Total Depth.	
	ft.	in.	ft.	in.
Surface material, clay, earth, &c.	11	4	11	4
Scoriaceous vesicular basalts	24	10	36	2
Basalt, more solid.....	16	6	52	8
Vesicular basalt	36	7	89	3
Hardened brown fine sand	4	0	93	3
Hard vesicular basalt.....	11	2	104	5
Dark brown compacted fine sand	4	6	108	11
Whitish grey compacted fine sand	2	8	111	7
Soft scoriaceous basalt	6	2	117	9
Brown sandy clay.....	2	11	120	8
Grey sandy clay.....	1	0	121	8
Compacted coarse and fine sand and fine gravel with peaty markings.....	2	3	123	11
Greyish sandy clay with peaty markings	8	0	131	11
Brown compacted fine sand and mud with carbonaceous markings	12	5	144	4
Basalt, partly vesicular	28	4	172	8
Brown compacted fine sand and mud.....	2	9	175	5
Light-coloured bluish slate (bottom)	15	1	190	6

No. 2 BORE.

160 feet above sea level; 3½ chains east of No. 1 Bore.

Strata.	Thickness.		Total Depth.	
	ft.	in.	ft.	in.
Surface soil, &c.	14	0	14	0
Blue clay	1	0	15	0
Hard rubbly basalt	57	4	72	4
Hard brown clay	1	9	74	1
Rubbly basalt	2	4	76	5
Brown clay	0	10	77	3
Rubbly basalt	8	7	85	10
Blue clay	1	10	87	8
Brown sandy clay with slate and quartz pebbles and decayed wood	6	3	93	11
Grey sandy clay and decayed wood	8	7	102	6
Brown clay with carbonaceous matter	21	9	124	3
Basalt, vesicular.....	6	1"	200	0
Basalt, very hard	69	8"		
Black clay.....	1	0	201	0
Brown clay and carbonaceous matter.....	3	3	204	3
Coarse gravel, floating reef, and decayed wood.....	10	8	214	11
Brownish sand	2	6	217	5
Coarse gravel, floating reef, and wood.....	2	11	220	4
Soft sandstone, showing quartz veins.....	22	6	242	10
No gold found in the bore.				

No. 3 BORE.

164 feet above sea level. Over 3½ chains, E.S.E. of No. 2 Bore.

Strata.	Thickness.		Total Depth.	
	ft.	in.	ft.	in.
Surface soil, &c.	8	6	8	6
Hard rubbly basalt	68	0	76	6
Brown clay	2	5	78	11
Rubbly basalt	5	9	84	8
Brown clay	2	0	86	8
Brown clay, fine gravel, floating reef, and wood	6	5	93	1
Fine sandy clay and wood	6	6	99	7
Brown clay and carbonaceous matter	29	2	128	9
Basalt, vesicular.....	38	8"	209	6
Basalt, hard	41	0"		
Basalt, soft	1	1"		

No. 3 BORE.—*continued.*

Strata.	Thickness.		Total Depth.	
	ft.	in.	ft.	in.
Black clay	2	0	211	6
Brown clay	0	6	212	0
Gravelly wash, floating reef, and decayed wood.....	10	3	222	3
Brown sandy clay and wood	2	6	224	9
Coarse gravel, floating reef, and decayed wood.....	3	9	228	6
Blue sandy clay	4	10	233	4
White sandy clay	2	0	235	4
Brown sandy clay and wood	3	4	238	8
Sandstone boulder.....	5	0	243	8
Gravelly wash and floating reef.....	7	5	251	1
Soft sandstone bottom	15	5	266	6
No gold found in the bore.				

No. 4 BORE.

197 feet above sea level. About half a chain S.E. of the No. 4 bore of the 1883 series, as to which there was some doubt if the bedrock had been reached.

Strata.	Thickness.		Total Depth.	
	ft.	in.	ft.	in.
Surface clay	9	0	9	0
Basaltic boulders	9	0	18	0
Basaltic clay	6	6	24	6
Basaltic boulders	2	0	26	6
Basalt, rubbly	13'	8"	97	4
Basalt, solid.....	83'	8"		
Black clay	6	5	123	10
Brown clay, floating reef, and fine gravel	5	0	130	3
Brown sandy clay and wood	9	3	135	3
Basalt, vesicular	51	10	144	6
Black clay	1	6	196	4
Brown sandy clay and wood	22	8	197	10
Gravelly wash, wood, and pyrites	5	7	220	6
Whitish sandy clay, fine gravel, and floating reef.....	5	2	226	1
Bluish clay, fine gravel, and floating reef.....	1	11	231	3
Whitish clay	4	0	233	2
Brown clay and wood	1	0	237	2
Sand and wood.....	1	0	238	2
Gravelly wash with much pyrites	2	6	240	8
Bluish clay, fine gravel, and sandstone boulders	8	4	249	0
Gravelly wash.....	2	6	251	6
Gravelly wash, with large sandstone boulders	11'	2"	18	6
Soft sandstone bottom	7'	4"		
Soft sandstone bottom	9	0	270	0
No gold found in the bore.				

The above quoted evidences prove conclusively that under the flat ground along Sludge and Blanket Creeks there is a deep buried valley, which we may call the Lefroy main lead. Its position is best indicated on surface by the basalt, which formerly ran in a liquid state over the lowest ground. A glance at the positions of the above bores on the plan shows that they were all to the west of the centre of the basaltic area, and the three most northerly bores getting successively deeper going eastward prove that the deepest channel has not yet been located, but is probably still further east. Several more bores should be put down in a straight line across the basaltic area, in order to find the position of the gutter, and also to show how near to it it would be possible to get a shaft in solid ground. It would be useless to sink a shaft right on the gutter, as the subsidence of the loose material round it on withdrawal of the water by pumping and when extraction of wash began would destroy the shafts. The best practice in such cases is to sink the shaft in the bedrock to one side of the lead and drive thence in solid country under the gutter, but, owing to the width of the alluvial ground in the Lefroy lead, this course would necessitate a long crosscut, which would make trucking the dirt expensive. By taking advantage of the presence of strong layers of basalt in the lead, shafts could be pretty safely sunk to strike the bedrock where the edge of the lowest basalt layer rests upon it, all the upper portion of the shaft being thus in ground resting on the sheets of basalt, and so not likely to be affected by working out the wash. In this way the working shafts could be got fairly near to the gutter. It would probably, however, be advisable to

have them made round, and lined with cast-iron tubing, to best resist the pressure of the sedimentary layers between the basalt sheets, and to dam back the water in these as much as possible.

There will be, without doubt, a good deal of water to contend with in working this lead, especially at first. The gutter lies a long way below sea level, and must form an underground reservoir of water, which must be pumped out. The catchment area of the lead is not, however, large, and when the accumulated water is mastered there should be no trouble in keeping down the ordinary influx. It does not appear to me to be a mining venture of any extreme difficulty to open this lead, but it would certainly require a heavy initial expense. A company undertaking it would do well to have a working capital of not less than £50,000.

Before sinking a shaft further boring with diamond drills is a necessity, to prove the depth of the gutter. They should not be relied upon to prove the value of the wash, the core being too small to give any information worth having on this point. The gold is so irregularly distributed in an alluvial deposit, and is as a rule so closely confined to the bottom layer, that the chances are greatly against the small piece brought up by the drill being a fair representative sample of the whole. This was well shown by the bore in the East Pinafore shaft: the cores brought up by the drill were thoroughly washed but gave no gold, yet when the shaft itself was sunk to the bedrock gold was found all over the bottom. The drill should therefore be relied on only to ascertain the depth of the ground and the thickness and general characters of the layers of wash; if the latter are satisfactory the presence or absence of gold in the core is a matter of little consequence. The evidence as to the gold-bearing character of the lead rests on a far wider basis. Wherever we have found the heads of branches running into the main lead there has been gold in them, often fairly large nuggets, and it stands to reason and experience that the main channel should be much richer than the branches. It is seen from the plan that the lead runs right across the numerous auriferous reefs of the district, and for ages these must have been yielding their gold to it. It would be hard indeed to find a lead more certain to contain a great deal of gold, and I have much confidence that it will yet be profitably worked. It may well prove to Tasmania what the Ballarat lead has been to Victoria, and every encouragement should be offered to induce a powerful company to undertake the enterprise of opening it up. Success in this would mean the establishment of a large alluvial mining industry not only at Lefroy, but also on the deep leads at Back Creek and Beaconsfield, and possibly also on the Piper River, which would then be sure to receive attention.

The likeliest place for a good deposit of gold in the Lefroy main lead is at and below the junctions of the three main branches, which we may call the East Pinafore lead, the Sludge Creek lead, and the Blanket Creek lead. The junction of the Old Pinafore lead with the main one would also be worth looking for. The main pumping station should be as far as practicable down the lead so as to unwater the greatest possible length of it.

Auriferous Reefs or Lodes.—The positions of all the principal lines of lode yet discovered are shown on the plan of the District. It will be seen that the general strike is more or less east and west. The central parts appear to be nearly east and west in strike, but the ends show a tendency to bear off to the south of west and north of east, giving a general strike approaching E.N.E. and W.S.W. The lodes are also strongest in the central parts, and appear to die out and split into narrow veins as they get into the belts of harder country which, as previously remarked, form the flanks of the productive portion of the field. This zone runs north-westerly, concordantly with the strike of the Silurian formation, and the reefs to the north of the field extend further west in consequence, while those in the southern parts run furthest east, the lodes being *en échelon*.

Very few cross-lodes of any consequence have been discovered, the principal one being that worked by the Golden Point and Crown Company on Section 160-83, which runs north-easterly. There are, however, in various parts of the field a number of lodes running north-westerly, agreeing in strike with the Silurian strata, but I am not aware that any of these has been clearly proved goldbearing, and certainly none of them have yet been mined upon seriously. They usually present outcrops of slaty gossan mixed with vitreous-looking quartz, and do not seem to have any connection with the auriferous series of lodes. They are also found in the Back Creek goldfield. They have not been considered worth surveying and marking on the plan.

The auriferous lodes are in lines of faulting of the country, the wall-rocks being usually distinctly different on each side of the lode-channel, though it has not been hitherto possible to measure the extent of the vertical displacement of the strata. The bending down of the lines of reef to the southward in the centres is doubtless due to the faulting movement being there greatest. It seems certain that faulting movements of the country along the lode fissures have gone on for a long time, and at widely separated intervals of time, resulting in repeated reopening of the fissures and consequent formation of wide channels of squeezed and broken material along them. From time to time quartz has been found in the fissures, sometimes auriferous, sometimes not, and the movements of the walls have frequently broken this after it has been deposited. It seems probable that the gold-bearing quartz was among the first deposited, for we sometimes find pieces of it

attached to the walls and with valueless quartz upon it, separated by a mere joint, the face of this being frequently a slickenside. Some curious results of the movement of the walls after the deposition of the gold have been noticed. For example, in the Waverley mine a flat, loose, bent flake of auriferous quartz was found lying almost at right angles to another flake attached to the lode-wall, the first one being most probably carried down from its original position higher up. In the same mine the writer has seen stones of quartz with a streak of gold on the surface, caused by an auriferous specimen being crushed over it. Slickensided quartz in the Volunteer mine has more than once been found, with polished gold showing in the smooth face, and occasionally with a streak of gold below the imbedded grains, due to portion of these being rubbed off by the moving wall. In this mine also, in driving through a portion of the lode-channel filled with broken country and mullock, pieces of auriferous quartz have been found, angular in the main, but with more than one surface polished and striated, evidently a portion of the auriferous reef torn from its original position. Slickensides are very common in the Lefroy reefs, some of them very highly polished and of great extent. In the upper levels of the Volunteer mine the hanging-wall of the reef was often one polished mirror-like surface for many square yards at a time, and the same feature has been seen in parts of the lower levels. The New Pinafore main wing, below the 800 feet level, also showed a very fine slickenside of great extent, the upper side of a layer of quartz on the footwall of the lode being splendidly polished. The quartz contained a good deal of pyrites, and this mineral had also been deposited, particularly along the hanging-wall of it; the polished face was often quite metallic-looking with the bright smoothed pyrites. Another notable slickenside, over 50 feet in depth, is seen in an underlay shaft on one of the Sentinel's Company's lodes, near the top of the high ridge in their northern section.

In the New Pinafore mine the effect of the movements of the walls has been usually to shatter the auriferous quartz so thoroughly that it forms a rubbly mass, often with a good deal of inter-mixed mullock, a feature noticed also in the Clarence and Recruit mines. In one part of the Clarence mine nothing was left of the auriferous lode but a thin streak, about an inch thick, of clay and finely ground-up quartz, with small angular fragments of quartz, on the footwall.

The reiterated movements of the walls of the reef, besides tearing up and shattering the sheets of quartz first formed, have caused a great deal of wall-rock to get into the lode-channels, where it has been crushed to mullock and pug, or, if not so thoroughly broken as this, has been squeezed until the bedding laminations of the slates present remarkable contortions and twistings. Where a large mass of country rock occurs in the lodes, as is very frequently the case, the bedding is very irregular, and the mass is commonly broken by numerous slippery smooth joints, and full of irregular veins of barren quartz. The lode-channels are often from 50 to 100 feet wide between the main walls, there usually being a fairly well-defined lode on each wall, sometimes of quartz, oftener of a mixture of quartz, lode-slate, and mullock. The large "horse" of country between is generally much broken, full of slides, and seamed with irregular quartz veins. Where it is composed of soft slate the whole channel may be little more than soft mullock, but where it is hard sandstone it is frequently somewhat difficult to say that the solid wall-rock has not been reached. The jumbled stratification is then often a good guide, the true solid wall-rock generally being very regularly stratified.

It is usual in this district, as in a great many others in the Australian colonies, to refer to the whole of the lode-filling between the main walls as the reef or lode "formation," a somewhat unfortunate term, as it has another restricted geological meaning. It includes quartz, pug, mullock, and "horses" of lode-slate; in fact, everything between the main walls. In several instances there is a more defined lode of quartz, &c. on each main wall, each of which has its own hanging and foot-walls quite well defined, and there are sometimes also intermediate lodes and walls, all in one large "formation." From a geological point of view we must regard the whole "formation" as the lode, while for mining purposes only the quartz-bearing portions are so spoken of. From the way in which the lode-channels have been filled, reopened, and refilled, several times in succession, perhaps, we can have no rule as to where the auriferous material is to be found; it may be on the footwall in one place, on the hanging-wall in another, and in the middle of the "formation" in a third place; or, it may be so much broken up as to be scattered in bunches through the "formation." This adds very much to the difficulty of mining the quartz, as more or less exploration work has to be kept going on all parts of the "formation" in order to locate the payable ore. Fortunately there seems usually to be a connection from point to point by means of more or less defined veins leading from one auriferous portion to another.

The Recruit, Pinafore, Clarence, Land o' Cakes, and Volunteer lines of lode are all large "formations" of the above type. The Chums, Morning Star, New Native Youth, and other smaller and less important lines, are more of the ordinary well known type of fissure lodes, with fairly solid quartz between solid walls of country, but at times they also show a tendency to become large "formations." A good deal seems to depend upon whether the lode is in strong hard country or in more decomposable slate, if it will be a typical lode or a mullocky "formation." The New Golden Point and Crown Company's reef, however, though in hard strong country, appears to be a "formation," the quartz being very erratically disposed in it. It seems most probable that in this

instance a channel of broken sandstone has been filled with quartz in the spaces between the broken blocks. The result is an ore deposit very puzzling and troublesome to follow, but which will very probably assume a different character in depth when the hard sandstone belt is passed through.

The quartz in the Lefroy field usually carries a good deal of pyrites of iron and copper, and often some arsenical pyrites, with the gold, but sulphide of antimony seems especially to be the most favourite associate of the noble metal. It is met with in small quantity in most of the mines. In the old Wanderer mine some fairly large blocks of auriferous stibnite, very pure, were found. This is one of the mines closest to the granite country, and the occurrence of stibnite and gold together here is quite similar to that at Hillgrove, in New South Wales, where also granite intrudes through slates and sandstones near to the mines. The sulphides in the Lefroy field are generally of high gold value when coming from any of the auriferous chutes, but where the quartz is poor in free gold the sulphides are also generally poor, a feature usual in most auriferous reefs.

Examination of any of the mines shows that they are not uniformly goldbearing, but have the ore in patches, bunches, and more or less regular "chutes." The quartz in the chutes is often separated from the barren stuff by a smooth joint, and in such cases the two portions are probably of different age; but frequently, also, there is no distinguishable difference in the stone, except that the gold is present in one case, and absent or in very small amount in the other. Frequently, however, the cause of mining work ceasing in a given direction is the working out of the quartz altogether, broken country and mullock taking its place in the lode-channel. This may be due to faulting subsequent to the formation of the auriferous quartz as above explained, or to the original fissure having been closed or filled with wall-rock at these parts when quartz was being deposited elsewhere. The sections of the Chums, Pinafore, Native Youth, and Volunteer reefs attached to this Report show that numbers of the auriferous chutes have been of considerable length and area. They have not, however, proved themselves as yet equally persistent in depth unfortunately. In every instance as yet the payable gold has ceased at a depth from surface of from 300 to 450 feet, and though gold has been got at 800 and 1100 feet in the New Pinafore, and at 800 feet in the New Native Youth mine, the stone has hitherto been poor. The sections also, however, show very plainly that the amount of work done to prove the lodes in depth is but little, not at all commensurate with that done at higher levels. In the latter the knowledge that gold existed ahead on surface has caused levels often to be boldly extended through long stretches of barren ground, but capital has been wanting to proceed on the same lines in depth. The New Pinafore and Volunteer companies are now making a determined effort to test the matter by extended deep exploration, and, in my opinion, they have great likelihood of ultimate success. The principal cause of the gold giving out in depth seems to be the disruption of the stone by the faulting movements of the walls. The Volunteer No. 2 level from this cause was an almost complete failure for working purposes, hardly any payable stone being found in it, only mullock and lode-slate, with odd fragments of the auriferous reef. Yet, as seen in the longitudinal section, the gold was both below and above it. In this instance it seems clear that the faulting movement tore away a piece of the lode, and the blank space in the bottom of the mine may well be due to a similar accident. In all probability the torn away portions are somewhere in the "formation" yet, for it is difficult to conceive of any method by which they could have been removed from the lode-channel, unless, indeed, the faulting took the form of a movement of the hanging-wall upwards, or reverse fault, which is unlikely. There are so many proofs in these mines of this faulting along the planes of the reefs that it cannot be dismissed as an idle theory, and the obvious consequences of the movements in tearing asunder the first-formed quartz must be expected and looked out for.

But, even if the chutes were, as some of them are, found to become poor in gold without showing any break in their continuity, the experience is by no means an uncommon one in mining. It has happened over and over again in other fields, and in many of these the gold has been found to come in again at lower depths; and I have no doubt that the same will be the experience at Lefroy if deep exploration is patiently and steadily pursued.

The importance of the economic question at stake of the permanency of gold in depth in these lodes will, I trust, be sufficient excuse for a short discussion of certain geological factors affecting the subject which are often unconsidered. If we are to believe that the gold gradually dies out in depth, there must be something in the fact of proximity to the surface favourable to the deposition of gold. Perhaps, it may be said, the gold comes from the surface, say from the sea, whose waters we know contain minute quantities of gold. This is, however, very improbable, for there can be next to no circulation of waters of any sort below sea level in the earth's crust, and certainly none sufficient to make up the large amount of gold in a good auriferous reef from the very small quantity in sea water. Again, auriferous chutes often do not come near the surface in reefs, and have barren quartz over them; if the gold came from above we should expect the out-cropping quartz to be all more or less auriferous. The quartz in the Bendigo saddle reefs has no apparent connection with surface at all, yet is often richly auriferous. Another reason often brought forward for a possible deposition of gold near surface rather than elsewhere is the probably greater amount of organic matter, which is an excellent precipitant of gold in the surface rock. There is, nevertheless, organic matter in all sedimentary rocks, no matter how old, and as we know

that gold has been found at a depth of 3000 feet from surface, it does not seem likely that there is any superficial organic matter required for its precipitation. Another pessimistic view is founded on the Ascensional theory of the deposition of lodes, the argument being that in the deepest parts of the fissures the highly heated and compressed water is in the most favourable condition for solution of substances, and that precipitation of minerals takes place when the solutions ascending to near surface become cooled and are under less pressure. Against this we may urge, as before, the Bendigo experience of the gold being found as low down as 3000 feet, as showing that even at that depth precipitation was still possible, and secondly, that the reefs of quartz, pyrites, &c. are in depth going down as strongly as ever, the conditions for the formation of these minerals associated with gold being evidently still favourable. Without very strong experimental evidence that gold is more easily kept in solution than these substances, it is difficult to believe that it would not be deposited with them at lower as at higher levels, the well-known chemical fact being that gold is a metal very difficult to keep in solution and particularly ready to become precipitated. So long as quartz and sulphides are found in the reef fissure so long do we think it likely that gold will be found, supposing it to come from deep down in solution, as the Ascensional theory requires. Another possible explanation of the dying out of gold in depth argues from the theory of formation of lodes by lateral secretion as a basis, pointing out that certain strata are usually more favourable for the occurrence of gold than others, and that if we get the favourable country near surface we shall probably pass through it in depth sooner or later and come into less favourable ground. This line of reasoning has much force, or apparent force, in some instances, but in the case of the Lefroy reefs it happens that it will not hold at all. The country has a certain considerable amount of dip, and in the case of two adjacent reefs like the Chums and Pinafore lines the country carrying gold in the one dips into and forms the supposed unproductive zone in the other. There is no difference in the country at the higher and lower levels in these mines that would account for a general and universal dying out of the gold at the 400 feet level or thereabouts. In discussing this matter with various persons having knowledge of the field, I have often found a rooted belief that the absolute height above sea level affected the question, but the difference in level of surface, say the Pinafore and Volunteer reef outcrops was taken no account of. Making the opposite side the present of an argument, I would remark that the "critical level," as it has been called, is much more nearly the old sea level of the days when the deep leads were first scooped out than the present one. The absence of oxidation of the sulphides makes it very improbable that height above sea level had anything to do with the deposition of the gold. Also, if height above the sea was the controlling factor, how is it that we find gold-bearing stone and good-looking but barren stone in slabs right alongside one another, not in one instance only, but constantly?

All the above reasoning is on the supposition that at the time of the formation of the gold ore the reefs occupied something like their present position with reference to the surface. But this is really highly unlikely, the probability being that at the time they were formed the portion of the Silurian country now seen at surface was deeply buried under possibly thousands of feet of superincumbent rock. It has been above pointed out that we have reasons for connecting the time of formation of the reefs with the period of the extrusion of the granites of Tasmania, somewhere between the Upper Silurian and Carboniferous periods. Now, granite is a thoroughly crystalline rock, and modern geologists are agreed that it is a rock of deep-seated origin. The same igneous mass which is poured out at surface as a trachyte or rhyolite lava is believed in depth to form granite, the difference in the rocks being simply degree of crystallisation owing to more rapid or very slow cooling. The deep portion, cooling with extreme slowness, becomes the thoroughly crystalline granite, while the rapidly cooled surface lavas are glassy or little crystalline. Before the granite can be exposed there must be enormous superficial denudation. In Tasmania there are several scattered remnants of Upper Silurian rocks, enough, however, to show that the formation was widely spread over the island, and of very considerable thickness. There may also have been deposits of Devonian age. The reefs were in all probability formed about this time. Since then the whole of the Devonian and Upper Silurian strata, and the lavas belonging to the granitic extrusions, have been entirely swept away, and we now have the quartz lodes exposed on much the same horizontal plane as the deep-seated granite. Since the great erosion in Carboniferous times the surface of the Silurian system has been again sunk deep below the sea and covered with the thick sediments of the Permo-Carboniferous and Mesozoic coal measures, and with the doleritic lavas of the great Greenstone formation, and all these have in turn again been eroded. In Miocene or early Pliocene times we know the reefs contained gold, for fragments of them with gold in them are preserved in the gravels of the deep leads. In view of huge geological changes like these, what possible influence can we ascribe to the accidental position of the present surface with regard to the reefs and their auriferous contents? The almost entire absence of any trace of mineral-forming action after the Permo-Carboniferous period in Tasmania shows that we must look to much older geological times for the conditions that affected the deposition of the gold. The conclusion, then, is that we are now dealing with reefs and gold in them that were deposited long ago and deep down in the ground, and whether they were a few thousands of feet deeper or shallower is a matter of no moment. In the Bendigo field there is also granite cropping at surface, yet gold is got at 3000 feet depth. The probability is that the chutes of ore at Lefroy were not very regular in the first instance, and have been much broken by subsequent earth movements, making the occurrence of

the gold patchy. When a patch has cropped out at surface we have worked it, and when it gives out we shall have to go through more or less dead ground in depth just as we have to do along the length of the lodes. But there is no reason to believe that the lodes will cease to be productive at the trivial depths to which they have been worked as yet.

MINING DEVELOPMENT.

Proceeding now to describe the various mines in some detail, it will be convenient to take the various lines of reef from the north southwards.

Perpetual No. 1 Mine, Section 711-93G.—The reef worked by the Perpetual No. 1 Association was formerly known as Hackett's reef, and was described in Mr. Thureau's report of 29th September, 1882, as follows:—"The *Hackett's* line of reef is situate about $1\frac{1}{2}$ miles north of Lefroy township; it occurs in a soft white to reddish argillaceous slate and sandstone (Upper Silurian), which is besides traversed by numerous veins of white crystalline quartz. A considerable number of small shafts have been put down on its course to various depths, not exceeding, however, 64 feet. The reef so near the surface is narrow, and it underlays to the south. Judging from general indications, the auriferous quartz forms most probably a portion only of other and parallel veins not yet discovered. The gold appears to occur in that characteristically crystalline quartz, without much regularity, but very rich specimens have from time to time been found in this reef. Inducements are held out for prospecting the ground by means of cross-cuts, and the sinking to greater depths, where in the harder strata those veins may consolidate into a more compact body of auriferous quartz." In reference to the above quotation, the present writer has to say that he has not seen any evidence whatever that the country in this mine is of Upper Silurian age; it certainly belongs to the same formation as the remainder of the field. On the general map of the district with this report, three lines of quartz are marked on Section 711-93G. The central one is the Hackett's reef: the one to the south is a small leader carrying a little gold, but too small to be worth working; the northern one is cut where shown on the plan by a number of trenches and small shafts. One of the shafts was put down 40 feet. A shallow cross-cut went from it 150 feet to the north, but got no gold, though a small leader was cut. From this lode south there has been trenching more or less continuously to the south boundary of the section, without finding anything of consequence. The north lode is gold-bearing, but very small. On Hackett's lode some 16 years ago, or thereabouts, a good deal of work was done, and a crushing is said to have yielded 15 or 16 dwts. to the ton; the workings were to the east of the Perpetual Company's main shaft shown on the plan. This has been sunk to a depth of 100 feet. When I visited the workings (25th September, 1896,) the reef had been followed east 74 feet and west 41 feet, and a cross-cut had been driven north 103 feet and south 44 feet. The underlay of the reef is 35 feet in the 100 feet of depth to the south, or say 1 in 3. In the east end it is flatter, about 1 in 1. In the west end the lode had broken up into strings. The quartz vein is quite small, from 2 to 8 inches only, but carried some nice gold. In a cut put into the reef from higher up the shaft, after I visited the mine, good specimens were obtained, showing gold very freely. The north cross-cut was in through pretty solid well stratified country, and was to be continued to cut the north lode. The south cross-cut found very disturbed country, and passed through two leaders carrying gold; the rock was much shattered, and gave out a good deal of water. The opinion formed by me was that the cross-cut had not been driven far enough to cut the true south wall of the lode, and that this would prove to be one of the large "formations" above described. If so, it is probably a much more important line of reef than we should imagine from the small quartz veins found. I should recommend sinking deeper and cross-cutting into unmistakably solid country. The enclosing wall-rocks are soft slates and sandstones of the description considered "kindly" in this field. I understand that an English company have now an option over the property and are developing it, which will give the lode a good trial.

On the plan a line of deep trenching by means of shallow shafts connected by cross-cuts, an excellent method of costeening, is shown crossing the south boundary of Section 711-93G, and another a little further west through the south-eastern part of 732-93G south into 860-87G. No reefs were cut by this trenching. On the north boundary of 860-87G, however, there is a small reef on which several little shafts have been sunk, one of them 50 feet deep; the vein of quartz is very small, and I am not aware of any gold having been found in it. Underlay is southward.

In Section 778-93G a small leader was cut in a pair of prospecting shafts shown on the plan, and a few buckets of very rich quartz were obtained, but the good stone very soon gave out. North of this line runs a longish piece of deep costeening, which did not find any lode of importance.

Looking at all the above leaders and reefs on the map, it will be seen that they appear to converge westerly towards the Recruit lode next to be described, and there is a good deal of probability that they are really connected with it, the reef having divided into branches going eastward. The Perpetual, or Hackett's, reef might very well be the main portion. The line connecting the Recruit and Perpetual workings is therefore very well worth thoroughly prospecting, gold having been found at both ends of it. Very little work appears to have been done along this line.

Recruit Lode, Section 221-93G.—This was in former years worked under the name of the Perseverance reef. Mr. W. H. Stubs, to whom I am much indebted for valuable information as to a great many old workings, has kindly given me the following particulars, under date 7th November, 1896 :—“Perseverance.—Started work some fifteen years ago, and after doing a good deal of surface crosscutting a good sized rubbly lode was discovered, which contained fairly good gold in places. Three shafts were sunk, and the lode intersected—No. 1 shaft, 30 feet; No. 2, 60 feet; and No. 3, 160 feet. Nos. 2 and 3 shafts were connected at 60 feet from surface and the lode driven on 160 feet. In No. 3 shaft the lode was driven upon for a similar distance. From the three shafts a small amount of stoping was done, producing about 150 tons of stone, which was crushed in small lots from time to time and yielded from 4 dwts. up to 16 dwts. per ton. The reef was, however, too patchy to prove remunerative.”

The Recruit Company have reopened this old mine by sinking two shafts, a whip shaft 105 feet deep, and a main shaft 310 feet. The lode underlays to the south. The main shaft cut the hanging-wall of the reef at 187 feet, and will be through the foot-wall at 310 feet. When I last saw the mine the shaft was not sunk the full depth given, and preparation was being made to open a level at 303 feet. The Recruit lode is a large soft formation with some very good gold-bearing stone in it, but, as in the other lodes of the same description, this is very likely to suddenly disappear. From the whip-shaft a level was driven at 100 feet, 30 feet east on the lode and 32 feet west, and a little stoping done, which yielded 45 tons of quartz. This gave 43 ozs. 10 dwts. of gold when milled, but included 13 tons of poor second-grade stuff which gave only $1\frac{1}{2}$ ozs. of amalgam, or about 10 dwts. of gold. The No. 2 level is at 190 feet in the main shaft, the lode being cut 36 feet from the shaft. The main hanging-wall, however, is only 16 feet from the shaft. The cross-cut was continued to 61 feet from the shaft into hard foot-wall country. The hanging-wall country is slate and the foot-wall sandstone, both dipping somewhat to the south-west: the lode evidently faults the country strongly. At the time of my visit the drive east on the lode was in 101 feet and that west 77 feet, good gold being got for 20 feet west and 32 feet east from the cross-cut. The quartz was from 8 to 18 inches wide. A little stoping had been done, yielding 30 tons of quartz, which gave a mill return of 15 ozs. 11 dwts. of gold. The pyrites saved from this crushing were thoroughly cleaned by Frue vanners and amounted to 1 ton and 7 cwts., assaying 5 ozs. 18 dwts. gold per ton. The pyrites from the crushing of 45 tons from the whip shaft were badly cleaned, and weighed 2 tons 4 cwts. 1 qr., assaying 3 ozs. 17 dwts. per ton. When I saw this mine its prospects were very promising, but I have not heard how it has developed since. It contains some very good auriferous stone, and will probably yield a large amount if well opened up. The soft mullocky nature of much of the lode, and the liability of the gold-bearing stone to be broken and carried away at any moment by the faulting movements that have taken place, are much against success until the mine has been well opened. The prospects seemed to me to warrant giving the lode a very thorough trial by sinking on it and by doing a lot of driving at various levels.

On surface the reef has been traced by trenches a short distance into Section 233-93G. On Section 484-93G is the West Recruit main shaft, down 100 feet in clean sandy slate. If sunk for the Recruit lode, this shaft will have to go to a very considerable depth before it can hope to strike the reef. On Section 208-93G the East Recruit shaft is down 98 feet: at 94 feet they drove 10 feet north of the shaft and cut the lode, which here underlays south 1 in 4, about one foot wide of slickensided and brecciated stone. There was no gold in the stone, but a little in the rubble and pug. A drive was put in 40 feet to the westward, the lode-matter in the end being 3 feet wide with broken walls. Some pyrites from these workings are reported by the mining manager to have assayed 7 ozs. gold per ton.

The reef is traced by trenches eastward through Section 208-93G, and in Section 482-93G is cut in what appear to be two branches. The southern one is 2 feet 6 inches wide of rubby iron-stained quartz, said to contain a little gold. The northern branch is also said to yield colours of gold in the rubble.

Old Pinafore Mine.—On the north boundary of Section 155-93G is an old shaft said to be 100 feet deep, from which considerable crosscutting north and south is supposed to have been done, but I have been unable to obtain definite particulars. A lot of quartz is lying about the surface of the shaft, which makes it likely that some sort of reef had been cut, but I have been unable to learn anything about its position, size, or value. In the same section near the centre is another shaft which must have been over 50 feet deep, about which also much quartz is lying, but no information is available. It is possible that there is a line of lode between these shafts.

Section 83-93G.—In the south part of this Section a small shaft has been sunk some 40 or 50 feet, in which goldbearing stone was stated to have been discovered, but I did not get any very reliable information about this, and the workings being full of water could not be examined. There is an old shaft to the west of this which is probably on the same little lode.

Chums Line of Lode.—Coming still south we reach the Chums lode, one of the longest and strongest on the field, extending from near the Deep Lead on the east to close to Slaty Creek on

the west. A great deal of work has been done on this lode, and there are several important mines upon it, notably the New East Chum, New Chum, West Chum, West Extended Chum, Boy's, and Unity. A plan and section are attached, also some cross-sections showing the workings of the East Chum, New Chum, and West Chum, so far as any records have been preserved of them; and there is a separate plan and section of the Unity workings. None of these plans, however, are by any means complete, but it was found impossible to get better ones, and they are given, therefore, as the best available. They are compiled from the plans furnished annually to the Inspector of Mines by the mineowners.

In Section 607-93G is the shaft of the New East Chum Extended Co., on a reef on the general Chums line, but which must be a different branch from that worked by the New East Chum Co. This reef is small, but has been cut in some shallow shafts near the main one, and also near the eastern boundary of the section, close to the edge of the basalt of the Deep Lead. I did not see this mine while it was working, and the following particulars are from a report by the late Mining Manager, Mr. Thos. Williams, kindly given to me by Mr. E. Gaunt, Secretary of the Company. The reef was first cut about 4 chains from the western boundary, small, but "very rich in gold." The main shaft was then sunk 150 feet, and the reef cut 20 feet south of the shaft, carrying some gold. Driving east at 40 feet the lode opened to one foot wide, and for 30 feet further, then gave "splendid prospects" both from stone and rubble. The drive was continued for 105 feet through whitish sandstone rock "without meeting settled country," from which expression I infer that the lode broke up into strings. A winze on the good ore having had to be abandoned for water, the shaft was next sunk deeper and a level opened at 200 feet. The reef was cut 24 feet south of the shaft, and a drive put in on it eastward; after driving 40 feet the reef made to $1\frac{1}{2}$ to 2 feet of stone carrying gold; but the water became too heavy for the small pumping plant used, and the company's funds were exhausted, so the mine was shut down. The shoot of gold dipping eastward, it was not expected to be met with at the bottom level till a distance of 130 feet had been driven. Mr. Williams remarks that at the 300 feet level the New Chum Co. drove on their reef for 180 feet with never more than 3 inches of quartz, and then it suddenly widened to 8 feet, going 4 to 5 ounces to the ton.

According to the above showing, which I have had no means of verifying, this mine should be worth going on with.

Section 200-83, East Chum.—The general plan shows three branches of the main lode,—the main one at the main shaft, one to the south known as Williams' lode, and one to the north, which is likely to be connected with the East Chum Extended lode. Gold has been got in all three branches, but the north one appears to be of little consequence. The shaft on it was full of water when I saw it, so no examination was possible. The workings from the main shaft are shown on the plans and sections, so it will be useless to describe them in detail. There are several branches of the lode, and everything at this east end of the line appears to me to show a tendency of the reef to split up and die out going eastward. In the New East Chum workings, however, the main branch is still a strong body of good-looking quartz, but very little gold has been got outside the old stopes shown on the longitudinal section. The main shaft is 413 feet deep, and the lowest level 406 feet. The country is slate and sandstone, striking north-westerly, and dipping to the south-west 15° to 30° . Some of the stopes of the East Chum mine near the western boundary underlay north, while the adjacent New Chum reef has a southerly underlay, the reef being split and the gold on different branches. A good cross-cut both north and south on the boundary between these properties seems likely to give very useful information. The East Chum mine has been unfortunate in not having ever had much capital for working purposes, and prospecting work in it has gone on slowly. It seems well worth spending some more money upon.

At the time of Mr. Thureau's report in 1882, the East New Chum Company were on gold at the 240 feet level, and in the subsequent report of 1883 he gives the yield of gold from it up to date as 331 ozs. 5 dwts. I have not been able to obtain the total tonnage crushed from this mine, or the total gold raised, but understand that it has never paid a dividend.

The Chums Proprietary Mine.—In this are now included the New Chum mine, Section 366, the West Chum mine, Section 368, The West Extended Chums mine, Section 411, and Sections 546-93G and 547-93G, on which are the workings of the Old Boy's mine and the more recent West Extended Pinafore Company, the latter, however, being on the Pinafore line of reef. The plans and sections show the work done better than can be described in words, but I have been quite unable to procure plans of the West Extended Chum and Boy's workings, or to get any information about them worth mentioning. The New Chum mine has been shut down for many years, and only very little of it can now be inspected. As shown by the section, there was a fine chute of ore in this mine. The total value of the gold got by the first Company was £108,036, and of this £58,250 was paid in dividends. The total yield is given by Mr. Thureau as 25,675 ozs. 1 dwt. 20 grs. at the date of his report. The mine was opened from the first out of the gold obtained, without making calls on shareholders. When the bottom level proved unpayable work was suspended, there having been no reserve fund set aside for prospecting work in times of adversity. The levels

from the West Chum shaft are now being pushed forward under the New Chum workings in the hope of getting the downward continuation of the chute, but as yet little success has been met with.

The present Chums Company's main shaft is that first sunk by the West New Chum G. M. Company. For many years past the bottom level has been under water, and work confined to extending the upper levels, but since the days of the West New Chum Company the concern has been unpayable. The first gold was got at a depth of 62 feet from surface, the reef being from one to three feet wide, and a crushing of 41 tons gave 6 oz. 13 dwts. of gold to the ton. In 1883 Mr. Thureau gives the total yield as 13,939 ozs. 4 dwts., and the dividends as £21,000. The expenditure on the mine before dividends were paid is stated to have been £2250, after which all expenses were paid out of the gold raised. After the mine became unpayable parts of it were worked by tributors, and some work was also done by the Chums G. M. Company before the mine passed into the hands of the present Chums Proprietary Company. I have not been able to obtain returns of the gold got during this period. Writing on the 23rd October, 1896, Mr. J. B. Hickson, secretary of the present company, gives the gold got by them up to that date as 321 oz. 1 dwt., of value £1185 13s., from 1509 tons crushed, but this company has practically only been prospecting. 9 tons 3 cwts. of pyrites have also been sold, of value £38 2s. 10d., or £4 3s. 1d. per ton. In 1890 a sample of clean pyrites washed by myself from the tailings heap at the West Chum battery yielded on assay by the Government Analyst 4 oz. 5 dwt. 17 grs. of gold per ton.

The longitudinal section shows that there have been several chutes of ore worth stopping in the West Chum mine, and that there has really been very little done to search for their downward continuations. The reef is generally hard quartz, often laminated, and carrying a good deal of pyrites and stibnite. It is in many places divided into two or more approximately parallel branches, requiring therefore frequent cross-cutting. In some parts of the mine one of these branches has been followed and proved valueless, and then later it has been discovered that there was rich ore in an adjacent parallel vein. In the west end of the mine the reef appears to be splitting up still more, the branch worked by the West Chum Company being apparently a separate one from that on which the West Extended Company did their stoping.

Taking the whole longitudinal section of the East Chum, New Chum, and West Chum workings, as shown on the drawing herewith, it is seen that there has been a large amount of payable ground in the reef for a long distance on its course. That such bodies of ore should be the whole quantity existing in the lodes is a supposition quite contrary to general mining experience, and I have no doubt that if operations at deeper levels are perseveringly carried on other similar rich patches will be laid open. The working of these mines in depth is, in my opinion, a very genuine mining enterprise.

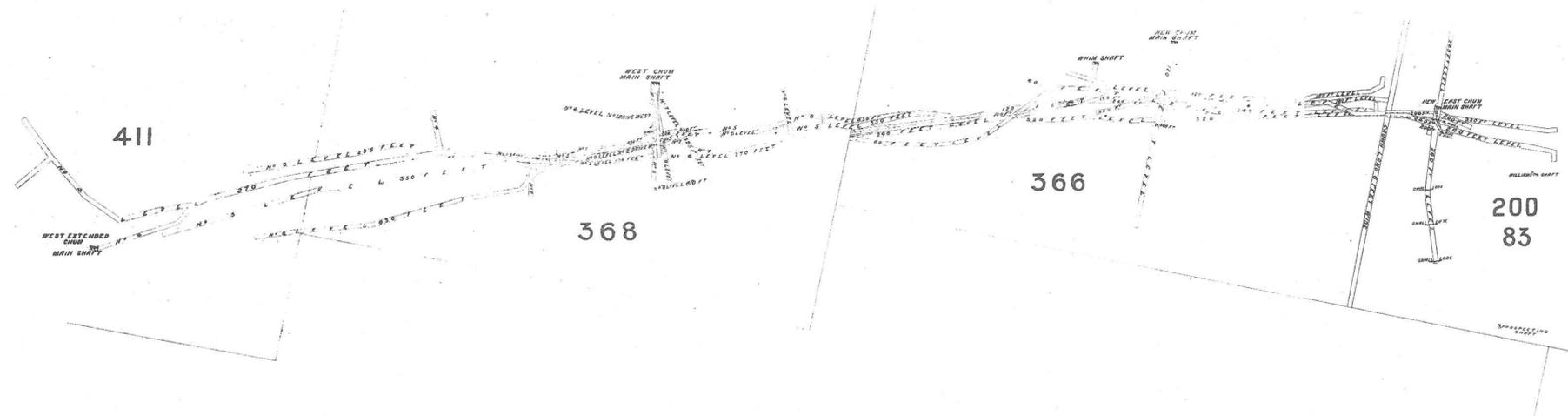
The West Extended Chum mine, Section 411, has long been closed, and I have not been able to get any information as to the extent of the workings or the tonnage and value of the ore milled. Shaft 189 feet deep at date of Mr. Thureau's Report.

Section 546-93g.—The shaft shown on the general plan in the north of this Section is believed to be one belonging to the old South West Chum Company, but I have no information at all about it further than that contained in Mr. Thureau's 1882 Report, viz.—“Shaft had reached a depth of 200 feet, and machinery would be requisite to overcome the influx of water.”

Section 547-93g.—Two shafts in the north of this Section were formerly known as “Our Boys” shafts; they have been abandoned for many years. Mr. Thureau says of them.—“The Great West Extended New Chum Company (‘Boys’) have sunk two shafts. Of these two their old shaft was 260 feet deep, and they had opened at the 250 feet level. Their new whim shaft had reached a total depth of 140 feet, but at that level they had so far failed to intersect the continuation of the gold-bearing stone which was found at the 100 feet level in the old shaft, though they had driven along the reef for a distance exceeding 100 feet in length. The gold-bearing stone measured from 6 to 8 feet in width.”

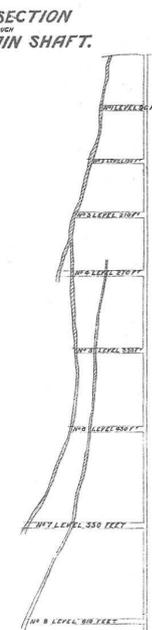
Unity Mine, formerly United Chum, Section 748-93g.—The two shafts seen on the plan in the south-east part of this Section belong to this mine, a plan and section of the workings of which are also appended hereto. The eastern shaft is a whim shaft from which considerable stoping was done and a good deal of gold was got out; the western shaft is the one from which all operations have been carried on in later years. After doing a good deal of work at the lower levels without any good result, a cross-cut was put in to the south to cut the Pinafore lode, but this also proved disappointing. Mr. Thureau in 1883 gave the return of gold from this mine as 1342 ozs. 1 dwt., but I have not ascertained how much has been got since. Owing to changes of ownership and want of care in preserving old records, it is often very difficult to get any information as to old mines.

Section 761-93g.—Towards the north-east of this ground is the old shaft of the Ryhope Gold Mining Company, long since abandoned. In 1882 Mr. Thureau says that the Company were sinking below the 180 feet level, but does not mention if any lode had been cut. I have never heard of any discovery of value having been made from this shaft.

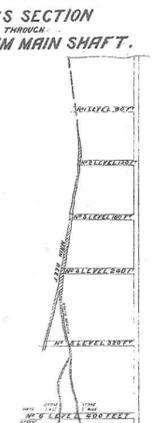


CROSS SECTIONS OF CHUMS REEF.
 COMPILED BY MESSRS J. T. STUBS and H. F. MILES.

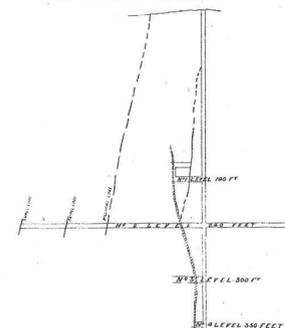
CROSS SECTION THROUGH CHUM MAIN SHAFT.



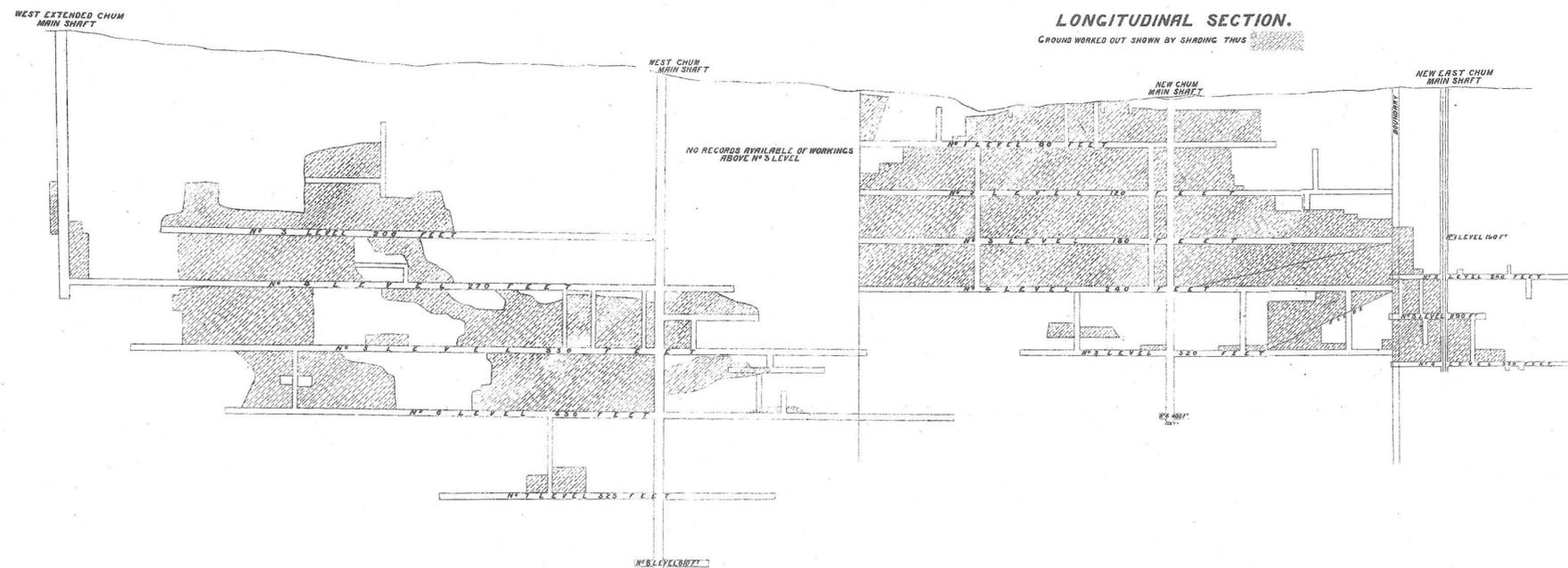
CROSS SECTION THROUGH NEW CHUM MAIN SHAFT.



CROSS SECTION THROUGH NEW EAST CHUM MAIN SHAFT.



LONGITUDINAL SECTION.
 Ground worked out shown by shading thus



LEFROY COLDFIELD. PLAN AND SECTIONS OF WORKINGS ON THE CHUMS LINE OF REEFS.

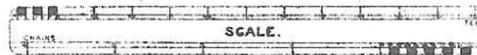
SCALE

COMPILED FROM PLANS AND SECTIONS FURNISHED ANNUALLY BY THE OWNERS TO THE INSPECTOR OF MINES.

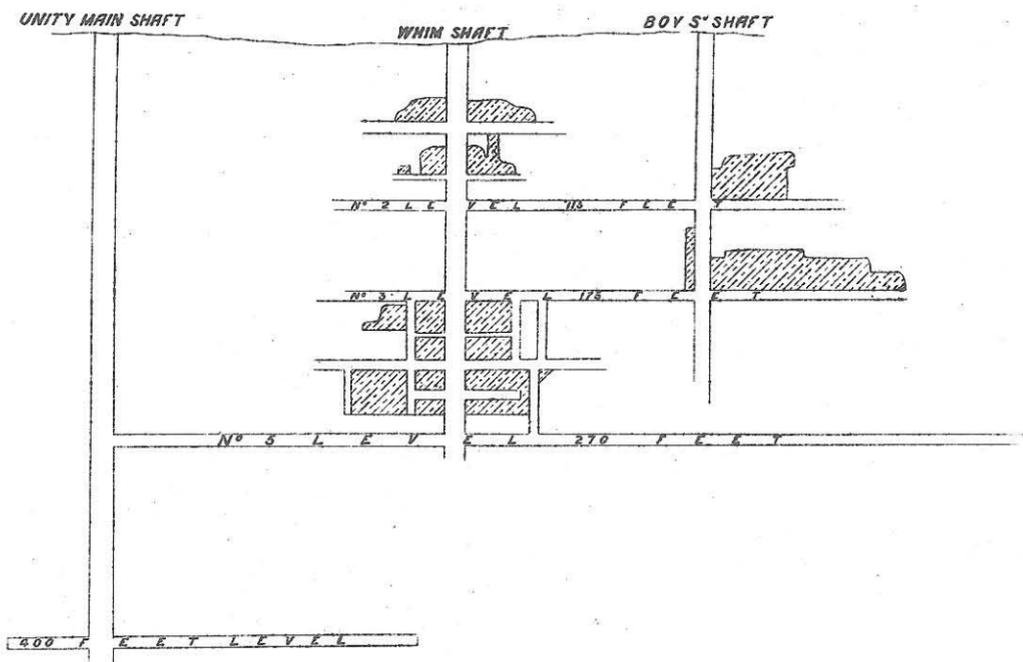
5 cm



LEFROY COLDFIELD. PLAN AND SECTION OF WORKINGS OF THE UNITY MINE.



5 cm



Section 762-93g.—The shaft in the south-eastern angle of this property was sunk by the Band of Hope Company, but has long been full of water. In 1882 Mr. Thureau mentions that sinking was in progress below the 150 feet level, but I have no later information as to the total depth reached, or if the reef was cut.

Section 789-93g.—There is an old deep shaft near the centre of this section, sunk by the long defunct United Chum Extended Company. In 1882 Mr. Thureau reports sinking in progress at a depth of 118 feet; I have not been able to learn that a reef was cut.

About 700 feet west of the last-mentioned shaft is another, sunk by the Consolidated New Chum Company on land not at present under lease. In 1882 sinking was going on below the 140 feet level. I have not heard of the reef having been found, and work has ceased for many years.

From the Unity main shaft westward it is doubtful if the Chums lode has been cut at all, though, as shown on the general plan, the above four main shafts have been sunk on about the line of it, and presumably some discovery had been made in each case to justify sinking. There are no more workings on the line of the lode for some distance further westward until we reach Sections 1118, 1127, and 1128, where a reef has been found corresponding in course and position with the Chums lode and therefore probably identical with it. None of these workings are extensive, and I have not learned that any gold of consequence has been discovered. The shaft in Section 1118 was sunk by the Telephone Company, and that in 1128 by the Outward Bound Company. From the quartz about these shafts they seem to have had a strong reef.

The New Pinafore Line of Reef.—Towards the end of 1890, in prospecting and working alluvial gold to the south of the Chum line of reef another lode was discovered, which has proved very important. It is a parallel reef to the Chums line, and only some 300 to 350 feet distant from it, and has received the name of the New Pinafore lode. Unlike the hard Chums lode, this one is a wide soft reef as a rule, consisting of several veins of quartz in a wide "reef formation" of mullock and lode slate. As above mentioned, the auriferous quartz is usually much crushed and fractured and mixed with mullock from faulting movements along the plane of the reef after the quartz had been deposited. In the New Pinafore mine three distinct veins of stone are seen in the lower levels, though at surface they were all together as one body of quartz, known as the hanging-wall, foot-wall, and intermediate lodes. As shown by the cross-sections these diverge in depth, and appear to form three separate parallel lodes. In the 800 feet level the foot-wall lode is a strong body of quartz of likely appearance carrying a little gold, but not payable. The intermediate lode appears to be the one on which the faulting movements have principally taken place, for even down to the 1100 feet level it is a wide "formation" consisting of a solid vein of quartz on the foot-wall with 8 or more feet of lode-slate squeezed and broken country and hard pug on the hanging-wall. In the deep winze from the 800 feet level the upper side of the quartz vein on the foot-wall is often highly polished or slickensided. At this level the hanging-wall lode has not yet been cut, owing to its flat angle of dip.

A plan, longitudinal section, and some cross sections of the workings on the Pinafore reef, are appended to this Report. The plan shows the complexity of the workings arising from the branching of the lode into the three veins just mentioned, it having been necessary to keep driving more or less on all three branches and cross-cutting continually from one to another. The longitudinal section is not so satisfactory as it should be, for the stoping shown is sometimes on one branch of the lode, sometimes on another. For correctness there should be longitudinal sections of each branch lode. Circumstances already explained have, however, prevented me from having time to rectify this.

East Pinafore Mine, Section 392-87g.—The main shaft of the East Pinafore Company is near the centre of the section quoted. As above stated, the first 236 feet in depth of the shaft were through basalt and Tertiary deposits belonging to the deep lead. The longitudinal sections shows how the outcrop of the reef dips deep under the Tertiary covering going eastward. The drawings show some small workings that were put in to work the alluvial "wash," but the flow of water from this was so great that it was considered imprudent to jeopardise the workings on the reef by trying further after the gravel. The lower levels shown on the plans were put in to work the New Pinafore reef, which was duly found and followed, but with poor success, only a little gold-bearing stone being discovered. The lode is very mullocky, and often full of crushed quartz mixed with squeezed and twisted country rock. After a long struggle the mine was shut down in 1896. It deserves further trial both in the alluvial ground and along the reef, and will no doubt again be opened in the future. I have no record of the yield of gold from this mine, but know that it was quite small.

New Pinafore Mine.—In the upper levels, as shown on the plans, there was a large amount of good auriferous ground, which has been stoped out. When the mine became poor in the bottom it was decided to try again at a considerably deeper level, and the central shaft was sunk to 800 feet, where a cross-cut was driven to intersect the reef. Before cutting the foot-wall stone several small leaders were met with, some of which carried gold. Driving west on this lode there was a body of

much brecciated stone three to four feet wide, nice-looking, but carrying no gold. In the east drive on it there was a little gold at times, and some of the pyrites got by washing the powdered quartz gave gold equal to 1 oz. 13 dwt. per ton. Between this foot-wall lode and the intermediate lode there was hard strong country, showing little evidence of disturbance. Driving west on this lode it was found to be a wide mass of mullocky matter containing a little gold, not payable, at two or three places. The crosscut has been carried some distance (see plans) past the intermediate lode, but is not yet far enough forward to cut the hanging-wall stone if this continues at the same underlay as in the levels above. To try the intermediate lode at lower depths a winze or underlay shaft was next carried down to a depth of over 1100 feet from surface. A little gold was got at times, but not payable. At the time of my visit sinking this winze was in progress, and, I understand, that it has since been continued deeper and some driving has been done from it. Gold has been got in small quantity down to the deepest level, and in my opinion there is every inducement to keep on working pluckily, as there is sure to be more gold to be found.

Up to 22nd October, 1896, the New Pinafore mine had crushed 46,032 tons of stone for a return of 42,212 ozs. 9 dwts. 15 grs. of gold, worth £168,840. Of the total quantity 585 ozs. 10 dwts. 6 grains came from the chlorination works attached to the Company's battery. This is a good mill, though of a somewhat old type, and has lately been improved by the addition of better concentrating plant. The concentrates are roasted in a long reverberatory furnace, and then chlorinated. I understand that cyanide treatment is now also being resorted to.

The West Pinafore Mine.—This property adjoins the New Pinafore, and the workings are connected as shown on the plans. Up to 22nd October, 1896, the mill returns were 6709 tons of ore crushed, for a yield of 4551 ozs. 2 dwts. of gold, valued at £18,200. This Company also has a fair battery.

The West Pinafore Extended Mine.—The Pinafore reef was cut in this, as shown on the plan, and proved to be a wide, broken, mullocky "formation," with little, if any, gold. Work was soon suspended, and the lease has since passed into the hands of the Chums Proprietary Company.

Unity Mine.—As already mentioned, the Pinafore reef was cut in the Unity mine, but was valueless.

Young Chums Mine.—Near the south-east corner of Section 789-93G a small shaft has been sunk to work a "formation" which seems to be the Pinafore lode. At the time of my visit, the cross-cut from the shaft was not completed, and all that was to be seen was a very doubtful-looking vein of rubbly quartz in a trench on surface. The shaft was 65 feet deep, and the cross-cut for the reef opened at 61 feet.

The Pinafore line of reef has an excellent record, and will, doubtless, yet prove a large producer of gold if energetically opened up at deep levels.

Golden Era Line of Lode.—This is the next line known south of the New Pinafore reef, and is shown on the plan in Sections 821-87G and 373-87G. The most easterly shaft on the plan is an old one sunk by the East Golden Era Company, and is said to be over 200 feet deep, but I have not been able to procure particulars of the work done from it. The next shaft west of this was also sunk by the same old Company. It is stated to be 206 feet deep, and at the 200 feet level there was cross-cutting done for about 70 feet to the south and about 80 feet to the north. A soft lode "formation" six feet wide was cut in the drive south, and Higgs' leader in the north one. North-west from this shaft the plan shows a smaller one, known as Higgs' shaft, from which some good stone was obtained. This was from Higgs' leader, which appears to be a branch of the main lode, or a vein parallel to it. The shaft was 100 feet deep, and the gold came from stopes between the 40 feet and 70 feet levels, 29 tons yielding 97 ounces of gold. The reef was about one foot in width, but not a solid body of stone. It had an underlay to the south.

Coming still west we find an old shaft, now fallen in, almost on the boundary between Sections 821-87G and 373-87G. This was 170 feet deep, and is referred to above in dealing with the alluvial deposits, in a quotation from Mr. Thureau's 1882 Report. The total length of the cross-cut at the 170 feet level was 530 feet; course north-east. I have no information as to workings on the lode from this shaft. West of it there are several small prospecting shafts which do not appear to have been of importance. South-west from the old shaft we see on the plan the main shaft of the present owners of the ground, the Amalgamated Golden Era G. M. Co. This was shut down when I visited it, and the following particulars are from reports kindly furnished to me by Mr. Edward Gaunt, Secretary of the Company. Mr. N. Foote in a report dated 15th July, 1896, gives the depth of the shaft as 250 feet, and says that at 240 feet a cross-cut was driven north 93 feet. At 16 feet from the shaft a small unimportant leader was cut; at 67 feet another with a northerly underlay and course N. 10° E.; the latter was followed 30 feet eastward and 10 feet westward; it was small, but carried some gold. At 93 feet the hanging-wall of the main lode was cut by the cross-cut, and drives were put in 80 feet to the east and 15 feet to the west, the lode being at first 2 feet 6 inches wide, but varying in size as it was followed. Driving east "some very rich

LEFROY GOLDFIELD. PLAN AND SECTIONS OF WORKINGS ON THE PINAFORE LINE OF REEFS.

NOTE
THE PLANS AND SECTIONS ARE COMPILED FROM THOSE FURNISHED ANNUALLY TO THE INSPECTOR OF MINES BY THE MINE OWNERS.
THE LONGITUDINAL SECTIONS DO NOT ALWAYS CORRESPOND STRICTLY WITH THE PLANS HAVING IN SOME PARTS BEEN TAKEN ON
LINES RUNNING EAST AND WEST PARALLEL WITH THE LEASE BOUNDARIES INSTEAD OF ALONG THE LINE OF THE REEF.

SCALE
FEET CHAINS

5 cm



CROSS SECTION
THROUGH
EAST PINAFORE MAIN SHAFT
LOOKING EAST.

CROSS SECTION
THROUGH
NEW PINAFORE CENTRAL SHAFT
LOOKING EAST.

stone was obtained" at about 60 feet, the reef being 18 inches wide; the stone went down below the floor, but did not rise to the back of the level. A little gold is also reported in the west end. Difficulties with-water and want of capital caused the mine to be shut down.

Two shafts marked on the plan near the centre of Section 373-87g, on the crown of the ridge, are old workings of the Chance mine. From these it is supposed that there were cross-cuts to the reef, but very little information could be obtained about them.

On Section 119-93g a small leader has been cut corresponding very well in position with the Golden Era reef, but very little work has been done to prove it, the vein being so small.

The Golden Era lode, though not a large one, appears to have contained some good auriferous stone, and probably will be again and again tried as interest in the Lefroy field revives.

Clarence Line of Lode.—In Sections 385-93g and 993-87g three lines of quartz are shown upon the plan of the field. The most northerly one, near the north-west angle of 993-87g, is an unimportant vein of quartz which has been cut in some shallow trenches, but not mined upon. The next one is known as the Clarence North lode, and the one south of it as the Clarence South lode. Both have been worked in the Clarence mine, and the south one is also seen in the East Clarence, Section 383-93g. The New Golden Heart Company are also cross-cutting for it in Section 573-93g. The Clarence main shaft is a small one, 7 feet by 3 feet 6 inches, only fit for prospecting; it is 209 feet deep, and levels have been opened at 80 feet and at 194 feet. At the latter depth a cross-cut has been driven S.S.E. a distance of 177 feet through slate and sandstone country dipping south-westerly. At 45 feet from the shaft the north lode was met with, and has been driven on to the eastward 284 feet. The lode-matter is soft mullock mostly, with a little crushed quartz through it, between smooth walls. The country is distinctly faulted by the lode. For 60 or 70 feet in the east end of the drive some gold-bearing stone was obtained and a little stoping was done, the quartz being apparently a patch of the original lode-filling which has escaped destruction by the later faulting movements. It was much shattered and crushed. In the cross-cut the country for 16 feet to the north of the lode is shattered, and has an abnormally steep dip, about 65° to the S.W., and it is probable that the reef channel is really to be considered much wider than the space actually between visible definite walls; in the upper level it is very evident that there is a wide "formation" outside the more defined lode fissure. About 15 feet to the end of the cross-cut a little drive has been put in to the east on a sort of break in the country, which appears to be the only sign of the south reef, unless, indeed, it underlays very flatly and is still further south. In the 80 feet level, however, a similar "track" was found, and it seems probable that this really represents the south reef at this point, if north and south reefs are not really one and the same as seen hereafter.

In the 80 feet level the north lode is 23 feet from the shaft, and had been followed, at the time of my last visit, 256 feet to the eastward, showing well defined smooth walls, and a "formation" about four feet wide of pug and shattered country with intermixed fragments of quartz. For the last 63 feet, corresponding very well with the ore stoped from the lower level, there was a little gold in the quartz when it appeared, but only odd stones of it and a little crushed stuff were obtainable. A cross-cut north, 48 feet from the face, showed the footwall not to be the true wall of the lode-channel, as there was another wall eleven feet further in, the space between the two being full of twisted disturbed country, and at the time I saw it, though the cross-cut was in 25 feet it was not certain that the undisturbed country had been reached.

The north lode was passed through in the shaft between 113 to 125 feet, from 3 feet to 3 feet 6 inches in width; it contained no free gold, but gave a quantity of pyrites, which were reported to assay 12 ozs. 15 dwts. 4 grs., and in another instance 22 ozs. 8 dwts. of gold to the ton.

On surface the north lode has been traced by trenches westward into Section 580-93g, and eastward to near the crown of the ridge running through Section 993-87g. Further east several shafts have been sunk and trenches dug to find it, but without further success than that two leaders, underlying north, *i.e.*, the opposite way to the reef, were cut in two little shafts just inside the boundary of the adjoining Section 385-93g.

The south reef, on the other hand, seems to die out suddenly going westward, just as the north one does going eastward. It was worked on surface many years ago on the ridge where shown on the plan, but could not be found in three shafts immediately to the west. It has been traced eastward on surface to the edge of the Tertiary basalt, to the east of the East Clarence shaft. In the East Clarence mine the lode is quite similar to the north lode of the Clarence in the lower levels, and I strongly suspect that they are identical, and that the west part of the reef has been heaved north by a fault. This would explain the sudden cutting off of the north lode to the eastward and of the south lode to the westward, and would explain why the Clarence mine has never got the south reef in the cross-cuts. It is quite possible that there is not a true fault cutting fairly across the lode, but that the wide channel of shattered country along the line of this has a fissure across it from wall to wall, and that the lode has formed on opposite sides of the main channel on each side of this heave. It seems more probable that the dislocation of the reef is due to a local heave of this sort than to a true fault, for one of the latter of magnitude sufficient to produce so much lateral displacement of the lode could hardly have missed being seen in some of the adjoining mines. Driving eastward on the Clarence north lode should soon solve the problem.

The Clarence mine has not been a producer of much gold, but has yielded sufficient to show that it is well worth prospecting further, especially at greater depth. A new shaft further south than the existing one, and much better equipped with machinery, is urgently required in order to open satisfactorily in depth.

East Clarence Mine, Section 385-93G.—The main shaft of the East Clarence Company is shown on the general plan of the field about three chains from the south boundary of the section. It was sunk as a prospecting shaft, 6 feet by 3 feet, but below the 160 feet level has been lengthened to 9 feet by 3 feet. The shaft is 230 feet deep, and at the time of my last visit preparations were being made to open No. 3 level at 220 feet. No. 1 level is 100 feet from surface, and No. 2 is 160 feet. At No. 1 level the lode was cut 43 feet from the shaft and to the north of it, and followed westward 55 feet and eastward 94 feet. The lode proper is a vein up to three feet wide in a much wider broken "formation." In the main cross-cut a hard footwall is seen eight feet past the lode. Going east gold was found in the floor of the level about 14 feet from the cross-cut and at 30 feet in; stopes are seen in the back of the drive. The vein-filling is mullocky material containing much shattered and crushed quartz in the auriferous portions. The underlay is to the south.

At the 160 feet level the lode was cut 22 feet north of the shaft, and followed on to the east 240 feet, and westward 143 feet. In this level the chute of gold was west of the shaft, dipping apparently westward, therefore at a flat angle.

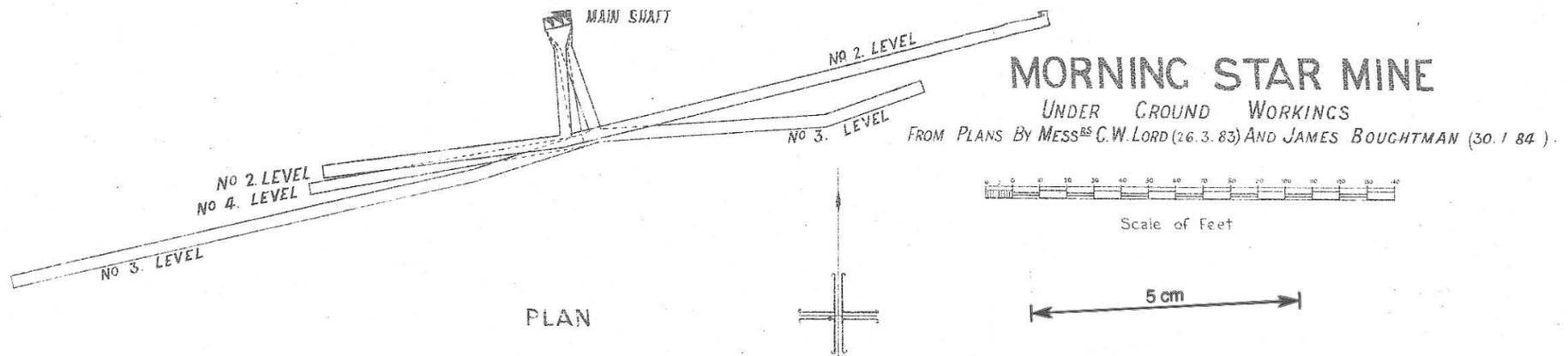
Some good crushings have been taken from this mine, but I have not the exact figures of the tonnage and yield. The stone is quite similar to that of the New Pinafore mine, and the whole Clarence reef closely resembles the New Pinafore one, but appears to be smaller. The Clarence lode is one of the wide shattered lode-channels or "formations" that have been above described, and affords excellent examples of the crushing of the auriferous stone by the pressure and movement of the walls. It is well worth an extended trial in depth.

New Golden Heart Mine, Section 573-93G.—Three shafts are shown on the general plan towards the south-west corner of this section. The furthest north one was not very deep; it passed through the edge of the basalt and struck slate bottom. The next one to the south is 58 feet deep, but did not penetrate through the basalt. The furthest south is the main shaft of the New Golden Heart Company, sunk to prospect for the East Clarence lode. As shown by the plan it is well situated for cutting this lode in depth, but is rather far south to get it at shallow levels without some cross-cutting. It seems to be near the middle of a branch of basalt from the Deep Lead, but the gutter is probably some chains east of it. The shaft is 220 feet deep, and a cross-cut is driven northward from it at the 200 feet level. In sinking through the Tertiary material the following section was obtained:—

	ft.	in.	Total.	
	ft.	in.	ft.	in.
Basaltic clay	30	0	30	0
Strong basalt	41	6	71	6
White silt.....	8	0	79	6
Dark soil	1	6	81	0
Sandy clay.....	10	0	91	0
Waterworn wash.....	10	0	101	0
Slate and sandstone	119	0	220	0

The Manager of the mine, Mr. Tripptree, informs me that he got traces of gold from the gravel on the bottom, which latter was dipping about 1 in 3 to the east. At the time of my visit the cross-cut had been driven north 67 feet through slate and sandstone country with little dip in any direction, and containing numerous small nearly vertical veins of quartz from $\frac{1}{2}$ -inch to 2 inches wide running more or less east and west. At 13 feet from the shaft a small lode was cut of 6 to 8 inches of quartz running N. 87° W. and dipping south 68°. At 44 feet from the shaft another little lode of 6 to 8 inches of quartz was met with running N. 85° E. and underlaying very slightly to the north; this seemed to be cut in the centre of the cross-cut by a slide running N. 40° W. and underlaying 2 in 3 to the S.W. A little gold was got in this lode, and after leaving the district I have been informed that some fairly good stone was obtained. The East Clarence lode, however, had not been cut when last I heard of the mine. The cross-cut is well worth pushing on.

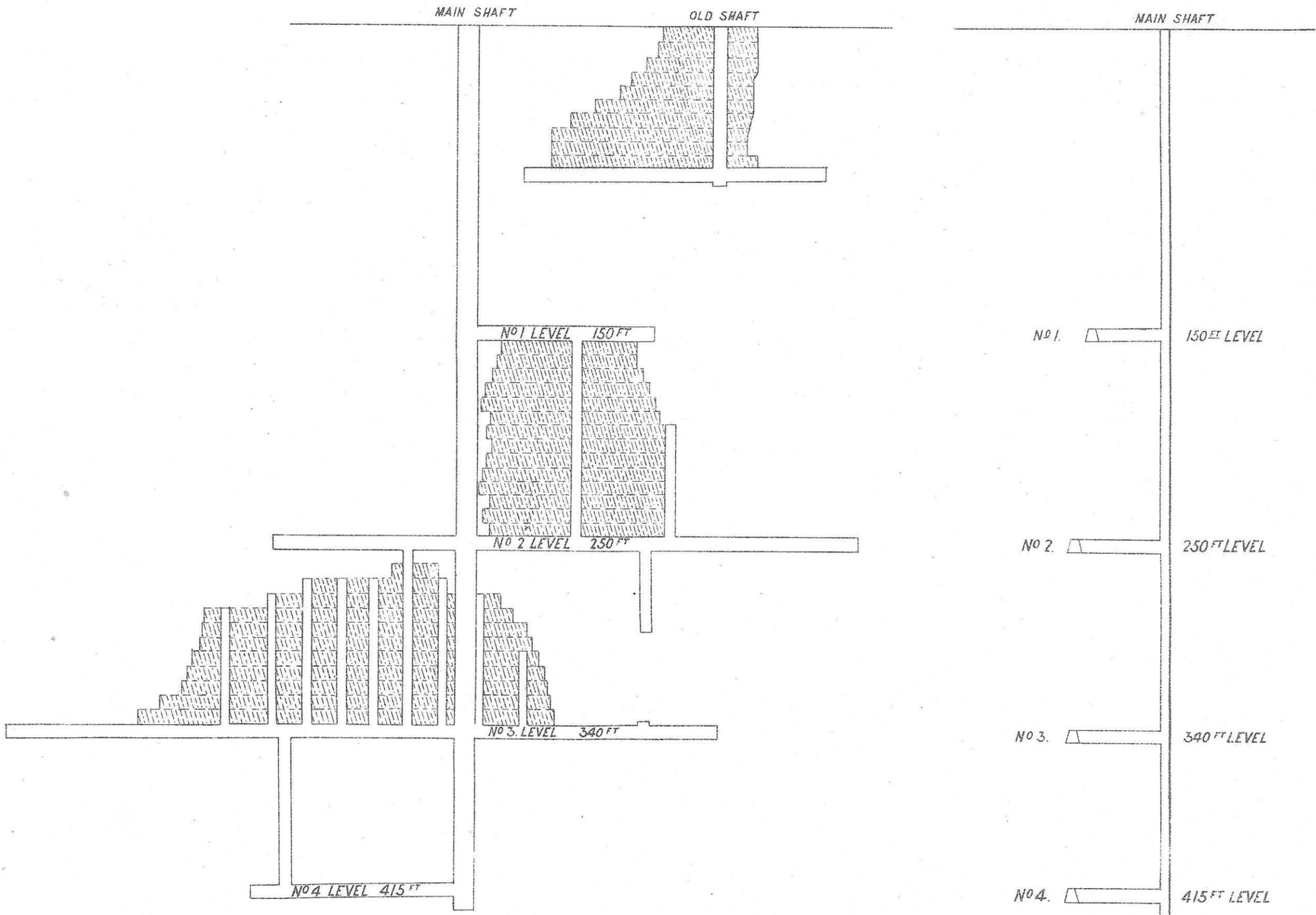
Morning Star Line of Lode.—This is a strong line of reef, on which a great deal of prospecting and some good mining work have been done. As seen by the plan of the field, it seems to extend as far east as Section 275-93G, but appears to get small and become split up at this end. It is the only one of the Lefroy reefs that seems to be at all certainly traceable across the Deep Lead; the Volunteer reef, being quite south of the alluvial ground, not being referred to in saying this. The Welcome workings on Section 172-93G are so exactly on the line of the lode seen west of the deep ground that there can be little doubt that they are on the same lode. The Morning Star reef is a strong body of stone, resembling the usual type of quartz reefs elsewhere rather than the broken "formations" so common at Lefroy. Gold has been got in it in several places, but except in the Morning Star mine itself there has been little ore worth crushing. This mine after standing idle for many years was unwatered in 1896, but little more was done than looking at the old workings.



LONGITUDINAL SECTION LOOKING NORTH

CROSS SECTION LOOKING WEST

— NOTE — Shading represents ground worked out.



when circumstances again compelled suspension of work. I was not able to see the mine during the short period it was open, and in fact have not been able to get underground in any of the shafts along the line. The following information is gathered from various sources:—

Section 275-93G.—On this section as shown on the plan a reef has been cut by a number of trenches, and just east of the eastern boundary is a shaft about 100 feet deep sunk by the Million P.A. A reef has been cut in this shaft, but I am unable to say whether it was got in sinking or by cross-cutting north or south, nor have I any information as to the size or value of the quartz.

A little north of Section 933-93G are several old prospecting shafts as shown on the plan, in which a reef has been cut. It seems likely to be a rubbly reef, with much mullocky matter with the quartz judging by the stuff thrown out of the shafts. All the old holes are full of water and much fallen in, so the size of the reef cannot be estimated. This lode is to the north of the Welcome and Million line, and is probably a branch from it.

Welcome Mine, Section 172-93G.—A reef has been traced by trenches and shallow shafts right through this section, disappearing westward under Tertiary alluvial matter of the Deep Lead. The New Welcome G. M. Company have sunk a main shaft shown on the plan, near the centre of the section, and east of it there is a whip shaft 50 feet deep, 8 feet north of which the lode was cut. The main shaft was sunk 186 feet, and a cross-cut driven 34 feet to the north. The lode was met with at about 20 feet, and was driven upon to the eastward 28 feet, the face showing 3 feet in the width of rubbly quartz and grit with no gold in it, when work was stopped in June, 1895. Another level had previously been put in at 100 feet from surface, the reef being cut 50 feet north from the shaft; it was here 4 feet in width of rubbly quartz with a little gold in it, but not payable. The water became too heavy for the small engine used, and better machinery would be required before the mine could be re-opened. There is gold-bearing stone in this mine and a fair-sized reef, so it offers some inducement for further trial. Some of the stone is very splendidly slickensided. The workings from the whip shaft are said to be connected with those from the 100 feet level of the main shaft, but I have not learned that any stone was milled.

Section 583-93G.—In the north part of this lease there is an old shaft probably quite 50 feet deep, but there is no quartz about it to show that the reef was cut, and it seems to lie south of the line.

Section 310-93G.—Near the north boundary of this the Morning Star reef was cut in an old fairly deep shaft now fallen in, shown on the plan, and from this point it has been traced westward to Section 551-93G. In an old deep shaft (fallen in) just west of Section 310-93G the reef must have been a large body of quartz according to the stone at surface and local reports. South of this there has been a little alluvial digging on the edge of a branch of the Deep Lead. Three and a half chains further west is another old deep shaft, in which the reef is said to have been a soft "formation," and about four and a half chains still further west is yet another in which there was a strong body of quartz. In Section 848-87G two more shafts are shown on the plan, both fairly deep, and both apparently having yielded much quartz. In Section 863-87G on the east side of the road we come to the East Morning Star whip shaft, from which a good deal of work appears to have been done. Between this and the Morning Star main shaft, which is close to the west boundary of Section 863-87G, are two more small shafts and some trenching, and by the same means the reef has been traced westwards into Section 551-93G, where there are two fairly deep prospecting shafts belonging to the old West Morning Star mine. In the eastern one of these the lode is reported to have been twelve inches wide. Still further west in Section 746-87G we see the Bendigo or Reliance workings, which appear to be on a branch of the Morning Star line.

Morning Star Mine.—A plan and section of the workings of this mine, copied from drawings in the Inspector of Mines' Office, is attached to this Report. When the mine was pumped out by the Amalgamated Morning Star G. M. Co., No Liability, in August, 1896, the Mining Manager reports getting gold-bearing stone from the winze in the east level at 200 feet, the stone being 4 feet wide. The most complete account of the old workings that I have been able to obtain is given in a report by Mr. W. H. Stubs, from which the following particulars are taken:—From surface to the 70 feet level several crushings yielded from 4 dwts. to 17 dwts. gold per ton, the reef being from 2 to 10 feet wide. The No. 1 level, at 150 feet, was driven about 100 feet east, and the ground stoped up to the 70 feet level, the stone crushed being payable. The No. 2 level (230 feet), was driven 210 feet, the reef being 2 to 4 feet wide, of similar quality to that above. The No. 3 level (320 feet) was driven 100 feet east, the reef being 3 feet wide, and rather poor. Driving west a good improvement took place, and the first crushing gave 12 dwts. to the ton. This level was driven some 300 feet, of which the first 200 feet were on payable ore; and in stoping up from this level some good stone was met with. One crushing of 400 tons yielded a little over 400 ozs. of gold. Large quantities of stone were crushed from this portion of the mine with highly remunerative results. The No. 4 level (420 feet) was next opened, and the reef driven along westward for 250 feet, about 3 feet wide, but not payable, "except some excellent stone met with near floor of

level." The mine was then let on tribute, but the tributors were unable to keep going, and the workings were allowed to fill with water, and the machinery was sold off. The water was easily kept under by a 7-inch plunger.

From Mr. Stubs' account of the mine and the plans preserved it seems that there was a really good chute of ore in this mine, and that working was abandoned owing to financial embarrassments rather than on account of the mine having failed. It seems well worth trying at lower levels, below the old workings.

Bendigo Mine, Section 746-87G.—All that is now visible on this mine gives no information further than as to the general course of the reef, which is as shown on the plan. There are several old fallen-in shafts, some old shallow alluvial digging below the line of the reef, and a main shaft full of water. I am indebted again to Mr. W. H. Stubs for particulars, as follows:—Under date 7th November, 1896, he writes: "New Bendigo, late Young Bendigo, late Reliance.—As far back as nearly twenty years ago the Reliance Company worked this property, but owing to the extremely patchy nature and diminutive size of the reef they did not remain long in existence. In 1885 Stubs and Keys took up the then abandoned section, and after prospecting some little time a small rich vein or leader was met with and sunk upon for a distance of 40 feet, during which the vein varied in size from one inch to twelve inches in width. At the 40 feet level, and in the course of driving, the vein widened out in one place for a distance of about 30 feet in length to 3 feet and 4 feet, and carried good gold at times, but did not maintain its size either above or below the level, which was subsequently proved by sinking another shaft 70 feet in depth and rising and connecting with the 40 feet level. The 70 feet level virtually proved a failure, for, although we drove along the course of the lode for over 200 feet, nothing approaching payable was met with. Small crushings, from 1½ to 40 tons, were put through the mill and produced about 300 ounces of gold, the amount of stone raised for this being between 200 and 250 tons. Some rich patches were discovered occasionally. One miner's cap full was taken off the wall at about 30 feet from surface, and after being panned off and cleaned yielded 21 dwt. of melted gold. Another time we crushed 1½ tons for 12 oz. 16 dwt., but on the whole the reef was too small and patchy to be of any use to us. We sank another shaft 100 feet immediately south of where we had the best gold, and put in drives east and west to overlap the upper level, but these workings were valueless, and the mine was closed down until another company was formed and sank the 100 feet shaft a further depth of 70 feet, cut the reef and thoroughly prospected it; but it, too, proved of no value. The New Bendigo then sprang into existence and started operations in the same shaft by sinking it a further depth of 60 feet. The reef was again cut at 230 feet from surface and driven on 60 feet west and 65 feet east; here the reef, or vein rather, was extremely small and of no value whatever. The country also was very hard and expensive for working. Mine at present shut down."

New Native Youth Line of Reef.—Sections 161-83, 133-83, 495-87G, and 113-93G. No work has been done on this reef for some years past, and the shafts are full of water. The shaft in Section 161-83 is known as the City of Launceston shaft, that in 133-83 as the New Native Youth shaft, and the largest one in 495-87G, as the Excelsior shaft. An old shaft in Section 263-93G further west is that of the West Native Youth Mine, but I am informed that the reef was not cut in it at all.

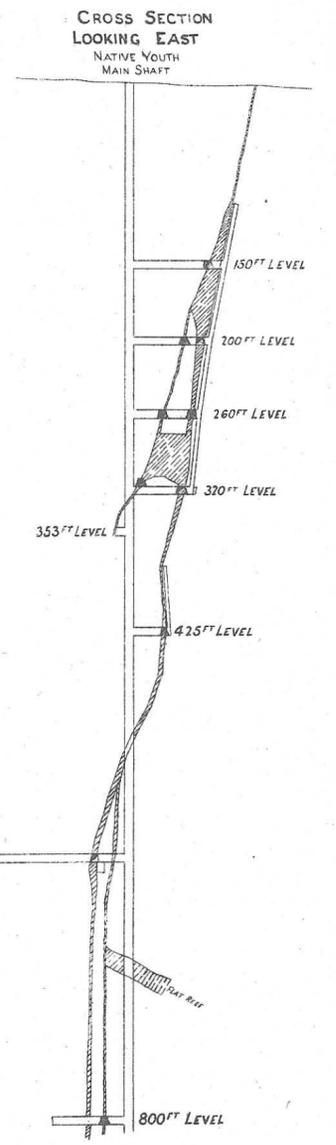
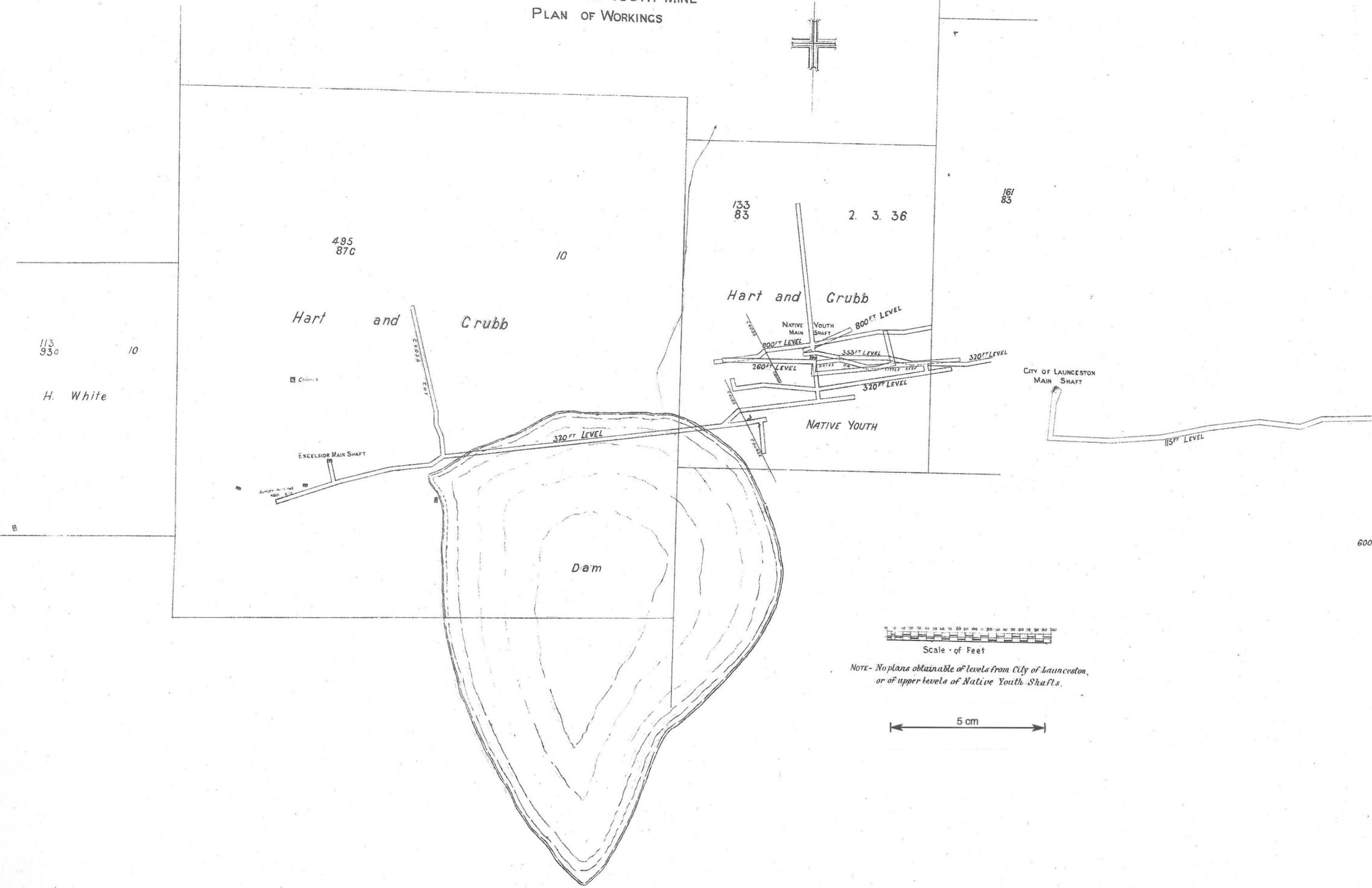
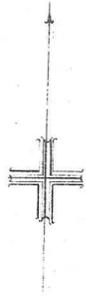
Mr. Thureau, in his Report of 1882, gives a plan and Section and some cross Sections of the New Native Youth lode, and a more complete drawing is appended to the present Report. It has been a strong well defined reef, underlying to the north instead of to the south like most of the Lefroy reefs. If this underlay is maintained in depth this reef must ultimately meet the Morning Star lode, and there is great hope that the junction will prove auriferous. A deep shaft to find this junction has long been a favourite scheme of Lefroy miners, and a very reasonable venture it appears.

The Native Youth and City of Launceston mines now belong to the New Pinafore Company, which bought them at the same time as they acquired the battery formerly belonging to the Native Youth Company. The total yield of gold from the City of Launceston mine was of the value of £10,000, and the Native Youth gave £95,589. In 1883 Mr. Thureau gave the total yield to date as 23,350 ozs., and the dividends as £28,437 10s.

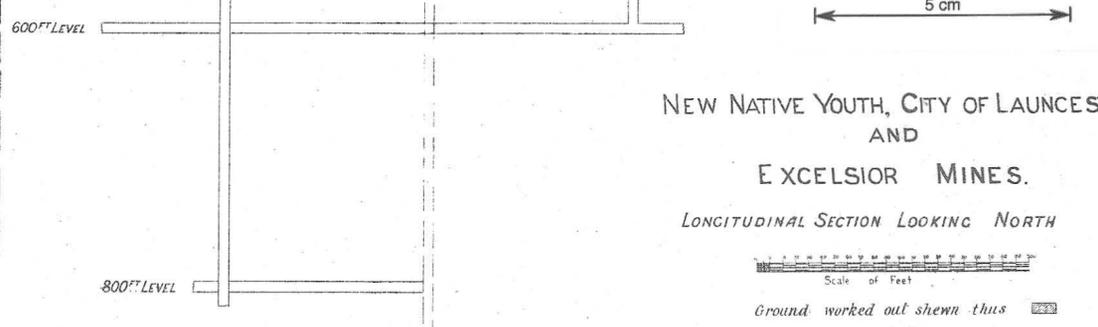
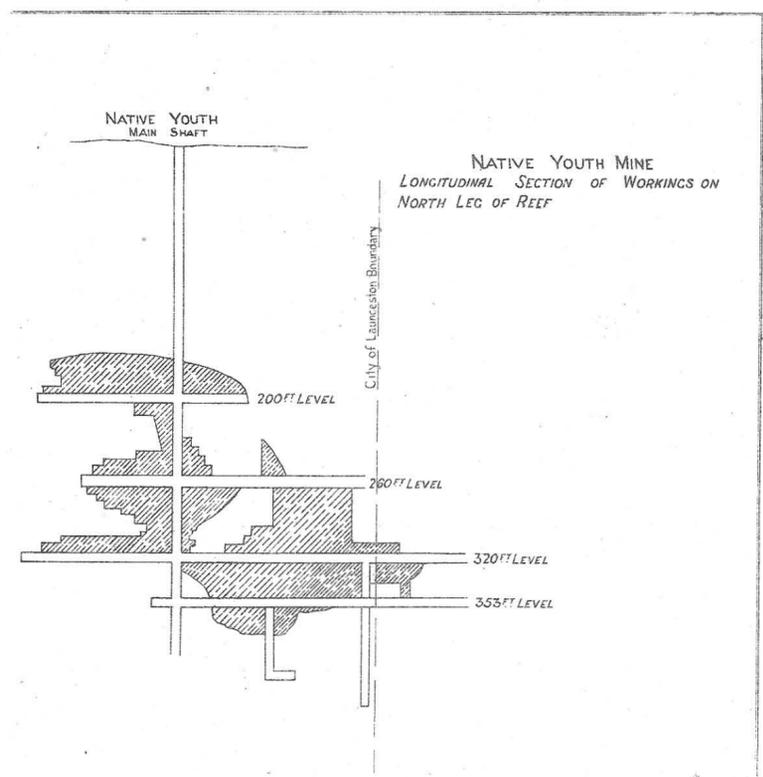
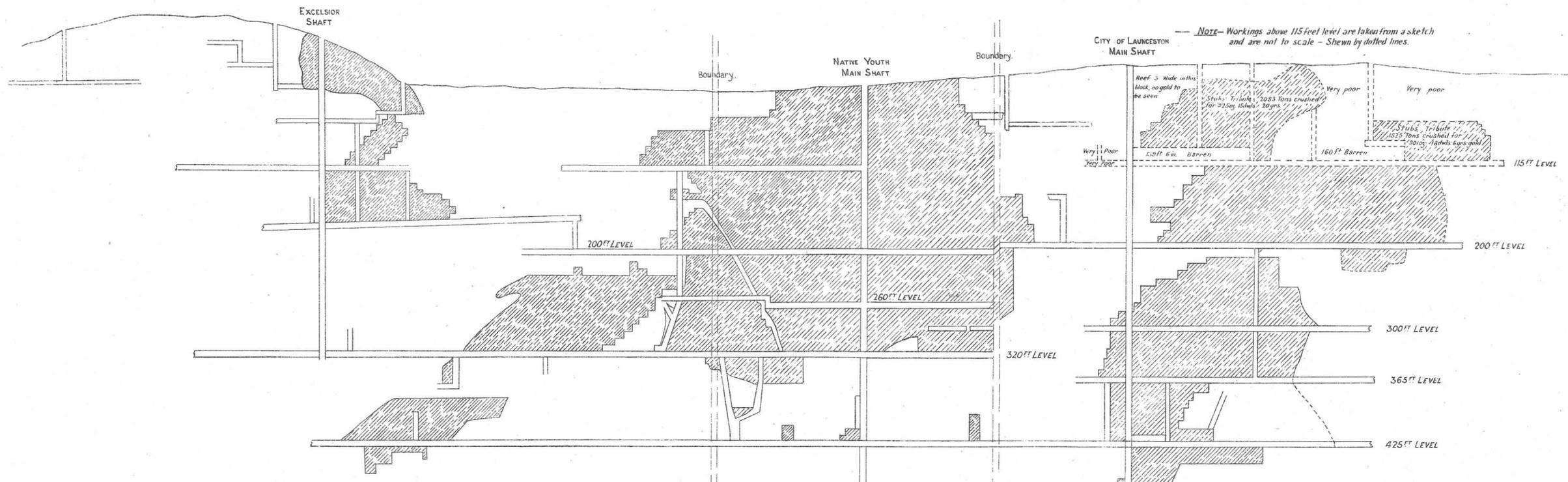
These mines were last worked in 1887 to 1889, when they were let on tribute to Mr. W. H. Stubs. He has been good enough to let me have a copy of a report dated 20th December, 1888, from which the following particulars are extracted.—"Over 1½ miles of levels &c. were unwatered, made up as follows:—Levels 5637 feet, shafts 1620 feet, crosscuts 615 feet, winzes and rises 425 feet, or a total of 8297 feet in all: this is, of course, exclusive of the stopes, where it would be utterly impossible to make even approximate calculations."

"800 feet level.—We started to open out west at this level on the 2nd January, 1888; driving was commenced immediately from the crosscut, the New Native Youth Company not having opened out there. The reef on starting was fully 3 feet 6 inches wide, and continued so for some distance, but eventually became very small and country hard. No gold was seen in this level, and the characteristic minerals, such as galena, black jack, (blende), and copper pyrites, which attend the gold-bearing portion of the lode, were conspicuous by their absence. The total distance driven on this level is 132 feet, and it is at present suspended: reef in the end very small."

NEW NATIVE YOUTH MINE
PLAN OF WORKINGS



NOTE - No plans obtainable of levels from City of Launceston,
or of upper levels of Native Youth Shafts.



"800 feet, *East Level*.—After cleaning out the old level and laying tramway, work was commenced at 125 feet from the crosscut. The reef was found to be very small, but improved in appearance and size as it was driven on. A few colours of gold were obtained, and a rise put up to test the value of the stone, but we could not succeed in getting any more. The walls in this level were very hard and clean, with a slight underlay south, or contrary to their true underlay. The total distance driven in this level is 227 feet 6 inches. It was deemed advisable to suspend operations here also, there not being sufficient encouragement to warrant any further outlay; the tramways were pulled up and sent to surface, when work was resumed at the No. 3 or 320 feet level.

"No. 3, *North Leg*.—This supposed "leg" or "branch" of the main lode was opened out upon from the cross-cut; reef 15 inches wide, of a very promising appearance. The reef was driven on for a distance of 47 feet, and averaged about 12 inches of very fine-looking quartz. A few specimens were obtained after driving about 15 feet, which in all probability will be further tested at some future date.

"No. 3, *Main Reef*.—We started driving at a distance of 76 ft. 6 in. from the main cross-cut, where the New Native Youth Company left off. We had only driven about 15 ft. or 20 ft. when gold was discovered. After continuing the level on a few feet further a rise was put up and struck payable stone. A crushing from this portion of the mine was commenced on the 4th May, when 230 tons of quartz were crushed, yielding 71 oz. gold. Having seen no hanging-wall in this level we put in a cross-cut (which we now call No. 2) north at a distance of 141 ft. 6 in. from the main cross-cut. The hanging-wall was struck 17 ft. 6 in. from the footwall, and we were pleased to find fairly good stone accompanying it, which lasted about 25 feet both east and west, when the stone gradually become poorer. In the meantime the foot-wall level was pushed on, but the reef on this wall was very small and carrying no gold: we therefore suspended work in this level and confined ourselves to the hanging-wall level, which was carrying nearly all the gold.

"*Eastern Level on Hanging-wall*.—This level has been driven 119 ft. 6 in. from No. 2 cross-cut, but during the last 70 ft. or 80 ft. little or no gold has been seen: the reef in the end is 2 ft. 6 in. wide. We are now within 35 feet of the City shaft, but have ceased working here for the present."

"*Western Level on Hanging-wall*.—We drove this level a distance of 65 feet from the No. 2 cross-cut, when, the stone being very poor, driving was discontinued. For the first 25 feet the level carried very fair gold. In order to prove whether the little reef was in any way connected with our hanging-wall I decided to drive the required distance of 29 ft. 6 in. We have since broken through into the level we started on the north "leg," which now proves conclusively that the hanging-wall of the main lode is identical with the hanging-wall of the north "leg," or little reef. This level has been driven a distance of 264 ft. 6 in.

"The total number of feet of levels driven since January, 1888, is 688 ft. 6 in., and cross-cuts 39 ft. 6 in., or a total of 728 feet in all.

"The amount of stone raised and crushed since the 4th May last is 1728 tons, yielding 739 oz. 16 dwt. of gold, being an average of 8 dwts. 13½ grs. per ton, valued at £2959 4s."

The record of the New Native Youth mine is a very good one for the amount of ground laid open, and in my opinion the mine has only to be vigorously explored in depth to again become a large producer of gold. The lode is a strong well-defined one, and will doubtless live to any depth to which it can be followed, and the chutes of ore have been very considerable in size, as shown by the amount of ground that has been stoped out. The venture of opening this mine once more and working it at lower levels is to be commended as a thoroughly genuine and legitimate mining enterprise.

On Sections 92-93G and 178-93G several shafts have been sunk to look for the eastward continuation of the Native Youth reef, the largest being that of the East City of Launceston mine, near the south of Section 92-93G. This is long since dismantled and fallen in, and I have not been able to find what depth it was or what work was done from it. Some gold-bearing leaders are said to have been met with, but no lode.

The small shaft in the angle of Section 161-83, seen on the plan, a few chains W.S.W. of the East City of Launceston shaft, was sunk 100 feet, and a small east-and-west leader is stated to have been cut. Another shaft, shown on the plan north of this one, just inside the boundary of Section 92-93G, was sunk 70 feet, and then some driving was done, of which I obtained no particulars. A winze has also been sunk some 30 feet, but I understand that no lode was found.

In the long excavation sluiced out by the Lefroy Hydraulic Sluicing Association, in Sections 501-93G and 583-93G, quartz with gold in it was obtained occasionally, and some veins of lode-matter were noticed in the bedrock. From its position it seems likely that this trench would cut the Native Youth reef, but it is not certain that it did so, and, possibly, it does not extend far enough south. If any of the veins seen in it really are the lode, this must here be small and split up, or else changed to a large slaty "formation," which might easily escape notice in sluicing if it did not happen to carry gold where cut.

In Section 178-93g, on the east side of the Cemetery Road, are some small shafts sunk by the Golden Light P.A., in one of which some gold-bearing leaders are stated to have been cut. These seem rather far south to be the Native Youth reef, and too much to the north to be on the Hit or Miss line.

Sea View Reef.—Away east of the Deep Lead, on Section 294-93g is a lode, which from its position might be part of the Native Youth line. The main shaft is close to the western boundary of the section, and is 60 feet deep. East of it a short distance is an underlay shaft 36 feet deep, in which some gold was got. From the bottom of the shaft, at 60 feet level, a little driving has been done on the lode, which here was from 4 to 7 feet in width, containing a little stibnite and "colours" of gold at times. The underlay agrees with that of the Native Youth reef, being to the north about 1 in 3. West of the shaft the lode has been traced for some chains as shown on the plan, but becomes small, and nothing has been done on it except shallow trenching. The country in this vicinity is mostly hard slate.

Hit or Miss Line of Reef.—This is a small line of reef, and does not appear to extend far either east or west, but is a true fissure lode, and is gold-bearing. The main shaft is shown on the general plan, near the north-west angle of Section 65-93g. My last visit to this mine was on 4th September, 1896, since when the workings have been extended, but the particulars now given are up to the date named. The shaft is 272 feet deep, with levels at 185 feet (No. 1) and 263 feet (No. 2). Many years ago the reef was worked near surface, and yielded gold-bearing stone, but no particulars are available as to the extent of the workings or value of the ore extracted. The present owners are the New Hit or Miss Gold Mining Company, No Liability. At the 185 feet level the lode is north of the shaft. A cross-cut has been driven eastward, and cuts the reef 50 feet from the shaft, then the line of the lode is followed for 182 feet. For the last 94 feet the course is more to the north than previously, the bearing being about N. 60° E., and the quartz has become very small, there being three parallel veins, with only about $\frac{1}{4}$ inch to 1 inch of quartz on each. The fissure appears to be dying out in this direction altogether, becoming a mere joint or divisional plane in the country, which is mainly sandstone, but the strings of quartz contain a little gold, and though small are very distinct. At the above bend in the reef a cross-cut has been driven 108 feet to the south-east, following for most of the distance a smooth divisional plane in the country dipping N.E. 63°. The cross-cut is almost exactly along the strike of the beds of country, which here run N. 33° W., and dip S.W. from 40° to 45°, the joint followed therefore cutting them nearly at right angles. A little quartz is often seen along this joint, but no faulting appears to have taken place. Other shorter cross-cuts have been driven north and south further back towards the shaft in this level, to make sure that the reef has not been faulted by a sort of cross-course which has been met with, but there does not seem to have been any perceptible heave. On the east side of this cross-course a rise has been put up 50 feet, on gold-bearing stone, and 40 feet up the lode was followed east for 20 feet, but became small and poor. To the west the cross-course was cut through, and proved to be 4 feet wide, but the reef became very small. The gold-bearing stone seemed to be confined to a few feet on the east side of the cross-course.

North of the shaft the reef was cut at about 9 feet, and has been followed 26 feet east and 24 feet west. In the west end is a fault 6 to 15 inches wide, filled with quartz veins, pug, and squeezed slate, with fairly defined walls running N. 85° W., and dipping 60° to the north. In the east end a rise has been put up a distance of 50 feet in broken lodestuff. A winze has also been sunk to the bottom level.

In the chamber and shaft there is a seam of pug about 18 inches wide, running north-westerly and dipping south-west. In the workings from the winze this cuts through the lode, but does not heave it more than its own width. The cross-courses of one sort and another met with in this mine are numerous, but do not appear to displace the lode appreciably, yet have a great effect on its size and value, the stone being strong and gold-bearing on one side of them and not on the other.

At the 263 feet level the reef was 35 feet north of the shaft, the underlay to the north being therefore 26 feet in 78 feet, or 1 in 3. The lode has been followed 45 feet west and 33 feet east, and is from 1 to 4 feet in width between the walls, the quartz being from 8 to 12 inches wide. At this level the lode has hard smooth walls, and is much more distinct than in No. 1 level; a little gold was in it in the east end.

One crushing of 33 tons of stone from this mine, in August, 1895, gave 8 ozs. 15 dwts. of gold.

This lode is parallel to the Native Youth lode both in strike and dip, and may be regarded as a "companion lode" to it; it does not appear to be one of the main lode fissures of the district. In the bottom level it certainly looks much more promising than in the upper one, and in my opinion it will live downwards, and may likely become larger. It can hardly be recommended as a good mining venture if it has to be developed from a shaft of its own, but would be worth cross-cutting for from the Native Youth line at some of the deeper levels. It underlays into the New Native Youth (now New Pinafore), Section 161-83, and to the westward passes into Section 496-87g. This has prevented much work being done on it to the westward by the present owners. The reef is much stronger in the west end than in the east, and requires proving in that direction. This could well be done from the existing shaft at the bottom level, and seems to me well worth doing.

The cross-cut in the east end at the No. 1 level was put in to try for the Golden Point lode, seen running north-easterly through Section 160-83 on the general plan. It seems doubtful, however, if this will pass through the Bain and Richards' reef, lying north of the Golden Crown shaft, now to be described.

Bain and Richards' Lode.—This is a reef with the usual course of the lodes of the Lefroy district, which has been well traced by trenches through Sections 905-87G and 160-83, but has had very little deep mining done upon it. Its western extremity appears to be at the Old Wideawake shaft, 70 feet deep, close to the eastern boundary of Section 245-93G. The reef in a surface trench south of this is very small, only about 2 inches of quartz, and I was told that it was not seen at all in a cross-cut from the bottom of the shaft. From three to four chains east of this shaft a little gold was found in the reef, but nothing of consequence. Going down into the low ground on the east of Section 905-87G the lode becomes larger, being up to 15 inches of quartz, but carries little or no gold. In Section 160-83 it has been cut in several prospecting shafts, but has not proved valuable. It is probably seen in the workings from the Golden Point and Crown mine, but this is not yet quite certain.

About 12 chains west of Section 268-93G is a whip shaft some 60 or 70 feet deep, put down to work a small leader cut on surface, which corresponds fairly well in position with the Bain and Richards' line. This leader is very small and does not appear to be of much consequence, and it need not necessarily have any connection with the Bain and Richards' line.

New Golden Point and Crown Mine.—On the general plan two large shafts are shown in Section 160-83 close to a line of lode running north-easterly: these belong to the Golden Point mine. North-east from them, just east of the boundary of Section 64-93G, is the main shaft of the Golden Crown mine. Both these mines are now held by the New Golden Point and Crown Gold Mining Company, No Liability. The northern one of the two large shafts of the Golden Point is the main shaft: it has been full of water for some years, and I have not been able to obtain full particulars of the workings from it. According to a plan made early in 1890 the main shaft was 180 feet deep, and considerable work had been done above the 100 feet level. The lode was cut 30 feet south-east from the shaft and followed north-east for 116 feet: it then divided into two branches, the eastern one keeping the old course of the reef was followed for 21 feet, while the western one ran N. 12° W. for 49 feet. To the south-west from the cross-cut the lode is shown as having been driven upon for 123 feet, and two winzes from surface connect with it. A large amount of stoping was done above the 100 feet level, and some very rich stone was obtained. The lode underlays to the north-west. I have no information as to the work done at the 180 feet level from the Golden Point shaft.

In the Golden Crown shaft on the occasion of my last visit on 5th October, 1896, the depth sunk was 345 feet, and it was intended to open No. 4 level at 330 feet. I believe the shaft has since been sunk deeper. The mine has the following levels,—No. 1 at 94 feet, No. 2 at 190 feet, and No. 3, 270 feet, besides intermediate levels at 210 and 236 feet.

At the No. 1 level there is a cross-cut to the south 105 feet to cut a lode from 3 to 5 feet wide, running east and west. A little stoping has been done on this, and three winzes have been sunk. This lode is driven upon to the east 86 feet. These particulars are from a plan given to me by the Mining Manager, Mr. A. Tarrant; the level, being dammed full of water, was inaccessible. North of the shaft is a cross-cut 88 feet in length, through disturbed country, with occasional strings and bunches of quartz. At 78 feet from the shaft an irregular break in the country was followed north-westerly for 40 feet; 24 feet in this met with a sort of lode-channel running a little north of east, which may be Bain and Richards' reef. I do not think, however, that the cross-cut has gone far enough north to be into undisturbed country, and it seems quite possible that Bain and Richards' reef is still ahead of it. No ore of value appears to have been got in this level. The country south of the shaft lies in very flat beds, and appears little disturbed, but it seems very probable that all the north cross-cut is in a wide lode "formation," which at this point carries little quartz. It probably is due to the shattering of the country in the acute angle between the Golden Point and Bain and Richards' reef.

In sinking the shaft at 110 feet down, a big "formation" carrying a good deal of quartz was cut, and at 145 feet the Golden Point reef was met with 2 inches to 8 inches wide, carrying gold. At 190 feet a cross-cut was driven north 75 feet, and passed through a hard "formation" carrying several veins of quartz for 37 feet, then got into more settled country, which still carries numerous quartz leaders. A cross-course running W.N.W. was met with 13 feet from the shaft, dipping to the north about 80°; this heaves the lode about 10 feet north, but is probably only a local displacement in the "formation." Some good stone was got in this level, but the quartz was in short blocks and irregular bunches, very difficult to follow, smooth divisional planes occurring plentifully, and faulting the stone in a most perplexing manner. In the intermediate levels at 210 and 236 feet the principal body of stone is on the course of the Golden Point lode, and at 236 feet it was a fine large body of good quartz, but there were also several veins of stone carrying gold running in other directions without regularity.

At the 270 feet level a cross-cut was driven south 70 feet through hard black slate, much twisted at times, which is still very probably in the shattered zone or "formation." The lode at

this level was still very irregular in shape and blocky in character. The main portion of it is cut at 26 feet from the shaft in the north cross-cut. This went north in all about 75 feet, and at 72 feet struck a hard wall. Between this and the lode the rock was full of quartz-leaders. The wall has been followed N.E. 48 feet and S.W. 13 feet; there is about 3 feet of broken lode-matter on it and a little gold. Its strike corresponds better with that of the Golden Point lode than with Bain and Richards'.

At 329 feet in the shaft a leader cut close to the shaft in the south cross-cut at 270 feet came in carrying payable gold, and at 345 feet, when I last visited the mine, there was in the bottom of the shaft from two to three feet of lode-matter with one foot of payable stone. This is quite in the foot-wall of the stone worked at the 270 feet level, which is north of the shaft.

Owing to the very irregular distribution of the quartz this has been a very difficult mine to work, especially at first, when the amount of work done was not enough to show the true character of the occurrence. It is now pretty clear that here we have a wide zone of shattered country in the irregularly shaped fissures of which quartz has formed, consequently ore may be found anywhere between the main walls of the shattered zone, and a great deal of cross-cutting through it becomes necessary. The country being hard strong slate and sandstone has not been crushed into mullock as in parts of the New Pinafore and Volunteer "formations," but shows the effect of the displacements that have gone on by the irregular jumbled manner in which the blocks of rock are disposed, and the frequently contorted stratification of the slates. A continual dripping of water all over the mine also testifies to the shattered condition of the rock.

Not having examined the workings of the old Golden Point mine, which have been shut down for some years, I am unable to say if it also presents the characteristics of a shattered zone "formation," but, judging from the way the levels branch to the northward on the plan of the 100 feet level of the mine, it seems probable that it did to some extent. The quartz body, however, appears to have been much better defined than in the present workings.

It seems most likely that the Golden Point lode is a cross lode between Bain and Richards' reef and the Australasian reef, both of which have the normal strike.

The work in progress from the Golden Point No. 1 mine in Section 143-93G should do much to throw light on this question. The writer's opinion is that it is unlikely that the cross lode will extend far past the lines of the normal lodes on the north and south of it.

The policy of the management of the present mine has been to keep sinking on the known chute of ore near the shaft, in the belief that the lode will become a more defined body of quartz in depth. This improvement is very probable, and the way in which the quartz has made stronger and stronger at each lower level is very encouraging. While thoroughly commending the policy of sinking, and giving great credit to the mining manager for the able manner in which he has followed the quartz in a peculiarly perplexing mine, it nevertheless seems to me that extension of the upper levels is also very desirable and advisable, and that the "formation" should be cut across in several places from wall to wall into plainly solid and undisturbed country. The quartz in this mine has been of very good quality, some of it among the richest ever found on the field, and the prospects of it are, in my opinion, very good if systematic opening of the ground is persisted in. It is very likely that in depth the "formation" may make into a much more defined lode. It seems especially advisable to try to find the junctions of the cross lode with the two east and west lines of reef to the north and south of it.

The old Golden Point mine yielded gold to the value of £15,000. On 22nd October, 1896, the New Golden Point and Crown mine had given 1175 tons of quartz, which yielded in the mill 1005 ozs. 11 dwts. 2 grs. of gold, worth £4020. On November 3, I have noted from press reports, another crushing of 215 tons of quartz yielded 204 ozs. 15 dwts. gold of value £816, and there have been later crushings of which I have no record.

Australasian Reef.—The main shaft of the New Australasian Gold Mining Company, No Liability, is seen on the general plan in the north of Section 326-93G. Very little work has been done on this lode, and at the time of my survey the mine was shut down. Mr. W. H. Stubs, who was in charge, has kindly given me the following particulars:—"The surface workings consist of several small prospecting shafts, varying from 10 to 22 feet in depth, and in some places connected with each other. A small reef was discovered, and at times carried sufficient gold to warrant sinking a main shaft, which was accordingly done. The shaft, 9 ft. 6 in. x 3 ft. 6 in., was sunk to a depth of 110 feet from surface, and a cross-cut put in at 100 feet, and driven 55 feet south. At 45 feet the reef already referred to was met with, but was not more than 6 inches wide and of no value. The reef was then driven on in an easterly direction for a distance of 48 feet, and varied in width from 3 inches to 20 inches, and invariably carried a high percentage of pyrites. At the end of this level a rise was put through to one of the small prospecting shafts where the reef had already been cut, and, strange to say, with the exception of the capping of the lode, scarcely a "colour" of gold was obtained. The lode throughout the rise was of most promising appearance. Immediately under the "wash" that overlaid the reef some good prospects were obtained, the gold assuming a ragged appearance, and pieces weighing up to 10 grains being revealed."

In Section 143-93G a number of prospecting shafts have been sunk nearly on the line of the Australasian reef, and also to the south of it, but, so far as I could learn, nothing of importance was cut in any of them.

Brisbane or Prince of Wales Line.—In the north-east portion of Section 1029-87G are seen some old workings executed by the Brisbane Company, now long shut down. The main shaft is said to have been 150 feet deep. The lode was very small, but contained nice-looking slickensided stone. One crushing from this lode is said to have given a payable return, but the vein was too small to be worked profitably. In the north-west of Section 332-93G a vein was cut in a small prospecting shaft 25 feet deep, the width between the walls being four feet; it was taken for the Tablier reef, but, according to the survey, seems more likely to be the Brisbane line.

In Section 249-93G is shown on the plan the shaft known as the Duke of Argyll, about the depth of which I have no information. Very little quartz is seen about the mouth of the shaft, so it is doubtful if a reef was cut; it is situated nearly on the line joining the Brisbane and Prince of Wales workings.

The last named workings are shown on Section 234-93G, and consist of one fairly deep shaft and several smaller ones and trenches on the line of the lode. The only information I have as to this reef was kindly supplied to me in a letter dated 5th November, 1896, by Mr. G. Beedham, of Hobart: he says:—"About 17 years ago 10-acre Section 234-93G was opened by sinking a shaft 50 feet, and 50 tons of stone were crushed at the Native Youth battery from a well-defined lode at the 50 feet level, 5 feet wide, which gave 19 dwts. to the ton. At 75 feet a still better crushing was taken out. At 100 feet the lode was struck again, but broken up and impossible to get a crushing out on account of the great influx of water. The lode underlays south."

Tablier Line.—The main Tablier shaft is shown on the general plan a little south of the centre of Section 1029-87G; it is said to be 100 feet deep; a reef of 3 feet of quartz is said to have been struck, but no gold in it. Another shaft east of the creek is 70 feet deep and got a big lode, also of no value. I have no further information about this mine, which has been shut down for some time. West of the shaft in the next section are several small shafts, in two of which a vein of quartz was cut. From the position on the plan it would seem likely that this vein connects the Brisbane and Tablier lodes. On Sections 66-93G and 332-93G the Tablier lode is traced by a number of small shafts and trenches from the top of the spur in 66-93G to the flat gully in 332-93G. In this gully the alluvial matter was too deep for trenching on the reef. The latter has an underlay to the south, and in some of the trenches gave a little gold.

Windermere and Monkland Line.—Still going south we next come to a line of reef on which a great deal of shallow working has been done, and from which good gold-bearing stone can often be obtained, though only in very small quantity. The New Windermere G. M. Company's workings are shown on the general plan on Sections 1024-87G and 51-93G. The main shaft is nearly on the boundary between the two sections. It was full of water when I saw it, and I could not get particulars of the workings. On the ridge in 51-93G several shafts up to 51 feet in depth have been sunk, and some driving on the lode done. The vein of stone is very small, and underlays to the south. Near the N.E. corner of 51-93G is the old tunnel, now fallen in, of the East Windermere Company, in which large blocks of quartz appear to have been obtained, but I am not aware at what point in the tunnel these were met with. According to the plan of the surface workings this tunnel would require to be put in a long way, from 300 to 400 feet at least, to cut the Windermere lode. On the east side of Section 51-93G a great deal of trenching has been done, but the lode is lost sight of for a time. On the slope down from the Main Road gold-bearing stone from this lode is frequently picked up. The reef, however, appears to be only a small one, and the only hope for successful working is that it may get larger in depth. It agrees so well in position with the Monkland line that there can be little question that the lodes are one and the same, and if so the fissure must be a fairly strong one, and there is consequently encouragement to believe that it will go down deep, and possibly get much larger.

The Monkland reef is shown on Section 742-87G. The main shaft is 110 feet deep, with a level at 95 feet. The lode was cut by a cross-cut 43 feet north from the shaft, and was then followed east 5 feet and west 65 feet. No stoping was done, and the reef was very poor, if not quite barren. This work was done by the last owners, the New Monkland G. M. Company. There are several older workings from which gold was taken, and I am again indebted to Mr. W. H. Stubs for particulars. He says (7th November, 1896):—"On this mine a good deal of surface cross-cutting has been done, and a fine solid body of stone uncovered for about 150 feet. Some years ago a main shaft was sunk 70 feet, the lode struck and proved to be very solid. Only a few feet of driving was accomplished, and about 30 tons of stone brought to grass, but was supposed at that time to be too poor to crush. Several small shafts were sunk on the lode, which produced about 100 tons of stone, the whole of which was crushed in small lots and yielded from $2\frac{1}{2}$ dwts. to 6 dwts. per ton."

Rifleman Lode.—Away to the west of the field on Section 187-93G a small lode has been cut on about the line of the Windermere reef, though it is hardly likely that they are identical. The workings on it are mostly very old, and I did not get any very certain information that gold had ever been obtained. The lode appears to underlay to the north. The shaft sunk a few years ago by the Rifleman Company seems to be about 50 feet deep, but is not now accessible for measurement. The lode seems small and unimportant, and is in very hard slate country.

Reward Lode.—Towards the north-west of Section 1015-87g is the highest point on what is known as Specimen Hill, from the number of pieces of auriferous quartz that used to be found there. A great deal of trenching and shallow shaft-sinking has been done in this vicinity, which was one of the first places worked for auriferous quartz on the field, the discoverer of the Reward lode obtaining a reward of £3000 for finding a payable goldfield. The old workings on this lode outcrop are seen on the general plan a little north of the centre of Section 1015-87g, and south of the Reward main shaft. The old workings are said to be from 70 to 100 feet deep, and underlay to the north. 70 tons of quartz are said to have given 140 ozs. gold. North of the main shaft is an underlay shaft 60 feet deep, on a vein underlaying to the north in which there was gold-bearing quartz near surface. Another small lode underlaying north is seen in a small shaft west of the main one; and still another lies about 68 feet south of the main lode. Two levels have been opened from the main shaft at 108 feet and 250 feet. In the upper level a cross-cut was driven north 159 feet, cutting veins of quartz at 6 feet, 66 feet, and 113 feet. The first one was followed east 16 feet and west 64 feet, and the second driven upon for 40 feet to the westward. The first vein underlaid to the north, the other two to the south. At the bottom level the first lode was 6 feet from the shaft, and was followed east 23 feet and west 64 feet, the lode being from 2 inches to a foot in thickness. A rise was put up 46 feet, and the lode followed on the south side of the shaft. Here it contained gold, and some very rich stone was taken out, but proved to be only a small bunch. At 80 feet from the shaft, going still north, the cross-cut passed through 12 inches of quartz and soft lode-matter dipping north, and at 160 feet some threads of quartz were cut.

The lodes do not appear to fault the country, and resemble the Hit or Miss reef in many respects, being at times a mere divisional plane in the rock. As in the Hit or Miss, the best hope of success appears to lie in sinking, but there is not a great deal of encouragement to do this. I am not quite satisfied that the lode worked in the old days to the south of the shaft has yet been cut in the later workings, and would recommend some cross-cutting to the south to make sure.

In the north-east corner of Section 52-93g is the main shaft of the Research Company, but I did not find out the depth, or learn if a lode had been cut. I believe work was suspended before any cross-cutting was done.

Both the southern Reward lode and the one next to be described, the Queen's Birthday line, are seen on the plan to bear towards the south of east, as if making towards the Land o' Cakes line of reef. It is rather probable that they are offshoots from this major reef.

Queen's Birthday Lode.—This is shown on the plan passing through the south boundary of Section 1015-87g, and apparently dividing into two branches, one of which runs into 18-93g and the other into 1020-87g. No work was going on along this lode at the time of my visit.

The main Queen's Birthday shaft was 140 feet deep, and is near the south-west corner of 1015-87g, now owned by the Reward Company. A little driving is said to have been done to the eastward on a soft "formation." West of the shaft the lode has been traced across the Launceston road by a number of prospecting shafts. It has also been cut to the eastward in some shallow shafts. In the north of Section 18-93g is another shaft sunk 80 feet deep by the Reward Company. At the 70 feet level they drove south 20 feet and cut the Queen's Birthday lode 3 inches wide of quartz, but with no gold. They also drove 200 feet north, but cut no recognizable lodes.

The vein cut east of the shaft in Section 1020-87g is seen in some shallow trenches on surface and seems small and of little consequence.

Land o' Cakes Line of Reef.—This long line of lode may be traced with considerable certainty from the Mole Creek and Zeehan Prospecting Association shaft on Section 147-93g through the Admiral, Clansman, New Waverley, Land o' Cakes, Fortune of War, and Captain workings to the Launceston road, and then appears again in the old Bannockburn and Specimen Hill workings in the south of Section 18-93g. Still further east it is quite possible that the Pioneer Company's workings are on this line. The western workings on this line are shown as fully as possible on the plan and sections of this and the Volunteer line of reef forwarded herewith, so it will not be necessary to fully describe the workings, except in the eastern portion, where no drawing of them has been given.

The lode is usually a wide mullocky "formation," showing numerous signs of repeated movement of the walls. It is very probable that both this and the adjoining Volunteer reef should be regarded as a main fault in the country. They will probably be found ultimately to be connected by numerous cross-fissures.

Mole Creek and Zeehan Mine, Section 147-93g.—The main shaft is down 100 feet, and a level is opened out at 95 feet. The lode was cut in the shaft at about 80 feet underlying south, and the footwall came in in the bottom of the shaft. A cross-cut was put in to the south 10 feet, and then a drive was made eastward on the hanging-wall a distance of about 30 feet. The "formation" was 10 feet wide of mullock and rubbly quartz. A few "colours" of gold are said to have been got by vanning, but nothing at all approaching payable stone. The walls were smooth and pretty regular. Two other shafts shown on the plan near the main one were each 30 feet deep, and cut the "formation," in which it was stated there was a little gold. The mine had been shut down for some time when I saw it.

Sections 60-93g and 62-93g.—In these the lode is seen to have divided into two branches, known as the Admiral North and South lodes. The south lode has been cut by the shaft and trenches shown on the plan, and is a wide rubbly "formation," in which little or no gold has been found. The workings on the north lode also are shown on the drawings, but have been of no importance in either of these Sections. The north branch appears to die out going westward.

Section 1016-87g.—In these, known as the Clansman workings, the south lode has only been cut in one or two small shafts, and has been of no value. The north lode has been traced through the section by a succession of shafts. In the underlay shaft it was a big mullocky "formation" over 12 feet wide, but had no gold. There was a little gold in the shafts to the west of this, but nothing payable. East of the main shaft gold was taken from the Peden P. A. prospecting shaft, 175 tons yielding 10 dwts. of gold to the ton. The Peden P. A. whip-shaft east of the prospecting shaft gave 20 tons of quartz which gave gold at the rate of 12 dwts. per ton.

Section 53-93g.—At the 180 feet level of the Caledonia main shaft the cross-cut north cut the lode, well defined but with the wall running a little to the south of east: this might perhaps be due to a junction with the south lode of the Admiral and Clansman mines, which might be expected to join the north lode in this vicinity. In the 80 feet level going east the lode had no true walls and no quartz, but was only a mullocky "formation." Driving west they had to go 116 feet before any gold was met with. The best gold in the old Caledonia mine was got in the prospecting shaft north west of the main one, on a branch of the main lode; 10 tons from this gave 24 ounces of gold, and another crushing of 40 tons yielded at the rate of 9 dwts. 2 grs. to the ton. This branch of the lode was cut again further east in the New Waverley Company's prospecting shaft, which is sunk 70 feet on the underlay; near the surface there was a little gold in this. Lower down there was very little quartz, but from 6 to 18 inches of a "formation." This possibly also is the lode cut by the North Land o' Cakes Company in Section 180-93g in their workings from the Cakes shaft.

The workings from the New Waverley shaft are shown on the plan, with notes as to the occurrence of gold at different points. The "formation" is very wide and mullocky, and the quartz carrying gold is much shattered and disrupted. The quantity of gold raised from this mine is not great, though some very good ore was at times found in bunches.

Section 59-93g.—The lode has been worked through this section from several shafts shown on the plans and sections. From the old Waverley whim shaft, 160 feet deep, several crushings were taken out which gave 7 dwts. to 15 dwts. to the ton, the quartz vein being about two feet wide. In the Land o' Cakes whip-shaft, 65 feet deep, the lode-matter was 10 feet wide, with 2 feet of pug and quartz on the hanging-wall, carrying gold. The best mine on this line of reef was the Land o' Cakes, from which a large sum was paid in dividends; the workings from the main shaft are shown on the plans and sections. The last owners, the New Land o' Cakes G. M. Company, sank the shaft to 400 feet, and drove a long cross-cut south at this level. They cut the Land o' Cakes lode and drove upon it, as shown in the plans, a good distance east and west, but the lode was valueless. It was a wide "formation" composed of squeezed and shattered country and mulluck, with a more defined lode-channel carrying smooth polished walls and a little rubbly quartz. The cross-cut was driven south to cut the Volunteer line of lode, passing through somewhat disturbed country all the way. At the 167 feet level the North Land o' Cakes Company drove a cross-cut north across the boundary from the old Land o' Cakes workings, and cut a parallel lode four feet wide, but there was no gold in it, and no driving was done. The machinery on the mine was not strong enough, and a new main shaft required, consequently the mine was shut down. Its record in the upper levels being a good one, it seems to be worth a thorough mining trial at greater depth still than has yet been reached, and also at say 300 feet below the old run of gold.

Section 124-93g.—The last owners of this section were the Fortune of War Company, who sank a shaft near the western boundary, and cut a large mullocky lode "formation," but got no gold. Near surface there was some good stone in an old shaft a little further north. The deep shaft near the eastern side of the section is known as the Rob Roy shaft; the foot-wall of the "formation" was cut in it about 70 feet down. At the bottom level, 200 feet, a cross-cut south had to be driven 180 feet before the hanging wall was reached, the "formation" being from 70 to 80 feet wide. The drive east is along the footwall, where there was a little quartz. On the hanging-wall there was no quartz, only pug. No gold was got in this mine. Between this shaft and the Fortune of War shaft the lode is cut in some old shafts shown on the plan and section, but no gold was obtained.

Section 49-93g.—The Land o' Cakes lode is traced into this section by means of some old shafts which cut the "formation," but found no gold in it. The Bannock shaft near the north-east corner of the section, is said to be 190 feet deep, and to have levels driven north from it at 100 feet and 180 feet which did not cut any lode. This seems to be incorrect, for the Captain Company's long cross-cut has proved that the Land o' Cakes "formation" exists almost at the Bannock shaft, and the latter must have either passed through it or had it on the north side where

the cross-cuts must have gone through it. It is very slaty, however, and possibly was not recognized as lode-matter. No gold had been got in this lode in the Captain cross-cut up to the time of my leaving the district, and I have not heard of any being found since.

Section 18-93G.—The lode is next seen in the south part of Section 18-93G, where it appears to have two branches. The shaft on the south-west corner of the section was known as the Bannockburn shaft; a mullocky "formation" was cut in a cross-cut north from this. East of this about 7 chains is the old Specimen Hill shaft, which is said to have been over 100 feet in depth. They are said to have driven 200 feet west from this shaft on a mullocky lode 12 feet thick. An old tunnel went in on this lode from the creek where it crosses the north boundary of Section 20-93G, and between this and the shaft a good deal of gold is supposed to have been got. A great deal of alluvial work has been done near the mouth of the tunnel, and it is said that the gold obtained was rough hackly reef gold. There must have been a good deal of gold got here for so much work to have been done. The southern branch of the lode passes through the south-eastern corner of Section 18-93G. The Victory shaft, which was the deepest on it, is shown on the general plan of the district, just south of the north boundary of Section 20-93G.

From the old Specimen Hill tunnel a small lode has been traced nearly due east along the south boundary of Section 1020-87G as shown on the general plan, but seems small and not gold-bearing. It is probably only a branch from the main lode, which most likely follows much the line of the Specimen Gully.

Looking at the Land o' Cakes line from end to end it is seen to be usually a large mullocky lode without much quartz in it. Payable gold has been got in small patches in the Clansman and New Waverley mines and in the Specimen Hill workings, and there has been one large block of good stone in the Land o' Cakes. On the whole, however, the line has proved a very poor one, the amount of work that has to be done to find the patches of stone being out of all proportion to their value. It must be said, however, that at the time the most of the work was done on it the character of the lode as a large "formation" was not always recognized, and there was not the amount of cross-cutting done that is necessary for such an occurrence, so it is possible good patches of stone have been narrowly missed. The line is, however, not any too promising as a mining venture.

Pioneer Reef.—Near the north-west angle of Section 276-93G the general plan shows a shaft sunk by the Pioneer Company on a line of reef traced by shallow trenches, which from its position may be connected with the Land o' Cakes line. Some of the quartz in the old workings is of rather favourable character, but I have not heard of any gold having been got in it. The Pioneer shaft is 90 feet deep, and a cross-cut has been driven 17 feet south.

About 4 chains to the south east along the spur there is another small quartz vein parallel to the above, with a small old shaft on it.

Volunteer Line of Reef.—The principal mines on this lode are shown in some detail on the plans and sections herewith. It is one of the longest lines of lode on the field, having been traced from Section 53-93G on the west to the flat land at the head of the Back Creek Valley on the east. The gold-bearing portion has, however, been confined as yet to the Volunteer and West Volunteer mines, except for a small piece in the old Shamrock mine (now the East Volunteer) and a little in the Adjutant.

The lode in Section 53-93G was first cut many years ago in a long prospecting trench dug from the Land o' Cakes line south to the top of the hill in Section 120-93G. A little gold is said to have been got in it, but most probably this was alluvial. The New Waverley Company sunk a shaft 50 feet and drove north to cut the foot-wall: a little nice-looking quartz was got, but the "formation" was mostly soft lode-matter and mullock; no gold was got. The formation is some 15 feet or more in width.

In Section 59-93G this lode was again cut at the 400 feet level by the Land o' Cakes' south cross-cut at 397 feet from the shaft, and was driven across for 42 feet without getting the hanging-wall. A good deal of water came from this "formation." They drove east on the foot-wall 20 feet on about two inches of quartz which carried no gold: west it was followed for 12 feet and the stone widened out to ten inches, not solid, however, and carried a little gold. The influx of water prevented much prospecting. On the general plan the position of this reef is shown as if it outcropped on surface, allowance having been made for the underlay.

In the north-east corner of Section 635-93G the general plan shows a tunnel driven by the California G. M. Company, which is worth referring to at this point as it bears upon the question of the Volunteer lode going more to the south than its position as shown on the general plan. At 66 feet from the entrance a lode consisting of about 15 inches in thickness of soft mullock and rubbly quartz crosses the tunnel on a course N. 75° E. and dipping south 55°. It is small

and not gold-bearing, but has the normal strike of the lodes of the district. The tunnel is 327 feet long; it cuts two small slides running north-westerly and dipping to the south-west, but no more lodes are seen in it. The country strata strike N. 30° W. and dip to the S.W. about 40°. To go clear of the south end of this tunnel the Volunteer reef would have to bend a very great deal to the south, and though in the West Volunteer mine there is a branch going off to the south-west, I do not think that there can be any doubt that the "formation" in the Land o' Cakes cross-cut is the main lode.

Captain Mine, Section 49-93g.—The workings of this mine are shown on the plan, and section of the Volunteer line. In the long cross-cut north the country passed through is all somewhat disturbed, the block of ground between two so closely adjacent lines of faulting as the Volunteer and Land o' Cakes lodes being naturally much shaken. At 119 feet from the shaft the hanging-wall of a large "formation" was cut dipping south 55°, and was driven on to the west for 17 feet. Between this and the shaft the country is still a good deal disturbed, as if there were another lode still south of the shaft, and as lode-matter was cut in the Central Volunteer main shaft in Section 114-93g, it is very probable that there is one to be found by cross-cutting south from the Captain shaft. It may be the branch seen in the West Volunteer and West Volunteer Extended. The "formation" in the Captain north cross-cut proved to be 123 feet wide, and the foot-wall was fairly well defined and smooth, of hard laminated sandstone. The wall was followed east and west as shown on the plans, but gave little quartz and no gold. The mass of rock between the main walls was much broken and jumbled mullock, slate, and sandstone.

At 421 feet a small lode was cut running east and west, consisting of from 3 to 18 inches of soft material with smooth walls, underlying about 1 in 1 to the south. This seems likely to be the reef at the head of the West Volunteer dam in Section 22-93g, known as the Cadet reef, which is due to be met with about this point. If so the Cadet line would appear to be a cross fissure connecting the Land o' Cakes and Volunteer lodes. In the "*Examiner*" of 15th December, 1896, I note that the total length of the Captain cross-cut is 619 feet, and that the Land o' Cakes "formation" turned out to be 78 feet in width from hanging-wall to foot-wall. On the foot-wall there was 15 inches of quartz, but no gold.

Central Volunteer Mine and California Mine—The main shaft of the first-named of these is shown on the general plan towards the north-west corner of Section 114-93g, and that of the latter in the centre of Section 154-93g. Some black polished slate (lode-slate) and quartz were got in the bottom of the Central Volunteer shaft, evidently a lode "formation" of some sort, but I am not aware of any lode-matter having been found in the California shaft. Both mines were shut down at the time of my survey, and I did not obtain particulars of what was done in them. I have not heard of any driving having been done. The shafts were sunk to cut the underlay of the Volunteer lode.

West Volunteer Extended Mine.—The main shaft of this mine is close to the south boundary of Section 22-93g. The line of small shafts shown on the general plan to the east of the shaft are shallow prospecting shafts in which nothing was found, except in the one near the middle of the eastern boundary of the section. This was 65 feet deep; at 55 feet they drove south five feet and cut a lode two feet wide with no gold in it, which had been already seen in the shaft higher up. As shown on the general plan this is exactly on the line of the main Volunteer lode. Still further north, at the head of the West Volunteer dam, a shaft was sunk on a lode about 2 feet wide, known as the Cadet lode, which has been already referred to in speaking of the Captain mine.

The West Extended Volunteer Company very pluckily decided to test the existence of the lode at deep levels first, and did not open out from the shaft till a depth of 750 feet had been obtained. They then drove a crosscut south and struck what is undoubtedly the main Volunteer lode 27 feet from the shaft. The cross-cut was extended further, but did not cut through the "formation" to the main foot-wall. The hanging-wall was followed east and west as shown on the plan of the mine, but did not yield any gold-bearing quartz. The wall-rock is very solid well-stratified sandstone and slate. At the time of my visit the main foot-wall had not been cut, though there was a very distinct foot-wall to the lode-matter on the main hanging-wall. The cross-cut should be extended right through the "formation," as the most of the Volunteer Company's gold has been on the foot-wall. Owing, however, to the work in the West Volunteer having shown that a branch of gold-bearing stone ran across the "formation" into the hanging-wall, the West Extended Company next determined to crosscut south from their shaft, and did so, cutting two small lodes by so doing. The first was very small, only two to six inches of quartz and soft lode-matter with smooth walls, and does not fault the country strata. It dipped south 78°, and was found 48 feet south of the side of the shaft. At 107 feet in another small lode was found which corresponds very well with the lode worked by the West Volunteer Company; this has been followed east and west as shown on the plans, but remained very small, and did not carry gold. The walls are smooth and well-defined, and underlay south about 1 in 3. The stratified country, which here dips W.S.W. 24°, is not perceptibly faulted by this lode. In the west end when I last saw it the lode was much stronger than in the east face.

The work at the deep level turning out so unfortunately, a start has since been made at the 400 feet level.

The West Extended Volunteer shaft is a good one, and in a very suitable position for proving the Volunteer lode at still deeper levels.

West Volunteer Mine, Section 810-87g.—The workings of this mine are shown better by the plans than by verbal description. On the general plan of the district the new main shaft is seen near the south boundary of the section, and the old main shaft further north.

Looking at the plans of this mine and the adjacent Volunteer workings, it is seen that the levels in the West Volunteer bend away to the south from the line of the workings in the neighbouring mine. This appears to be due to a peculiar feature in the reef which it has required a great deal of work to elucidate, but which seems now fairly well recognizable, viz.—that the large Volunteer “formation,” has sent off a branch to the south which has gradually made its way into solid country and very possibly dies out to the westward. In the lowest levels of the West Volunteer the lode seems to pinch and become quite a small fracture in the rock, hardly at all faulting the country strata, becoming the small break seen in the West Extended Volunteer levels south of the shaft. Where it joins the main Volunteer lode, however, it becomes a strong reef and appears to fault the strata. In the Volunteer workings it has been proved by numerous cross-cuts that the reef worked is only a vein on the foot-wall of a large “formation,” often 20 to even 60 or more feet wide. In the No. 6 level of the Volunteer a cross-cut almost on the boundary between the two mines has gone in over 70 feet a sort of hanging-wall is met with in this at 37 feet south of the reef worked in the level, and all the rock between is much shattered and disturbed. Even past this hanging-wall, which is a smooth friction plane dipping rather flatter than 1 in 1 to the south the country is still disturbed, and when I saw it there was no certainty that the true hanging-wall of the shattered zone forming the lode “formation” had been reached. In the No. 4 level of the Volunteer the gold was found as usual on the foot-wall of the “formation”; but following this wall to the westward it turned a little to the north, and the gold was lost. Later on, when gold had been worked nearly to the boundary by the West Volunteer, it was seen by the plans that the levels did not meet one another as they might have been expected to do, and a cross-cut south was put in by the Volunteer Company on the boundary, which cut the vein of gold-bearing stone worked in the neighbouring mine 32 feet away from the foot-wall. Between the two there was curly slate, squeezed and contorted, and mullock, “formation” stuff in short. The Volunteer Company then worked the vein east, and came out on the level at the point where they had lost the gold. Here the gold-bearing stone has passed across the “formation” from the foot-wall to the hanging-wall. The West Volunteer gold has all been on this lode, on the hanging-wall side of the main “formation.” In this mine, however, it appears to become quite a separate lode, the country between it and the foot-wall lode becoming less and less disturbed going westward. As remarked above, also, it becomes very small, and seems to be dying out. It would seem, therefore, that the great fracture in the earth forming the Volunteer “formation” has become wide at about the boundary between the two mines, and then thrown off a branch on the line of the hanging-wall, and broken back on to the foot-wall, which is then a comparatively narrow fissure for some time, but widens out again to the large “formations” seen in the Captain and Land o’ Cakes mines. In the West Volunteer the foot-wall branch is seen at No. 3 level in the chamber south of the old main shaft, and has been driven upon to the westward. It is a distinct strong lode, but not gold-bearing at this point. The country between it and the hanging-wall lode is a little disturbed in the No. 3 cross-cut, but very little in the one from the No. 4 level to the same foot-wall lode. Eastward, towards the junction of the lodes in the Volunteer Mine, the intervening country becomes more and more shattered, and shows more and more clearly the effects of the rock movements. The lode in the chamber at No. 3 level of the West Volunteer has been called the “Cadet” lode, and in the sense that the latter is probably an offshoot from the main Volunteer line, this may be fairly correctly said; but the present writer has no doubt whatever of its identity with the foot-wall stone of the Volunteer Mine and the soft “formation” cut north of the West Extended Volunteer shaft at the bottom level. On the general plan of the district the line of lode is laid down, making due allowance for underlay, as it would outcrop at surface, and the identity of these lodes is unmistakable.

The longitudinal section shows the ground stoped out by the West Volunteer Company, which is practically all the known gold-bearing portion up to the present. The mine has unfortunately found the limits of this patch of good ore, and is prospecting for more. Owing to the fact that the gold-bearing hanging-wall lode will underlay out of the Company’s hands into the Section immediately to the south, there is little inducement for the present owners to sink the shaft deeper, and their best hope seems to lie in finding gold on the foot-wall lode, which is by no means impossible or unlikely.

The West Volunteer mine had crushed, up to the time of my leaving the District, 2589 tons of quartz for 11,252 ozs. of standard gold, and had paid in dividends £22,750.

Volunteer Mine, Section 834-87g.—As explained above, this mine is upon a large “formation,” on the foot-wall of which is a more defined lode which has proved payably gold-bearing, and been stoped out as shown on the longitudinal section. In the first part of this Report it has been explained also that the quartz is often very thoroughly slickensided, and has at times been torn asunder and dislocated by movements of the walls. The blank seen on the Section at No. 2 level is probably owing to a fault in the reef itself due to such movements.

The No. 8 or 626 feet level shows in parts a nice lode, but there was little gold in it. Below this level the Company have put down a deep winze or underlay shaft for a distance now over 400 feet, and intend prospecting at low levels from it. The mine has a splendid record, having crushed, to 30th June, 1896, 10,486 tons of quartz for 27,754 ozs. 5 dwts. of gold, worth £109,092 1s. 11d., from which dividends were paid in all £60,625. It is altogether improbable that the gold taken out is the whole amount in the reef, and I have no doubt that it will be found again if prospecting at lower levels is assiduously carried on.

East Volunteer, Section 811-87G.—This mine was worked many years ago under the name of the Shamrock, and yielded a good deal of gold. This gave out after a time, and the mine was abandoned. It will be seen from the section that the drive west at the bottom level of the Shamrock was almost upon the Volunteer chute of gold, and would have probably cut it if continued a short distance further. The East Volunteer Company have been very unlucky; they have done a large amount of prospecting along the reef, as shown on the plans and sections, but have got no gold. There is a large, often good-looking, reef on the foot-wall with a wide "formation" between it and the main hanging-wall, but on neither wall has any gold been found, and operations have been suspended.

In the present state of the mines on this Volunteer line, all down a considerable depth and all now requiring considerable capital for further development, it is advisable for the companies interested to agree to an amalgamation, by which all the mines might be tested in depth from one main shaft. The West Extended Volunteer shaft is the deepest, but, dealing now only with the properties of the West Extended Volunteer, West Volunteer, Volunteer, and East Volunteer Companies, the West Volunteer new shaft is the most central. It appears to me that a company to work all these mines in conjunction would be a first-class mining venture.

Adjutant Mine, Section 876-87G.—In this mine also the lode was a big "formation," with more defined lode-matter on the main walls. A rich little patch of gold was got at the upper level, from the northern shaft, but nothing more, and the mine was closed down after the work shown on the plans had been done. From these it is seen that this mine cannot yet be said to have been thoroughly tested.

Colonel Mine, Section 164-93G.—The lode is traced through this section by surface trenches, and a main shaft has been sunk as shown on the general plan of the District, but no work worth mentioning was done from it. It was put down 257 feet, and about 15 feet from the bottom cut a hard foot-wall. Above this "formation" material was passed through, so the lode appears here still to be a wide shattered zone.

Marshal Mine, Section 141-93G.—The workings of this mine consist of a main shaft and a smaller shaft, both of which were full of water when I saw them. A rubby quartz lode is cut in the small shaft and in a trench to the north of the main shaft.

From this point the Volunteer reef appears to divide into two separate branches. The northern one is traced by trenches through Section 170-93G where shown on the general plan through the S.E. angle of 240-93G and S.W. angle of 220-93G, where there is a small shaft sunk by the Artillery P. A., and is cut in trenches again in Section 184-93G. It is said to have been cut again near the westernmost point of Broad's farm at the head of Back Creek. I did not learn that any gold had been got in any of these outcrops. The southern branch is seen in Section 575-93G where it has been cut by a number of shafts and trenches, but not, I believe, been proved gold-bearing. Two other small lodes shown on Section 575-93G on the general plan are probably connected with the main line. A little alluvial gold is found near these reefs, but so far as I could find they have not themselves been proved of any value.

Taking the Volunteer line of lode throughout its length, it is seen that the gold in it has been practically confined to the Volunteer and West Volunteer mines, but also that very few of the other mines upon it have opened any large extent of the reef. It is of interest, as bearing on the theory that the gold in Lefroy is confined to one narrow zone, to note that the Volunteer chute of ore is not nearly opposite the Land o' Cakes one in the adjacent and parallel lode, but, on the contrary, there is a long distance between them.

To the south of the south-eastern angle of Section 56-93G a small tunnel is shown on the general plan running somewhat east of south. This has been put in a distance of 250 feet, and has some seven small quartz veins from 1½ to 8 inches wide, running from N. 25° E. to N. 40° E., and some underlaying to the north, others to the south. Near the face there is another leader which might prove of more importance; it is from 6 to 12 inches wide, and runs N. 80° E., or on about the normal strike of the auriferous veins of the field. It is more like a lode in its character than the other leaders, but has not been driven along.

Corporal Shaft, Section 193-93G.—No work was in progress on this section when I visited it. There are several trenches about the ground, but I could see no reef in any of them. The shaft is about 40 feet deep. I could not see any lode-matter about it to show that a reef had been cut.

Bugler Reef, Section 153-93G.—This is a small reef on which but little work has been done further than trenching on surface. The main shaft is 127½ feet deep. It is the one farthest to the west on the general plan. The lowest level is at 115 feet; driving south the lode was cut 5 feet from the shaft, and the cross-cut was continued for 40 feet. At 72 feet there is another level, and the lode is followed for 30 feet to the east. At 60 feet there is another drive, and some stoping has been done to surface for from 30 to 40 feet east and about 35 feet west. Two prospecting shafts east of the main shaft are down 63 feet and 40 feet. The lode is a small one, but has been gold-bearing in parts, and is traceable eastwards into Section 146-93G.

West from the Bugler workings on about the line of this reef a shaft has been sunk some 50 feet or more, close to the Launceston road. No work was going on when I visited this, but I understand that a small vein of quartz has been found in it, which may be the Bugler reef; it was nothing of consequence.

North-east from this shaft a small tunnel, known as the Wealth of Nations tunnel, is shown on the general plan; it is not on a lode at all, but on a small sharp anticlinal bend in the strata, which gradually flattens out and becomes invisible.

Orlando Reef, Section 963-87G.—A little north of the Orlando main shaft shown on the general plan are two small old shafts, formerly known as the Rose and Thistle shafts, the former being the eastern one. Another old whim shaft is seen to the north-east. I have no particulars of the work done from these shafts or from the Orlando main shaft, which was not at work at the time of my survey. Some good gold has been got from this reef, the stone carrying also a good deal of stibnite. The creeks to the south of this reef carry some gold, and have been worked in places.

Enterprise Reef, Section 345-93G.—This is another small gold-bearing reef, formerly known as the Josephine, about which I have not been able to get definite particulars. The lode is cut by some fairly deep shafts and a tunnel, and some fairly good stone is stated to have been raised from it. The workings had been abandoned for some time when I visited the ground.

Wanderer and Londonderry Reef, Section 160-93G and Eastward.—This is also a gold-bearing lode, and in the Wanderer mine large lumps of auriferous stibnite were secured. The workings on Section 160-93G have long been shut down, but at the time of my visit a shaft was being sunk by the Londonderry Company on the north boundary of Section 238-93G, to the north of which the lode had been traced by trenching as shown on the general plan. The shaft was down 49 feet and driving was in progress, a cross-cut north being in 18 feet. Shortly afterwards I heard that a large mullocky "formation" had been cut, and that work was suspended on account of a heavy influx of water. This line of reef seems to be larger and stronger than any of the others south of the Volunteer line, and deserves to be tested more thoroughly. Really very little is yet known about it, but it has been gold-bearing in parts.

To the north and west of the north-west corner of Section 286-93G the general plan shows two small veins of quartz on which some trenching has been done. The more southerly workings are on a very small but fairly well defined vein, which has been very rich in places. About half a mile north-east from these workings another small lode has been cut and trenched upon by the Dean P. A., but I have not heard that any gold was got. These little lodes all may have some connection with the Wanderer or Enterprise lines, and the intervening country should be worth prospecting.

Vidette Reef.—In the south-east corner of the field several reefs are shown on the general plan in the vicinity of the old Native Industry mine. About half way between Sections 131-93G and 839-87G is the Vidette lode, on which several small shafts have been sunk. It is a fairly strong lode up to three feet thick, but no gold has been found in it that I could hear of. Alluvial gold has been found in the vicinity, one heavyish piece being got near the reef. I have already pointed out the reasons why alluvial gold in this field need not necessarily come from reefs close to where it is found, and in this instance there are traces of the old Back Creek lead for ten chains south of the Vidette line.

Native Industry Reef, now the New Industry.—Towards the south-east corner of Section 839-87G is the Native Industry main shaft, 200 feet deep, and west of it are a multitude of small shafts some pretty deep sunk to look for the reef. Very little work has been done for some years past on this reef. At 100 feet in the main shaft a drive went west for 75 feet, and also for some distance to the eastward. At the 180 feet level they drove west 40 feet, but the reef became narrow and poor. There is a whip-shaft about four chains west of the main shaft 75 feet deep from which a good deal of driving was done. Some crushings were raised from this shaft, one parcel of 15 cwt. giving 4 dwts. of gold. Another shaft about 4 chains further west is 90 feet deep, and has cross-cuts south at 30 feet, and north at the bottom level. About 26 chains west of the N.W. angle of Section 322-93G, the general plan shows a lode which has been uncovered for the distance shown, and which may be the Industry reef. It has not been proved to contain any gold.

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Going eastward from the main shaft the Industry lode appears to be heaved to the north, and has been traced through the N.W. angle of 253-93g across the Piper road. The most easterly old shaft is said to have been 60 feet deep, and a good deal of work appears to have been done. The Sentinel G. M. Company were sinking a shaft on the reef on the west side of the road when I last visited the mine, and had some gold-bearing stone in a small reef underlying south.

Sentinel Reef, Section 253-93g.—A very small but gold-bearing vein, which was in places very rich, has been worked upon a little where shown upon the plan. In the tunnel shown it was of no value. The main shaft is 84 feet deep with a level at 74 feet going 110 feet north to the above leader, which was then followed 22 feet east and 25 feet west, but was small and valueless. On the hill in the east of the section a stronger lode is seen in several old trenches, and in Section 399-93g an underlay shaft has been sunk on it 75 feet, following a wonderfully smooth slickensided wall. The quartz is about 6 to 12 inches in width, and of kindly appearance, but contains no gold. This reef has probably been cut to the south of the Sentinel main shaft in some trenches shown on the plan. It is a strong, well defined reef, but so far not gold-bearing.

Two more parallel veins of quartz have been cut by trenches near the north-east and south-east corners of Section 399-93g, but are not gold-bearing.

This vicinity will doubtless attract prospectors at all times, as there are reefs with the normal strike, and occasionally gold is to be found in them, and very probably some better discovery will in time be made.

Anderson's Reefs.—These are not shown on the plan, being considerably farther to the south-east, near the old Den alluvial field. They are worth referring to as showing that there are reefs still south of the Lefroy field, with very much the same strike, a consideration that may assist in explaining the amount of alluvial gold found about the Den, and also perhaps account for some of the gold in the Lefroy and Back Creek deep leads, which may well have taken their rise in former times in this vicinity.

The reefs are found on Crown Land to the west of John Anderson's and John Shepherd's purchased properties, and have been prospected mostly by Mr. Anderson. There are two lodes, traced by several pits and trenches for some 300 to 400 feet in length: they are nearly parallel, running from N. 53° E. to N. 68° E., and underlying to the south. On the north lode a shaft has been sunk 63 feet, and at 57 feet a cross-cut was driven north 50 feet. On surface, in a deep cutting, the lode is seen to be about 2 feet thick of quartz, with broken country both above and below it, the thickness of the "formation" not being clearly seen. The lode appears to be a true fissure lode, with smooth walls. Very little, if any, gold has been seen in either lode, but some gold has been got about the surface, and as the reefs have the normal Lefroy strike, and are in good sandstone and slate country, they are worth testing more thoroughly than it has hitherto been practicable for the prospector to accomplish unaided.

Deep Cross-cutting of the Lefroy Field.—It has from time to time been proposed to prospect the Lefroy field at deep levels by a long cross-cut, at say 800 or 1000 feet, which would cut right across the field. With regard to this as a business proposition, I make no remark further than that it would probably be very difficult to reconcile the numerous interests of the various leaseholders whose land would have to be passed through, but from a purely mining point of view the scheme presents many admirable features. It would be a most excellent piece of prospecting, and might reveal other lodes whose existence is not yet suspected, and it would allow of drainage by a central pumping station down to the level of the cross-cut. The proposal is a large one, however, as it would require about two miles of cross-cutting. From the Chums lode to the New Native Youth reef, on a line connecting the deep shafts of the New Pinafore (central shaft) and New Native Youth, the distance is approximately 5000 feet, and from the Native Youth to the deep shaft of the West Extended Volunteer is in round numbers 6500 feet. A cross-cut on these lines would go through the best part of the field. The manner in which the lines of lode run parallel to one another across the field suggests some such scheme of deep-level cross-cutting as a natural and obvious consequence.

CONCLUSION.

In concluding this Report, I have again to regret that the circumstances under which it has been written have prevented me from completing plans of all the mines and describing the special features of each in detail. A large mass of data, collected with much trouble and expense of time, has had to be reduced to the smallest possible digest instead of being given in full, and there has been no possibility of looking up old records to get full particulars of old workings. One object of the survey was to acquire all the information possible about workings now closed down, in order that it might be put on an easily accessible record for future use. Every year it becomes more and more difficult to learn exactly what has been done and found in old abandoned mines, and such are often re-opened after the lapse of years on the strength of fables as to what had been

in them. The above account of the field shows how much information is still required before there can be a really thorough history of Lefroy mining, and I would suggest to persons interested in the district who are able to give particulars which I have been unable to gather, that they would be doing a good work for the district if they would note them down and send them to the Mines Office for record.

Just at present the Lefroy field is in a state of great depression, and has fallen low in public estimation on account of the failure of the principal mines to get gold; but this has happened before in the history of this field, as in that of many others, and things will doubtless take a turn for the better again. The great want of the mines is now capital for extensive prospecting at deep levels, and it can be truly said that there are few prospecting ventures that promise better for success than does the development of this field in depth. The gold will doubtless be found again in these reefs as in others elsewhere that have passed through the same experience, and the record of the field is good enough to warrant very sanguine hopes for its future when the lodes are more thoroughly and extensively laid open from deep shafts.

In the course of my survey it was necessary to ask a great many people to put themselves to some trouble to give information, and show me various features of the field, and I have pleasure in saying that everyone was most anxious and ready to give all assistance.

I have the honor to be,

Sir,

Your obedient Servant,

A. MONTGOMERY, M.A.,

Late Geological Surveyor.

The Secretary for Mines, Hobart.

LEFROY GOLDFIELD

GENERAL PLAN SHOWING TOPOGRAPHICAL FEATURES AND POSITIONS OF SHAFTS AND LINES OF LODES

REFERENCE

FIGURES ENCLOSED IN CIRCLES ARE ALTITUDES ABOVE SEA LEVEL AS DETERMINED BY ANEROID BAROMETER.

LINES OF OUTCROP OF REEFS SHOWN THUS **XXXXXX**

PRINCIPAL SHAFTS 

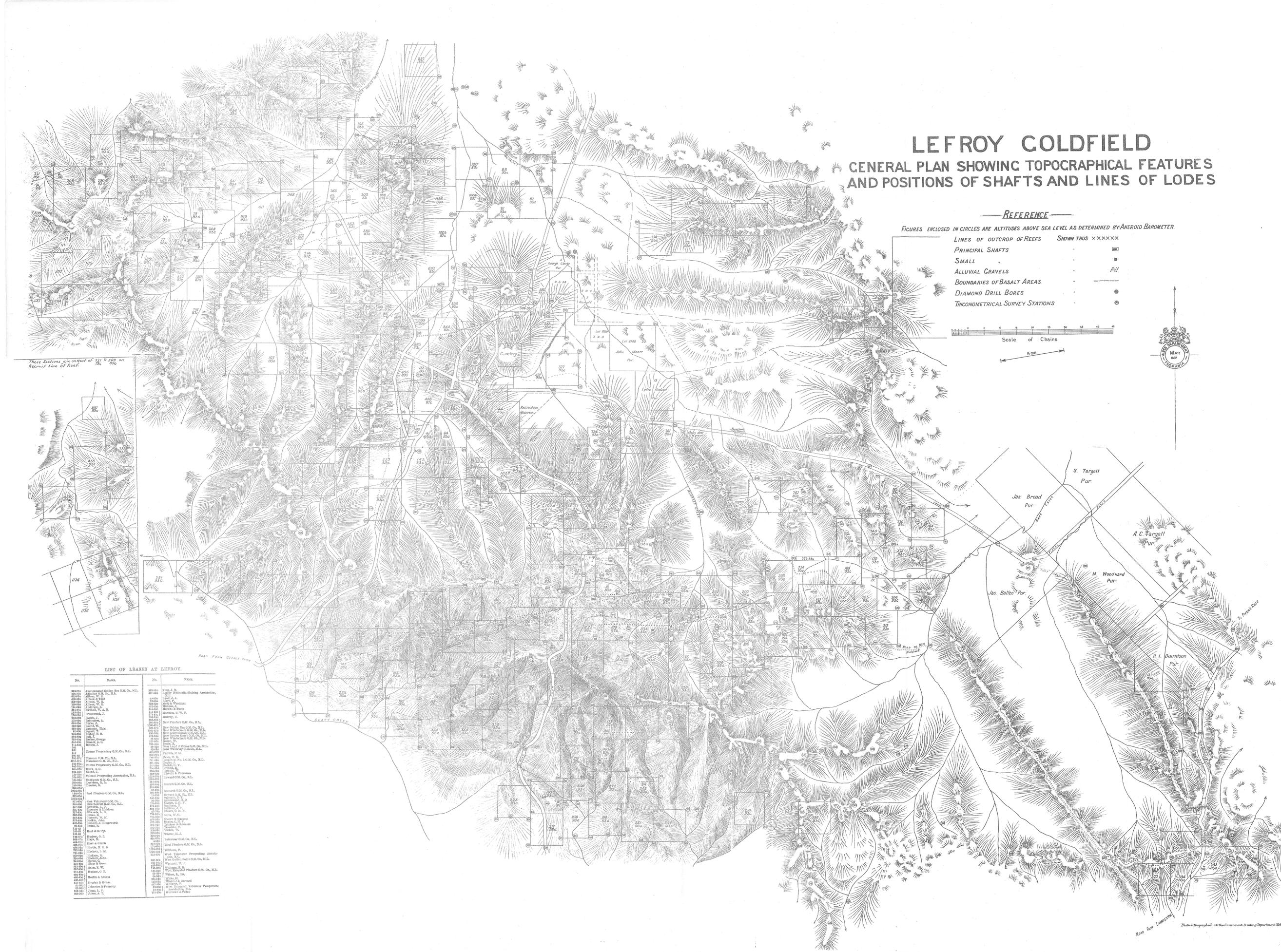
SMALL 

ALLUVIAL GRAVELS 

BOUNDARIES OF BASALT AREAS 

DIAMOND DRILL BORES 

TRICHOOMETRICAL SURVEY STATIONS 



LIST OF LEASES AT LEFROY.

No.	Name	No.	Name
878-880	Amalgamated Gold Pros G.M. Co., N.L.	895-898	Edo J. B.
881-882	Arthur G.M. Co., N.L.	899-902	Edo J. B.
883-884	Arthur G.M. Co., N.L.	903-906	Edo J. B.
885-886	Arthur G.M. Co., N.L.	907-910	Edo J. B.
887-888	Arthur G.M. Co., N.L.	911-914	Edo J. B.
889-890	Arthur G.M. Co., N.L.	915-918	Edo J. B.
891-892	Arthur G.M. Co., N.L.	919-922	Edo J. B.
893-894	Arthur G.M. Co., N.L.	923-926	Edo J. B.
895-896	Arthur G.M. Co., N.L.	927-930	Edo J. B.
897-898	Arthur G.M. Co., N.L.	931-934	Edo J. B.
899-900	Arthur G.M. Co., N.L.	935-938	Edo J. B.
901-902	Arthur G.M. Co., N.L.	939-942	Edo J. B.
903-904	Arthur G.M. Co., N.L.	943-946	Edo J. B.
905-906	Arthur G.M. Co., N.L.	947-950	Edo J. B.
907-908	Arthur G.M. Co., N.L.	951-954	Edo J. B.
909-910	Arthur G.M. Co., N.L.	955-958	Edo J. B.
911-912	Arthur G.M. Co., N.L.	959-962	Edo J. B.
913-914	Arthur G.M. Co., N.L.	963-966	Edo J. B.
915-916	Arthur G.M. Co., N.L.	967-970	Edo J. B.
917-918	Arthur G.M. Co., N.L.	971-974	Edo J. B.
919-920	Arthur G.M. Co., N.L.	975-978	Edo J. B.
921-922	Arthur G.M. Co., N.L.	979-982	Edo J. B.
923-924	Arthur G.M. Co., N.L.	983-986	Edo J. B.
925-926	Arthur G.M. Co., N.L.	987-990	Edo J. B.
927-928	Arthur G.M. Co., N.L.	991-994	Edo J. B.
929-930	Arthur G.M. Co., N.L.	995-998	Edo J. B.
931-932	Arthur G.M. Co., N.L.	999-1000	Edo J. B.

Photo-lithographed at the Government Printing Department, Sydney.

REPORT ON THE SCAMANDER MINING DISTRICT IN APRIL, 1897.

Mines Office, Launceston, 15th May, 1897.

SIR,

I HAVE the honor to submit the following Report of an examination made of the Mining Field in the vicinity of the Scamander River, in pursuance of your instructions.

The principal rocks of the district consist of slates and sandstones, frequently a good deal metamorphosed. No fossil evidence has, so far as I am aware, been found to prove their age, but they probably belong to the Lower Silurian series. Their general strike is approximately parallel to the Scamander Range, *i.e.* N. and S., and they dip at high angles to the west. Close to the Scamander Bridge they are penetrated by a belt of granite, which forms an anticlinal ridge, the sedimentary rocks dipping in opposite directions on either side. For some miles north and south along the coast they are overlain by Marine Tertiaries, which are also seen in isolated patches in other parts.

The mines may be roughly divided into two groups, *viz.*, those in the igneous rocks, as the old Scamander and Beulah Mines, and those in the sedimentary rocks, including the Eastern Proprietary and Yarmouth Mines; but it is noticeable that whereas the lodes in the Eastern Proprietary and adjacent properties have a general strike of north west and dip to the south west, the Yarmouth lodes strike about north east and dip slightly to the south east.

The only properties on which any work was being done at the time of my visit were those of the Eastern Proprietary Copper and Silver Mining Company and the Beulah Silver Mining Company, and at the latter only by tributors.

The former company holds an extensive property consisting of ten sections, 233-93M, 232-93M, 57-93M, 56-93M, 370-93M, 228-93M, 229-93M, 230-93M, and 564-93M, which extend in a north-westerly direction from a point near the head of the right or East Arm of the Scamander River, distant by the river about five miles from the bridge. The total area is 474 acres, 160 acres of which, contained in Sections 56-93M and 57-93M, are held as reward claims for copper. The outcrop of the main lode can be traced with few breaks for over two miles in a north-westerly direction from the most southerly block, and consists chiefly of siliceous ferruginous matter showing no copper-bearing minerals to the naked eye, though I believe traces of copper can generally be obtained by analysis. In Section 57-93M a tunnel was driven 43 feet in a south-easterly direction in gossan assaying fairly well for silver, but with little or no copper, but, copper and iron pyrites and blende were obtained from a small prospecting shaft 15 feet deep sunk a little below the tunnel; this shaft is now full of water.

The main workings are on Section 56-93M, where a long tunnel has been driven along the lode, starting on the north side of a large creek running through the section in a north-easterly direction.

The outcrop forms the crest of a ridge which rises some 600 feet above the level of the tunnel; and at a point in Section 229-93M about 500 feet above the mouth of the tunnel there is a strong outcrop cutting the main lode at an angle of about 45 degrees, but apparently without faulting it.

The point of intersection of the two lodes is, approximately, 40 chains horizontally from the mouth of the tunnel. The tunnel, starting at a point about 130 feet above sea level, has been driven a distance of 870 feet in a general north-westerly direction, and several good shoots of ore, apparently dipping south, have been passed through. In the back of the tunnel the ores are mostly oxidised, consisting of earthy black and red oxides and blue and green carbonates of copper, but underfoot copper glance predominates, and this with copper pyrites will probably be the principal ore below the water level. Copper glance or chalcocite when pure consists of 79.8 per cent. copper and 20.2 per cent. sulphur, but usually contains one or two per cent. of iron. The lode is a very wide one, and the necessary precaution has been taken of driving cross-cuts at intervals of 50 to 100 feet, which prove the lode formation to be from 20 to 40 feet wide, and some promising veins have been cut carrying carbonates, oxides, and sulphides of copper. The bulk of the formation consists of slaty lode-matter much kaolinised, yielding a small per-centage of copper, but, from the nature of the ores at this level, it does not admit of concentration.

At 440 feet from the entrance a strong body of ore was cut about 8 feet wide carrying copper-glance and tile ore (mixed oxides of copper and iron), and a winze was sunk to a depth of 85 feet, which at the time of my visit was full of water to within about 12 feet of the tunnel

level. Mr. Cameron, the mine manager, informed me that cross-cuts had been driven at 80 feet, 15 feet W., and 19 feet E. in lode-matter all the way, but as the water became too heavy for baling an opening was made at 47 feet and cross-cuts at this depth showed the lode to be 39 feet wide. A drive was also put in south along the lode, and the ore stoped out to within a few feet of the tunnel.

From this stope and from the ore obtained in driving the tunnel, about 120 tons of hand-picked ore were sent away, returning an average of 28 per cent. copper and 17 ozs. silver per ton. There are also about 300 tons of second-class ore at grass, which appear to have been very carefully sampled, and assayed from 10 to 15 per cent. copper and 10 ozs. silver per ton.

A few feet beyond the winze a rise was started to connect with the surface in about 200 feet for air. This was put up 136 feet. For the last 80 feet it carried little or no copper, and, as the air in the end remains good, it has been discontinued for the present.

The last cross-cuts were at 832 feet from the entrance, 24 feet east and 10 feet west, through slaty lode-matter impregnated with iron pyrites. The face at present shows similar material, with a good deal of kaolin, and on the hanging-wall is a thin vein carrying black oxide of copper. Some 45 feet ahead of the present face, crystals of chloro-bromide of silver (embolite) are said to have been found in a trench on the surface, and the intention is to extend the tunnel under this point in the hopes of meeting a rich shoot of ore.

On the whole the prospects disclosed by the tunnel working are decidedly encouraging, but it is certain that before the mine can hope to produce regular supplies of ore, a main shaft will have to be sunk and equipped with machinery. A rough cart-road has been made from the tunnel to the landing at the head of the East Arm of the Scamander, and from here the ore hitherto sent away has been taken down to the bridge in boats: this necessitates a lot of re-handling, and eventually a good cart-road or tramway will have to be made to connect with the main road.

The other work done on this property consists in a few trenches across the outcrops of two parallel lodes in Section 370-93M, exposing some very promising looking gossan. One of these outcrops can be traced on to the adjoining Section 341-93M, locally known as Loane's Section, where a tunnel has been driven on the lode for about 100 feet in a north-westerly direction through alternate bands of slate and sandstone striking north and south. In the face of the tunnel there is a foot of good-looking gossan, with a bunch of ore consisting principally of arsenate of iron with a little copper pyrites. At the entrance to the tunnel a shaft was sunk about 25 feet, but it was full of water, and I could not learn what the lode was like in the bottom. The lode has been cut again in several trenches higher up the hill, and in one of these, about 80 feet above the tunnel level, shows about one foot wide with well defined walls standing almost vertical and striking north-west. A sample from here assayed by Mr. Ward, Government Analyst, yielded 2.2 per cent. copper, 1 dwt. 15 grs. gold, and 8 ozs. 9 dwts. 20 grs. silver per ton.

Another strong gossany outcrop was seen on this Section, but no work has been done on it.

Further north, on what is known as Cramp's Section, a shaft has been sunk 100 feet, but it was inaccessible owing to water and bad air. So far as I could learn, no driving has been done from the bottom, but the ore on the top shows copper and iron pyrites, with stains of blue and green carbonates of copper.

North Scamander.—This Company holds Sections 718-93M and 719-93M, situated to the south of the Eastern Proprietary tunnel. The only lode on which any work has been done, so far as I saw, was one exposed in the bed of a creek running in a deep rugged gully through Section 719-93M. A shaft, which I was informed was 25 feet deep, was full of water at the time of my visit, as were also one or two trenches, and it was impossible to tell accurately the strike or width of the lode, which is evidently a very strong one. The ore at surface shows a dense mixture of blende, pyrites, and galena, with bunches of fairly pure copper pyrites and strings of clean galena. In places there is a good deal of pyrrholite or magnetic pyrites, which had a sensible influence on the needle. The gangue is very hard and siliceous, and the lode-filling does not seem to be much oxidised or leached. A sample which I took of some of the blende and pyrites returned 6 per cent. of copper, 1 dwt. 15 grs. of gold, and 5 ozs. 15 dwts. 12 grs. silver per ton. This lode seems well worth further prospecting, but water is likely to prove troublesome. As, however, the ore is so little oxidised, a tunnel might be driven with advantage.

On Section 353-93M a very strong outcrop is seen, and several trenches have been cut across it, in one of which I noticed a siliceous gossan formation about 6 feet wide. The outcrop can be traced to the top of the ridge about 530 feet above sea level. This hill offers very good facilities for tunnelling along the lode, though it is probable that here, as in the Eastern Proprietary, the oxidised zone will extend to a considerable depth.

Several other similar outcrops were seen on the adjacent sections, and there is evidently a wide belt of country traversed by a series of parallel lodes which, from the results obtained in the Eastern

Proprietary Mine, seem worth further prospecting. It is all open country, easily accessible, with an abundant supply of good timber.

The old Scamander Mine is situated on private property, about a quarter of a mile above the Scamander Bridge on the south side of the river. It was started more than 11 years, and some high grade ore was obtained assaying up to nearly 200 ozs. silver and 9 dwts. of gold per ton, but it proved very refractory, and the mine being situated so close to the river, the water was heavy. A tunnel was driven about 200 feet to the contact of the igneous and sedimentary rocks, and several veins of quartz were cut which are said to have yielded rich silver ores.

An underlay shaft was sunk near the entrance of the tunnel, and higher up the hill a main engine shaft was sunk 130 feet deep, but these were both inaccessible owing to water. The ore at grass shows principally crystalline arsenical and iron pyrites, zinc blende with a little galena and copper pyrites in a quartzose matrix.

On the north side of the river, about three-quarters of a mile from the bridge, are situated the Beulah, South Beulah, and Scamander Bell mines. The granite has here weathered *in situ* to a very considerable depth, but in places large kernels of undecomposed granite are met with, surrounded by decayed rock.

On the Beulah (Section 371-93M, 80 acres), two lodes have been worked from a series of shallow shafts and trenches, and in one place on the No. 2 or east lode a length of about two chains was stoped to the surface from a depth of about 40 ft. The lodes consist of iron-stained quartz, the silver being chiefly in the form of chloride in cavities in the quartz. Where the quartz is more solid a good deal of pyrites occurs which is also said to assay well for silver and gold. The lodes vary in thickness from a few inches up to a foot, and as exposed in the upper workings seem to be striking a little east of north, and dip at angles of about 45° to the east, but they are somewhat erratic. No. 2 lode is about 200 ft. east of No. 1, and about 200 ft. east of No. 2 a main shaft was sunk to a depth of 110 ft. At this depth water was struck, but only rose a few feet, and at 100 ft. a cross-cut was started and driven 134 ft. west, but was discontinued after meeting some hard granite "boulders" without cutting the lode. Except where these solid kernels occur, the ground is very soft, as may be judged from the fact that the main shaft, which is 9 ft. by 3 ft. 3 in. in the clear, was sunk for 14s. 6d. per ft., and the cross-cut driven for 7s. 6d. per ft., and it is a pity that this cross-cut was not continued. At present the mine is in the hands of tributors, who are burrowing out the more easily accessible parts up to about 40 ft. in depth. Since the beginning of 1896 about 51 tons of ore have been sent away, the average assays from which were 92½ ozs. silver per ton, one lot of 6 cwt. going as high as 241 ozs. For these figures I am indebted to Mr. Gaunt, the Legal Manager of the Company.

On the South Beulah (Section 648-93M, 40 acres) several shafts were sunk some years ago, but very little driving was done. To the east of the Beulah are two Sections, 933-93M and 934-93M, belonging to the Scamander Bell Company. A small vein of quartz and gossan is exposed in a trench, from which I broke specimens showing chloride of silver. A shaft was sunk 60 feet last year and a cross-cut driven 20 feet west, but not far enough to cut the lode. Large "boulders" of undecomposed granite were encountered in sinking this shaft, considerably increasing the cost. The ore bodies at present exposed in these mines are small and patchy, and unless larger lodes are discovered by cross-cutting they will not pay to work when the solid granite is reached.

Some three miles to the north of the Beulah is the property of the Yarmouth Proprietary Company, which holds Sections 743-93M and 744-93M of 40 acres. A creek runs through the centre of the sections from west to east, in the bed of which three lodes have been cut running about north east. On what is known as No. 1 lode (the centre one of the three) a shaft was sunk close to the creek (which has been here diverted for some chains in length). This shaft is 37 feet deep, and an opening was made at 32 feet and a drive put in north east about 20 feet, the lode in the end being full width of the drive, but the water was too strong to cope with the windlass, and driving was discontinued. These particulars I obtained from Mr. Brooks, the late mining manager, as the shaft was full of water at the time of my visit. The stone at grass shows a highly siliceous matrix, carrying a large proportion of crystalline arsenical pyrites with strings and splashes of galena and copper pyrites, picked samples from which have assayed up to 14 dwts. gold and 40 ozs. silver per ton.

This lode has also been cut in a trench on the north side of the creek, and shows about six inches of gossan, samples from which, Mr. Brooks informs me, had assayed 3 dwts. gold and 9 ozs. silver per ton.

About two chains higher up the creek No. 2 lode has been cut in several trenches, and, as far as could be seen, is about two feet wide, carrying arsenical pyrites and a little copper pyrites with stains of malachite. A sample which I took from here yielded 1 dwt. 15 grs. gold, 2 ozs. 15 dwts. 12 grs. silver per ton, and 3·5 per cent. copper.

What is known as No. 3 lode is east of No. 2, but sufficient work has not been done to determine its strike or dip. A few pieces shot from the capping show an intensely siliceous matrix, in which I noticed a little pyrites and blende. The country rock consists of slates and sandstones, in some places much indurated and altered to quartzite.

On this and the adjoining sections several other outcrops were seen similar to those near the Eastern Proprietary, but no work worth mentioning has been done on them. These properties are very easily accessible, the Yarmouth Mine being only about half a mile from the main road, about 8 miles from St. Helen's.

I also paid a hurried visit to the Silver Echo Mine, which, though not exactly in the Scamander District, is apparently on the same belt of country as the Eastern Proprietary Mine. It is situated to the north of Constable's Creek, about five miles from the town of St. Helen's. This property has been taken up at different times for tin, gold, and silver, but very little work was done until it came into the hands of the present holders, Messrs. H. Grant and party, of St. Helen's, who have shown their faith in it by the work they have done.

The workings are situated on Section 330-93M, at about 350 feet above sea-level. A creek with steep hills on either side runs through the section from south to north, and along the bed of this a trench about six feet wide and four feet deep has been cut in a southerly direction for forty feet through a big quartz outcrop, which I judged to be about thirty feet thick. The quartz again outcrops some distance up the hill on the west of the creek, and its strike is apparently about thirty degrees east of north. At a height of 750 feet above sea-level, or 400 feet above lode in the creek, on the eastern spur another outcrop of a gossany character is seen striking north west towards the present workings, and, Mr. Grant informed me, could be traced south east as far as Constable's Creek—about a mile and a half away. In the hope of cutting this lode a tunnel was started from the end of the trench and driven a total distance of 161 feet. In places the cleavages and joints in the schists show scales of native copper, but the lode was not cut, and it is probable that the junction is further north. Close to the mouth of the tunnel a shaft was sunk about fifteen feet on a large body of pyrrholite, which Mr. Grant informed me was giving way to cupriferous iron pyrites in the bottom. A sample I took of the pyrrholite gave traces of gold and silver and 0·1 per cent. copper. The main mass of this magnetic pyrites, though attractable by the magnet when powdered, does not affect the compass needle, but at one place there is a very decided deflection, the needle pointing due south. In the quartz are several small veins carrying black and red oxides of copper, and there is one vein about a foot wide of iron pyrites containing a little copper, a sample from which gave traces of gold and silver and 0·3 per cent. copper.

The ore as at present exposed is mostly of low grade, but, with such a big formation, there is much encouragement for further prospecting by driving along and cross-cutting the lode in the hope of meeting richer veins and shoots of ore. The country rocks are similar to those in the neighbourhood of the Eastern Proprietary Mine, and I noticed several indications of gossan outcrops.

I have, &c.

J. HARCOURT SMITH, B.A.,
Geological Surveyor.

The Secretary for Mines, Hobart.



REPORT ON THE MINERAL DISTRICT BETWEEN CORINNA AND WARATAH.

Mines Office, Launceston, July 25th, 1897.

SIR,

I HAVE the honour to present the following preliminary Report of an examination of the mineral district between Corinna and Waratah. The time at my disposal was much too short to allow of anything but a very hurried examination of such an extensive belt of country, and, as in a great many cases no work was going on, and most of the shafts were full of water, it was quite impossible to form a correct estimate of the prospective values of the different properties; this Report will therefore only deal with the district in a cursory way, and I hope to be able to make a more extended examination at some future date.

All the hydraulic sluicing companies formed to work the extensive deposits of auriferous gravel in the neighbourhood of Corinna have ceased sluicing operations, and I did not examine any of these properties. A good deal of money has been spent in constructing water-races, &c., and as far I could judge in passing, a fair trial of the wash appears to have been made, but the results were very disappointing. At several of these claims one or two men are utilising the water brought in by the companies, but I could not hear of any of them getting much gold.

Arriving at Corinna on the evening of the 19th of May, I went next morning to see the Savage River mine, which is best reached by going down the Pieman by boat for about two miles and thence by track some two miles inland. The Savage River Company was originally formed as a hydraulic sluicing company to work some of the alluvial terraces of the Savage River, but their operations were not successful, and attention is now being directed to underground prospecting. Two tunnels have been driven in a W.N.W. direction. The lower one, at an elevation of about 150 feet above sea level, is over 300 feet long; it passes through some feet of gravel into soft decomposed slates. Two small veins carrying oxides of iron and manganese were cut, which might contain silver and copper, but I do not know if they have been tried. On the hill above the tunnel there are some large boulders of gossan, but nothing corresponding to these was met with in the tunnel, and it seems probable that they have come from some formation higher up the hill. No. 2 tunnel, 85 feet above No. 1, is 45 feet long, the country being similar to No. 1, with bands of quartzite. Native copper is said to have been found in the joints of the country in this tunnel, but I could not see any. Several small shafts have been sunk through the gravel up to 20 feet in depth, but I have no information as to the quality of the "wash." The prospects of this mine, as far as I could see, are not very encouraging, though it is quite possible that there may be other surface indications which I did not see.

Lucy Spur.—From the Nancy Landing, some four miles above Corinna, a track leads to the Lucy Spur, passing by the old Frenchman's Peak Hydraulic Company's workings.

The Lucy Spur Company spent a large sum in bringing in a water-race fifteen miles long from the Rocky River, and a good deal of sluicing was done. Some rich patches of gravel were found, but were of very limited extent, and the bulk of the wash did not prove payable. The company has a couple of men working in the southern portion of the property, about S.S.E. from the old workings, and they are at present driving a small prospecting tunnel through soft sandstone striking north and south, and underlaying to the east. Eighty feet above this another tunnel has been driven 115 ft., in which several veins of rubbly quartz, containing copper pyrites and red and brown oxides of iron, were cut, which give very fair prospects of fine gold. These quartz veins occur in what is probably the capping of a quartz porphyry dyke, containing gold more or less through its entire width of about 38 ft., but not in payable quantities. These workings are on the eastern side of the ridge which runs through the property a little to the west of north. Good gold has been obtained from the creek on the eastern side, and from another creek running to the west good gold is said to have been obtained up to where it cuts through the spur, to the north of the present workings. The lower tunnel is about 220 ft. below the Lucy Spur water-race, which is said to contain from 35 to 40 sluice-heads, so that ample power for crushing purposes would be available if payable gold were struck.

From the Lucy Spur it is about six miles to the Rocky River, which is crossed a short distance above its junction with the Whyte River. The largest gold nuggets yet found in Tasmania—one weighing 243 ounces—were obtained in the bed of the Rocky River a short distance above the junction, and good gold has also been obtained from the Whyte River. A little above the junction the latter makes two sharp bends, forming a loop, and a scheme was mooted some years ago to drive a tunnel through the narrow ridge known as the "razor-back," and thus lay bare the bed of the river for about three-quarters of a mile, but nothing came of it.

The Rocky River Gold Mining Company.—Hold Sections 34-94, 35-94, 36-94, of 10 acres and Section 61-95 of 9 acres, situated between the Whyte and Rocky Rivers. The principal workings are about a quarter of a mile above the suspension bridge over the Whyte River, which here runs nearly west. No. 1 tunnel, between 140 and 150 feet above the river, was driven 340 feet, bearing south 35° east, and at 108 feet a cross-cut was put in over a hundred feet to the west without cutting anything of any value. From the end of the tunnel a cross-cut was driven to the east, and at 45 feet No. 1 lode was cut, striking a little west of north; this was driven on 30 feet south and 8 feet north, the lode in the south end being about 3 feet wide, consisting chiefly of magnetite and iron pyrites; in the north end the lode is broken and poor. At 90 feet from the flat sheet No. 2 lode was cut and driven on 4 feet north and 86 feet south, the ore in the north end being about 18 inches, and in the south end 3 feet wide, very similar to No. 1 lode. The cross-cut was continued to 360 feet without cutting any further ore bodies. The main country rock consists of hornblende, talcose, and other crystalline schists striking nearly north and south and dipping at high angles to the east, but in the cross-cut to the east of the lodes a hard belt of hornblende gneiss was cut.

No. 2 tunnel, about 120 feet below No. 1, is 228 feet long, with several bends. At 105 feet a small formation was cut, which on driving south opened out considerably, and is probably identical with No. 1 lode cut in the upper tunnel. As is usual with deposits of this kind, the ore appears to occur in lenticular masses. At 210 feet it had widened to about 8 feet, and at the time of my visit a winze was being sunk, but was only a few feet below the floor of the tunnel. The ore is very similar to what is seen in the upper tunnel, but contains more copper pyrites, and black oxide of copper is also said to have been found. In places there is a great deal of calcite disseminated through the ore, and veins of calcite carrying bunches of clean copper pyrites are occasionally met with. In the face, as I saw it 264 feet from the flat sheet, there was about 6 inches of calcite and pyrites on the footwall and on the hanging-wall, the dark green schist was strongly impregnated with iron pyrites in elongated particles with polished surfaces, pointing to great pressure and shearing action since they were deposited. One sample from this tunnel is said to have yielded 1 oz. 15 dwts. gold per ton, 7 ozs. silver, and 5 per cent. copper, and a sample of 56 lbs. to have yielded at the rate of 18 dwts. gold per ton, but, to arrive at any estimate of the value of the property, systematic sampling and assaying is absolutely necessary. It is probable that rich secondary bunches of ore may be met with, but the success of the mine must depend on the value of the bulk of the ore.

On the top of the ridge, 370 feet above the river, is a strong outcrop of magnetic iron. On the southern slope, 100 feet below the outcrop, a tunnel has been driven 102 feet in an easterly direction, the last 18 feet being through a gossan formation containing brown hematite, magnetite, and a little oxide of copper. This has a promising appearance, and could be easily prospected by a tunnel at a deeper level towards the Rocky River.

At present it costs five pounds (£5) per ton to pack ore from the mine to Corinna, but it should be done for very much less, although the first part of the track is certainly very steep, and in a terrible state. I hear that steps are about to be taken to construct a tramway down the Whyte River to some convenient point on the Pieman. This is the natural outlet for the district, and it is a great pity that the entrance to the river is such a dangerous one. It is a splendid river, and once over the bar there is deep water for some miles beyond Corinna. Before constructing the tramway it would be advisable to send away a parcel of ten to twenty tons, to find out what the ore already exposed is likely to realise in bulk.

To the north east of the Rocky River Company's workings on Section 47-95, known as Hacket's Section, a formation has been cut carrying iron pyrites and a little copper pyrites associated with magnetite, hematite, quartz asbestos in hornblende schist. A shaft about 10 feet deep has been sunk on the formation, which is about 4 feet wide at the top and about 2 feet in the bottom. A prospecting tunnel is being driven to intersect it at a depth of about 40 feet, and at the time of my visit the schist in the end was impregnated with pyrites, and a few feet more driving should prove what the lode is like at this level. From the mouth of the tunnel the ground falls rapidly to the Whyte River, offering splendid facilities for testing at a lower level should the prospects revealed by the present tunnel warrant it.

From the suspension bridge over the Whyte River the track is very rough and steep to the junction with the Corinna Road on Brown's Plains, the rise being about 750 feet in a mile and a half. Between the eight and the nine mile pegs from Corinna the ironstone formation is seen outcropping on the road, and on Section 886-93m some work was done several years ago by the South Savage River Company. Several trenches have been cut, exposing a strong formation consisting chiefly of magnetic and other oxides of iron, the country being metamorphic crystalline schists similar to those at the Rocky River. A shaft, now full of water, was sunk 60 feet, the ore at surface consisting of magnetite with a good deal of pyrites, talc, and asbestos, but I have no information as to assay values. The country is here covered with bauera and horizontal scrub, and a good deal of time was lost in unsuccessfully looking for another large pyrites formation said to have been cut lower down the creek.

To the east of the South Savage are situated two sections, 1077-93M and 1078-93M, in the names of Heaps and Simson. What is known as the Nine Mile Creek runs through the sections, and in working up the bed of this for gold a formation carrying copper pyrites was cut. A shaft was started close by the bed of the creek, but after sinking 30 feet the water became too strong. This shaft had been baled to a depth of about 16 feet from the surface at the time of my visit, and an examination of it showed a quartz formation about 3 feet wide carrying a little copper pyrites and carbonate of iron at the top, while just above the level of the water there is about 18 inches of fairly solid copper pyrites, samples from which are said to have given 28 per cent. copper, 8 dwts. gold, and 10 ozs. silver per ton. The course of the lode is apparently N. 20° W., the underlay at the top being to the west, but in the bottom it is said to be to the east towards the creek. Lower down the creek another shaft was sunk and a crosscut started for the lode, but work was suspended before the lode was cut. No work was being done on this property, but the prospects are such as to deserve further attention. An effort should be made to trace the course of the lode by trenching: if, as seems probable, it is running parallel to the creek, water will prove very troublesome, and as the hills on either side are very steep it will be difficult to divert the course of the creek. The rise from the shaft to the Corinna Road is 660 feet in about a mile. From this point the road was followed to the 16 mile-peg on Long Plains, and in about a mile from the turn-off Weetman and Crockford's was reached. The two sections formerly held by this company, 2-85 and 3-85, of 15 acres each, held in the name of H. H. Gill, were originally granted as reward claims for gold. The spur on which the workings are situated runs about N. 10° E., and is covered with quartz gravel of varying depths, from which altogether about 500 ozs. of coarse crystalline gold have been obtained. On the west side of the ridge three tunnels were driven and connected by winzes on a very flat quartz vein 6 to 12 inches wide crossing the country and running approximately east and west. In the rise from No. 2 to No. 1 tunnel some very rich patches are said to have been obtained, and a little underhand stoping was done below No. 2 level, but I could not ascertain how much gold had been obtained. In No. 3 tunnel the rich shoot was also cut, and a winze sunk on it, (now full of water). The country rocks are metamorphic schists and slates, striking about north and south, and in No. 2 tunnel several small quartz veins have been cut running parallel with the country, and a good deal of driving has been done, but so far as I could learn very little gold had been found. It is very unlikely that the rich shoot referred to above on the cross vein is the only one it contains, and it is hard to understand why more prospecting has not been done on this.

On the east side of the hill Messrs. Batty and M'Grath have cut a deep trench about 90 feet long, and from the end a small drive has been put in north and south. The country is much broken, and traversed by small quartz stringers carrying a little gold.

All the creeks in the vicinity of Long Plains carry more or less gold. It is very difficult to obtain accurate information as to the amount that has been actually obtained, but I have been informed on good authority that between twenty and thirty thousand ounces have been obtained from Main Creek and its affluents,—Grey's, Riley's, Big and Little Duffer, Big and Little Smith's and Townsend's Creeks, and there are still a few men fossicking. In Big Duffer Creek, about 200 yards above its junction with Little Duffer Creek, on Section 113-95, in the name of Shore & Sykes, a formation has been cut showing copper pyrites, zinc blende, and quartz, but no work has been done on it beyond putting in a shot in the capping. Its apparent strike is a little east of north, underlaying to the east. To the north of Weetman and Crockford's, in Riley's Creek, a quartz formation about 10 feet wide, carrying a good deal of iron pyrites, has been cut, which seems well worth further prospecting. A good many sections have been pegged for gold in this locality, but the only mining work that I saw was on what was formerly, I believe, known as the Stanley Company's property, Sections 56-94 and 104-95. A prospecting tunnel has been driven about 300 feet, and several small veins of quartz, with oxides of iron and manganese, have been cut, which look rather promising, but no driving has been done on them, and I do not know if they contain anything of value.

After crossing Main Creek the track rises to what is known as O'Brien's Terrace, where deep gold-bearing wash has been found at an elevation of about 1150 feet above sea level. Several shafts have been sunk, one of which is said to be 80 feet deep, and the bottom was not reached. Good prospects were, I believe, obtained from the wash, but the difficulty of obtaining a supply of water for sluicing prevented much work being done.

From here the Badger Plains track was followed to the Clarendon, Section 792-93M, 80 acres. On this section a tunnel was driven 400 feet in an easterly direction, but at the time of my visit this was blocked about 200 feet from the entrance, the ground having come away from the back. The first 50 feet are through soft decomposed whitish schist, succeeded by dark green actinolite schist impregnated with pyrites, with occasional bunches of magnetite, and showing in places stains of carbonate of copper. A belt of serpentine rock with veins of asbestos was also passed through, but I was unable to determine its relation to the crystalline schists. The ore at the mouth of the tunnel is principally magnetite and pyrites. Some high assays for gold are said to have been obtained from here, and the property deserves further attention.

The Rio Tinto Mining Company's property lies to the north-east of the Clarendon, and comprises in all 330 acres, included in sections 177, 178, 179, 180, 268 and 274-93M. No work was being done at the time of my visit, but Mr. Thorne, the mine manager, kindly showed me over the old workings. Two formations have been discovered on the property, the westerly one, known as No. 1 lode, being probably a continuation of that cut in the Clarendon, the outcrop of magnetic iron being traceable nearly all the way, and for some miles further to the north-east.

The Savage River cuts through the formations, and on No. 1 lode two tunnels have been driven on the north side of the river, and one on the south. Nos. 1 and 2 tunnels are situated close together, about quarter of a mile below the bridge on the old Specimen Reef track across the Savage River. By the bridge there is a belt of magnesian limestone or dolomite, which is succeeded by a fine-grained greenstone with minute granules of pyrites and magnetite disseminated through it, which is doubtfully classed as diorite. This continues as far as No. 2 tunnel, which has been driven 114 ft. about N.E., and from the end a crosscut put in 40 ft. to the N.W. The main mass appears to be magnetite and cupriferous pyrites with occasional veins of asbestos, but there is no defined boundary between the ore and the country rock. In places where water is oozing out, the walls of the drive are stained with incrustations of sulphate and carbonate of copper. No. 1 tunnel, a little to the west of No. 2, has a total length of 184 ft. through similar matter to No. 2. These tunnels were driven by the old Huzza Company, and were probably considered to be on the walls of the lode, as the greenstone again appears to the west of No. 1. A cut has, however, been taken along the hill and two more ore bodies cut, separated by a narrow belt of greenstone. The more westerly one shows about 50 ft. of magnetite and pyrites, the latter occurring mixed with the magnetite and also in veins. To the north the hill rises abruptly, and should the ore prove payable in bulk an immense quantity would be available, but systematic assaying is absolutely necessary to form any adequate idea of its value. On the south side of the river, a little to the west of Nos. 1 and 2 tunnels, is No. 3, which was driven 178 ft. bearing about S.W., the ore being similar to that on the other side, but its width is unknown. No. 4 tunnel was driven by the present company from a point on Hall's Creek about half a mile above its junction with the Savage River. It is driven across the country, bearing a little S. of E., and is in 172 ft. Ore was first met with at 147 ft., and a few feet further ahead is a small vein of copper pyrites. From here to the face the country, consisting chiefly of actinolite schist, is much disturbed with magnetite and pyrites disseminated through it. The main mass of the deposit is probably not far ahead, and it would be advisable to continue this cross-cut right across the formation, taking samples for assay every few feet. In this way a fair idea could be formed of the average value of the ore. The means of access to this property are very poor, but there are exceptionally good natural facilities for cheap working, and if it could be proved that the ore would yield a small profit per ton by being treated on the spot, there would be a great future before the district. Immense deposits of magnetite are of frequent occurrence in the crystalline schists in other parts of the world, especially in Norway and Sweden and the United States, but their origin, and indeed the origin of the crystalline schists themselves, is a much disputed point.

No. 2 lode lies some distance to the east of No. 1, and has a strong outcrop of red and brown oxides of iron. A tunnel has been driven 386 feet in a S.W. direction along its course. At 177 feet a winze was sunk about 17 feet through gossan, and a cross-cut to the west at this point shows the lode to be about 17 feet wide containing promising looking gossan with a little native copper and black and red oxides of copper showing in some of the vughs. A rise was also put up 80 feet, and at 50 feet up a cross-cut was driven through oxidised lode-matter similar to that seen in the level. At 266 feet there is apparently a fault in the lode, and the slide has been followed for some distance, but only small veins of carbonate of iron were met with. This lode seems worth further prospecting.

North of the Rio Tinto blocks are two sections in the name of W. W. Stewart, on which no work has been done so far as I know. The outcrop here forms the crest of the ridge, the highest point of which, close to the boundary between Stewart's and Thorne's section, is about 750 feet above the bridge over the Savage River. The ground here falls very rapidly to the west towards Hall's Creek, and offers splendid facilities for cross-cutting at low levels. Further north on Section 650-93M, in the name of J. H. Thorne, a tunnel has been driven from the west side of the ridge in a direction a little S. of E. for a distance of 220 feet. Two large gossan formations were cut, separated by a belt of soft decomposed schists. Twenty-three feet from the end native copper was met with through the country and eight feet further is a vugh showing native copper and specular iron. The last ten feet consist chiefly of magnetite specular iron and pyrites, and the indications warrant further prospecting being done.

Some distance further north the outcrop is overlain by basalt. The general strike of the formation is apparently a little east of north. All along the line the local attraction is so great that the magnetic compass is not of much use, and in connection with this I would strongly urge that in every mining district the true meridian be ascertained and laid down with permanent marks. At present all the mining surveys start with a magnetic bearing, and this often leads to considerable errors.

Specimen Reef, Hall's Creek.—A good deal of work was done here some years ago, including the bringing in of a water race about four miles long, and the erection of a six-head battery driven by a water-wheel. Three tunnels have been put in, and altogether over 2000 feet of driving has been done. No. 1 tunnel, bearing N. 30 E., was driven along the reef for about 300 feet and connected with the surface by several rises. At about 80 feet from the entrance a winze was sunk on the reef which underlays rather flat to the S.E., to connect with the No. 2 level 100 feet below, and at 60 feet down an opening was made in either end and short drives put in north and south. The north end shows about a foot of dark carbonate of iron, which is said to be the matrix in which the best gold occurs here. The drive south shows only traces of the lode, with blue pug on the footwall. Above the tunnel for some distance beyond the winze the ground has been stoped to the surface, which is here only 25 to 30 feet above, and some rich patches of gold were obtained. No. 2 tunnel has a total length of about 1000 feet, including 300 feet from the entrance to the lode. Just beyond where the lode was struck the ground had come away from the back and blocked the drive.

In No. 3 tunnel, which is about 100 feet below No. 2, the lode was cut at about 500 feet, and has been followed 200 feet to the north. When I saw it the lode was about 3 feet wide, rather broken with bunches of quartz and a little carbonate of iron. The intention is to drive under what is known as White's winze from No. 2 level, some 400 feet ahead of the present face, where a very rich shoot of stone is said to have gone down under foot, but could not be followed on account of water. Another good shoot may be cut at any time, and the present proprietors certainly deserve success for their pluck in doing so much dead work in face of great difficulties. Another formation carrying quartz and carbonate of iron was cut in the main tunnel about 60 feet beyond the present drive, but no work has been done on it. The gold found in this mine is said to be generally covered with oxides of iron and manganese occurring in black lumps locally termed "clinkers." Simple battery treatment would probably result in a big loss, and grinding and pan-amalgamation would be necessary. In places there is a good deal of pyrites which is also said to assay well for gold, and to save this considerable additions and repairs will have to be made to the battery, but very little can be done in this way until better means of access are provided.

HEAZLEWOOD AND WHYTE RIVER DISTRICTS.

The greater portion of the rocks of these fields consists of igneous rocks of very varying composition and structure, ranging from acidic through basic to ultra-basic. In the western portion of the field they are generally coarsely crystalline, but to the east are fine-grained to compact, and throughout the field have been more or less chemically altered to serpentine.

Messrs. Twelvetreets and Petterd have recently made an extended microscopical examination of some of the rocks from this neighbourhood, and have identified the following varieties:—Hornblende-granite, Porphyritic diabase, Augite syenite, Gabbro of several types, and several varieties of the Pyroxenite and Peridotite families. These rocks are probably of several different ages, but prolonged examination in the field and careful microscopical and chemical examination would be necessary to determine their relations to one another and the sedimentary rocks, through which they have intruded in numerous dykes and bosses. The sedimentary strata, consisting of limestones, sandstones, and slates of silurian age, are best seen to the west of the Godkin line of lode, narrowing going north and cutting out altogether on the other side of the Heazlewood River, but widening to the south. Narrow belts are also seen further east separated by igneous dykes, the slates near the contact being frequently porcellanised and altered to hornstone.

The main line of contact on the west crosses the Waratah-Corinna track, near the 18-mile peg from Waratah, and the slate country to the west of this should be well prospected, being very favourable for the occurrence of lodes.

The only work that was going on in the Heazlewood District at the time of my visit was on Section 1758-91m, 80 acres, owned by the Lord Brassey Nickel Company, situated on a high hill to the north of the Heazlewood Bridge. Several small veins containing nickel ores have been found on this and the adjoining section to the south.

A shaft, now full of water, was sunk at the top of the hill on an E. and W. vein, and some good ore was obtained. The nickel is chiefly in the form of sulphide of nickel and iron, and I have been unable to detect any trace of arsenic in it with the blowpipe. It is of a light bronze colour, and in powdered form is attracted by the magnet, resembling pyrrhotite, but clean samples are said to have assayed as high as 40% nickel. Mr. Petterd informs me that he has submitted samples to the well known mineralogist, Professor Dana, of the United States, who has pronounced it to be a new mineral, and the name "Heazlewoodite" has been proposed for it. So far as could be seen, it is always associated with the green hydrous carbonate of nickel zarateite.

The serpentine in which the veins occur is traversed in all directions by slickensided planes, probably due to differential movements within the mass. These are sometimes coated with a thin film of zarateite, and have led to a lot of useless work being done. A tunnel started presumably to

cut the vein on which the shaft was sunk has a very tortuous course of 265 ft., having followed these "greasy heads," and has gone right away from the supposed course of ore. A deviation has, however, been made, and the tunnel is being taken in straight, but had not reached the vein when I was there.

On the adjoining section to the south, 102-93M, 52 acres, known as Roy's Luck, a shaft was sunk 20 feet on a vein running about N.W., and there is said to be 6 to 9 inches of solid sulphide ore in the bottom, but as the shaft was full of water I could not examine it. A tunnel has been driven in an easterly direction along the northern boundary of the section to intersect this vein, and is in 120 feet, but has not yet reached it. This work is temporarily suspended, but should be pushed ahead in view of the prospects obtained at the bottom of the shaft. The veins cut on the surface vary in strike from W. to N.W., and it is probable that at the points of intersection good bunches of ore may be met.

Several other sections have been taken up in this vicinity, but no work has been done on them.

The weathering of the Serpentine forms very little soil, and the hill is bare of trees, so that timber for mining purposes is difficult to obtain.

On an uncharted section about a mile and a half S.W. from the Heazlewood Bridge several trenches have been cut across a quartz formation, carrying in places a little copper pyrites. In one of these trenches there is about six feet of broken quartz, but I could see no ore in it, though some of the stones at the side of the trench show a little copper pyrites. Further to the south a shaft, now full of water, was sunk about 20 feet, and I was informed that three tons of ore, assaying 23 per cent. copper, had been sent away; but I could get no information as to the size of the lode at the bottom, or the silver and gold contents of the ore sent away, and can therefore form no opinion of its value.

Heazlewood Mine.—This property consists of two 80-acre sections, 1309-87M and 1310-87M. I was only able to make a hurried examination of the workings, which have been abandoned for some time. On section 1309 a main shaft was sunk 160 feet, and equipped with a small winding-plant. An adit level, about 390 feet long, driven along the lode from the eastern side of the hill, connects with the shaft 60 feet below the surface. The lode here stands almost vertical, striking about N.N.W. Above this level it has been stoped to the surface, and was I believe in places up to 14 feet wide, mostly filled with fragments of the enclosing serpentine country rock, calcite, with small veins and bunches of galena and zinc blende; and I am informed that 230 tons of ore, averaging 56 per cent. lead and 88 oz. silver per ton, were sent away from here. In one place, near the shaft, I noticed a nice vein of galena about six inches wide going down underfoot; but below this level the shaft is full of water, and I could not learn what the lode was like at the bottom.

On the western side of the hill a tunnel has been driven about 400 feet towards the main shaft, and at 220 feet connected with the surface by an air shaft 70 feet deep. Two short cross-cuts were also driven from the main tunnel, but I could see no sign of any lode formation.

On the southern block, Section 1310-87M, several parallel lodes have been cut and three tunnels were driven, aggregating, including cross-cuts, about 1400 feet. The lowest tunnel is about 330 feet below the brace of the main shaft, and is said to be 475 feet long with a cross-cut of 136 feet, but the entrance was blocked. 50 feet above this, higher up the creek, is another tunnel 375 feet long connected with the surface by a cross tunnel. The bulk of the lode-filling appears to have been shattered country rock containing small veins of galena associated with blende, pyrites, quartz, and calcite.

Further up the creek is a third tunnel, 387 feet long, from which better prospects are said to have been obtained, but this I unfortunately missed.

From the main shaft a fair cart road about three quarters of a mile long connects with the Waratah road between the 14 and 15 mile pegs, so that the property is easily accessible, and the amount of ore already won should encourage another trial being given to the mine.

The Heazlewood Main Lode has been traced through Sections 825-87M and 4-87M, formerly known as the Heazlewood Extended, and a good deal of prospecting by means of tunnels and shafts was done some years ago. I had no time to examine these, but I understand that several small veins of galena were cut and some ten tons of ore sent away, but nothing was discovered which could be considered payable.

From the Heazlewood shaft a good pack-track about $3\frac{1}{2}$ miles long has been made to the Mt. Stewart Prospecting Association's property, consisting of two 80-acre blocks, Section 763-93M and an adjoining block to the north not numbered.

Crossing the Whyte and Castray Rivers sandstones and limestones are seen, but further south serpentine rocks again occur, and the boundary between the igneous and sedimentary rocks has not been determined. The track passes by the old Castray River Company's workings, where a little alluvial gold is still being obtained.

The Mt. Stewart workings are situated on a rather flat hill at an elevation of about 1400 feet above sea-level. A lode running approximately north and south has been traced through the property, and two shafts were sunk on it, but both of these were full of water. The top shaft is 43 feet deep,—the lode at the top being about 2 feet 6 inches wide of galena blende and quartz, showing a crustiform structure. In the bottom there is said to be about 10 inches of clean high-grade galena in three veins. The lower shaft is 19 feet deep,—the lode being about 2 feet wide, mostly quartz and blende, with a little galena. Two tunnels have also been driven to cut the lode, but on account of the flat nature of the country it has not been possible to get any great amount of "backs." In No. 1 tunnel, known as Harvey's tunnel, the lode was cut at 120 feet, and some high-grade galena is said to have been obtained, but I was unable to see the lode, as the end was blocked. This tunnel is too shallow to be of much use, and another tunnel has been driven by the present proprietors, which, at the top shaft, should give about 70 feet of "backs." The lode was struck at 100 feet, and a drive put in along its course 520 feet in a northerly direction. The lode has varied from a trace up to the full width of the drive, carrying in places small seams of zinc blende and siliceous galena, said to assay up to nearly 200 ozs. silver per ton. At 560 feet from the entrance a rise has been put up 40 feet, and this should be continued to the surface, a further distance of 15 to 20 feet, as the air in the end is rather light, and only one shift has been able to work. The present face is about 400 feet from the top shaft, but the last 60 feet have apparently been off the course of the lode. At 580 feet a small prospecting cross-cut has been driven 33 feet to the east without cutting it, and it seems probable that the lode lies to the west of the drive. Where seen the lode shows a favourable banded structure characteristic of true fissure lodes; and the ore is of a high grade,—a bulk sample from several tons raised having, I am informed, shown it to be worth about £15 per ton.

To the west of the main lode is a vein of talc 12 to 18 inches wide running about E.N.E., and showing in places stains of carbonate of copper. Though of not much importance in itself, it should be traced to where it intersects the main lode.

Another interesting occurrence on this property is what is called the "opal lode," a vein filled with chalcedony and common opal of various shades. Messrs. Twelvetees and Petteerd have made a microscopical examination of this stone and pronounced it to be "opalised serpentine."

Whyte River Mine, Section 109-93_M, formerly 1083-87_M, 34 acres.—On this section two tunnels have been driven on the north side of a hill running through the section, and one on the south side. No. 1 tunnel, which is only about 30 feet below the crown of the hill, was driven about 200 feet through soft decomposed igneous rock, and at 100 feet a lode formation about 5 feet wide was cut, consisting chiefly of shattered country rock stained with oxides of iron and manganese, impregnated with chromate and carbonate of lead. A winze on this connects with No. 2 level 60 feet below No. 1. In No. 2 tunnel the lode was cut at 160 feet from the entrance, and a drive put in about 200 feet in a general south-easterly direction. The lode is here very similar to No. 1 level, having no defined walls, and showing in places crystals of chromate of lead. A little beyond the rise to No. 1 level a winze was sunk 30 feet and a little stoping was done, but these workings were full of water. Good ore is said to be going down under foot, and on the tip at the mouth of the tunnel is some nice-looking galena mixed with a good deal of blende. No. 3 tunnel, on the south side of the hill, is about 110 feet below No. 2. It was driven almost due north for about 500 feet, where the lode was cut and driven on 170 feet, its course being north-westerly. The lode is here better defined than in the upper levels; but here, too, is chiefly filled with broken country rock with occasional bunches of pyrites and galena, quartz, and a good deal of calcite. Native silver is also said to have been found in this level, but I did not see any. This lode is supposed to be a continuation of that worked in the Bell's Reward mine, but is more probably a parallel one.

Bell's Reward.—The property formerly known as the Bell's Reward Mine comprises Sections 245-93_M (40 acres) and 44-87_M (20 acres) lying to the south of the Whyte River Mine. The workings are situated on the 20 acre block, and consist of several tunnels and a main shaft 156 feet deep. The main adit, which is about 500 feet long, was unfortunately blocked at the entrance, and as the shaft was full of water it was quite impossible to form any idea of the value of this property. On the surface there is a strong gossan outcrop which can be traced through the Discoverer, Godkin Extended, and Godkin Sections, the general strike being about N.W. and S.E. On the western side of the lode limestone, sandstone, quartzite, and slates occur, the country to the east being chiefly decomposed igneous rock, though occasional patches of sedimentary origin are also seen. Mr. Montgomery, late Government Geologist, after a careful examination of the Godkin Mine in December 1892, came to the conclusion that the lode is a contact one, and the sedimentary rocks seen to the east of the lode are either isolated patches or tongues projecting into the main igneous mass, and this seems most probable. The sedimentary strata have been a good deal broken

by the intrusive rocks, thus allowing passages for the circulation of mineral-bearing solutions, and the sandstones and limestones are often traversed by small threads of blende and galena. A lode is also said to have been cut in the limestone in the main adit and was followed for about 100 feet, but I have no information as to its size or quality. In an open cut close to the engine-house I noticed little chloride of silver in broken sandstone impregnated with oxides of iron and manganese, and all the gossan is said to carry a little silver. The main shaft is a roomy one, being 13 ft. x 4 ft. in the clear, and well timbered as far as could be seen. From the bottom I believe cross-cuts were put in S.W. 120 feet and N.E. 40 feet, when a burst of water drove the men out, and no work has since been done. It is probable that the lode was struck, and it seems a great pity that after spending so much money no effort was made to get the water out and see what the lode was like.

A good cart-road was made from the mine to the Waratah road, near the 13-mile peg, and I believe 7 tons of ore, assaying 65 ozs. silver per ton, were sent away.

On Section 916-87M, known as the "Discoverer," or Smith's section, two tunnels over 200 ft. long were driven, and one short one. No. 2 passed through clayey decomposed igneous rock for about 100 ft., when a belt of sandstone was cut, and beyond this there is a very strong manganese gossan formation, the western wall of which was not reached. No. 1 tunnel, 110 ft. above No. 2, was partially blocked, but as far as could be seen was similar to No. 2. The gossan is said to carry a little silver, but not in payable quantities, and sinking will have to be resorted to to prove the value of the lode. From what is seen in the Godkin mine, it is evident that the zone of oxidation extends to a considerable depth, but should good "pay-ore" be met with in that mine, this section should be well worth developing.

Godkin Extended, Section 62-93M, 80 acres. A good deal of work has been done on this section, with disappointing results. On the east side of the hill a tunnel was driven 105 ft. in a S.W. direction; the first 60 ft. through clayey decomposed country much stained with oxides of iron and manganese, and the remaining 45 ft. through sandstone. A shaft was also sunk 80 ft. through broken country containing bunches of gossan assaying a few ounces of silver per ton. On the west side of the hill a tunnel was driven 150 ft. through soft sandstone, and connected by a winze with the main adit 120 ft. below, which is 827 ft. long. The first part of this tunnel is in soft decomposed slate, which is succeeded by sandstone and quartzite, the latter gradually merging into limestone, which continues for the last 200 feet.

At 400 feet from the entrance a gravelly bed was cut, the pebbles of quartz being in places cemented together with blende and galena. A drive was put in to the north-west and a little stoping was done over the back of the drive, some 40 tons of ore having been sent away from here, averaging about 120 ozs. silver per ton with a low percentage of lead, and some of the clean galena is said to have bulked 350 ozs. silver per ton. Ore was found for a length of about 40 feet, but soon cut out over the back of the drive, and it appears to have been only a pocket. The end of the drive was blocked, but Mr. Thorne, the late mine manager, informed me that it was continued to 151 feet from the flat sheet through loosely cemented gravel and sand, and that at 100 feet he had put in cross-cuts and struck limestone on both sides, the width being about 25 feet; but it is very difficult to explain the occurrence of the limestone here. A winze was sunk about 10 feet south-east of the main adit to a depth of 23 feet and from the bottom sandstone was obtained, carrying strings and splashes of galena and blende, but there does not seem to be any real lode.

At 490 feet broken sandstone was met with, and a short drive put into the north-west. Above this drive is a cave of considerable extent, and in the joints in the sandstone is a brown slime which is said to carry a little silver. A little beyond this the course of the drive, which up to this point has been approximately north, has been turned to the east, and the end is within 20 or 30 feet of the eastern boundary of the section, the last 200 feet being in limestone.

Godkin Mine, Sections 1599-87M, 1615-87M, 40 acres each.—For a detailed description of the workings of this mine I must refer to Mr. Montgomery's Report of December, 1892, already mentioned, which was published with the Annual Report of the Secretary for Mines for 1892-3. All the workings on the southern section were full of water below the 45 feet level, and the only work that is being done is at the north shaft. A small pumping plant has been erected here, and the shaft sunk to 80 feet below the level of No. 5 tunnel. The bottom of the shaft is in gossan, and a cross-cut has been driven 30 feet through this to the south west, and from the end a drive put in 30 feet to the south east. The gossan, which contains a great deal of black oxide of manganese, is full of vughs, making it very bad for shooting, and progress is consequently slow. Mr. Scaddon, the mine manager, informed me that the gossan contained a little silver, but not in payable quantities. From the fact that galena was obtained from two winzes sunk between 30 and 40 feet below No. 5 tunnel, it was hoped that the oxidised zone would have been passed through, so the result is very disappointing. The first of these winzes is about 100 feet south east from the shaft, and from the open character of the lode-matter it is probable that this winze will soon be drained, and galena may be met with in the drive, but it is evident that the shaft will have to be sunk deeper to reach the main unoxidised portions of the lode.

Pike's.—On Section 2508-87M, known as Pike's Section, situated about a mile and a half south-east of the Godkin mine, a tunnel was driven, and at 100 feet from the entrance a lode was cut, running about north east. This has been followed for about 100 feet, and occasional patches of gossan with carbonate of lead and antimonial galena were met with, but the bulk of the lode-filling appears to have been broken country rock. The galena is said to be of low grade, and I do not consider that this find is of much importance, except as showing the extent of the mineral-bearing country.

On Section 1220-93M, 80 acres, formerly known as the Washington Hay, is a strong outcrop of manganese gossan striking a little east of north. A small shaft was sunk on the lode (which is almost vertical) to a depth of about 80 feet, showing in the bottom about two feet of carbonate of iron with a little galena and blende. The shaft being closely timbered, the lode could not be seen higher up, but the ore at the surface shows some nice-looking coarse and fine grained galena with carbonate of iron and quartz, and gossan with crystals of chromate and carbonate of lead. Fifty feet below the surface a short cross-cut was put in to the west and a small vein of gossan carrying blende was driven on a few feet; a little chloride of silver is also said to have been obtained from here. The country is a good deal broken and stained green, probably with oxide of chromium. Another opening higher up in the north end of the shaft shows several feet of promising looking gossan with chromate of lead disseminated through it. About 110 feet below the shaft an adit has been driven 250 feet a little west of south along the course of the lode towards the shaft, the end of the drive being about 50 feet away from the shaft. The lode is a strong one, widening in one place to about 8 feet. The bulk of the lode-matter is carbonate of iron containing small veins of galena with blende and pyrites, and I believe 30 tons of high-grade galena were sent away. The prospects of this mine warrant another trial being given to it. The Godkin Tramway passes just above the tunnel, so that the property is easily accessible.

Confidence Mine.—To the south-east of the Washington Hay, on Section 671-93M., 40 acres, formerly the Washington Extended, and now known as the Confidence, a good deal of work has been done and several small parcels of galena, about 50 tons in all, which, I am informed, assayed about 65 per cent. lead and 140 ozs. silver per ton, were sent away. No. 2 tunnel, 40 feet above the Whyte River, was driven about north-east, and the lode cut at 160 feet. This has been followed 180 feet, bearing a little east of north, being from 6 inches to 2 feet wide, carbonate of iron and fragments of country rock with occasional bunches of galena and blende.

No. 1 tunnel, 100 feet above No. 2, was driven nearly due east, and the lode cut at about 200 feet. Before cutting the lode a belt of broken country about 50 feet wide was passed through, much stained with oxide of iron, and in places approaching a true gossan. A sample across this is said to have given 56 ozs. silver per ton. The lode has been followed a little east of north for 120 feet, and at 30 feet from the flat sheet an air shaft connects with the surface about 60 feet above. At 80 feet the lode is apparently split and the western branch is being followed. Several good shoots of galena have been cut, and in the face, when I saw it, there was a vein of about two inches clean galena with about two feet of gossan, containing carbonate and phosphate of lead; a sample of this gossan is said to have given 65 ozs. silver per ton.

An intermediate tunnel about 40 feet below No. 1 was also started and driven 100 feet, but had about 40 feet further to go to reach the line of lode when work was stopped.

This mine has been recently re-started by a small syndicate, and the prospects of success seem very fair. Work is at present confined to driving No. 1 level with one shift. No. 2 tunnel would have to be extended between 300 and 400 feet to reach the shoots of ore cut in No. 1, but this would be a valuable prospecting work, and would prove the lode to a depth of about 170 feet. It seems probable that this lode is a continuation of the Washington Hay lode. The Godkin tramway passes through this section between the intermediate and No. 2 tunnels.

Washington Mine.—West of the Washington Hay and north of the Confidence is an 80-acre block section 1150-93M, known as the Washington. Two tunnels have been driven on this property. No. 1 is 120 feet long through clay and decomposed slate, with bands of hornstone. At 60 feet from the entrance a drive was put in 33 feet to the north, but I could see no sign of any lode formation. No. 2 tunnel, 130 feet below No. 1, was driven 300 feet, bearing N. 70° W. The first 120 feet are through weathered igneous rock passing into a dull greyish green rock, containing a great deal of carbonate of lime. It seems probable that the intrusive rock, has here absorbed some of the sedimentary strata through which it has broken. At 73 feet from the entrance a drive was put in 100 feet to the north-east and 580 feet in a general south-west direction, the last 100 feet being nearly south. A little galena is said to have been obtained from a winze sunk 11 feet below this level (now full of water), and some stoping was done above the drive on a vein of oxidised matter, which is said to have yielded a little high grade ore, but I could see nothing of any value in the drive.

Gregory, Section 3590-87M.—The workings on this section are situated close to the road about three-quarters of a mile above the *Whyte River Hotel*. Crossing a creek a little above the road a

trench has been cut along a small lode formation striking about north-east and south-west. In one end it is about 15 inches wide, and in the other end two feet, mostly quartz with splashes of galena and pyrites. A tunnel driven in a south-east direction from the level of the road cut the lode at 241 feet, and a little driving has been done on its course to the north-east. This drive was blocked, but it is, I believe, connected to the surface by a shaft 65 feet deep. Where cut the lode is about one foot wide, similar to what is seen on the surface, and some good assays are said to have been obtained. This lode is apparently a contact one, altered slates being seen to the east of the lode, and serpentinous igneous rock to the west. As far as can be seen it is too small to be of much value.

Although a considerable amount of money has been spent in the Heazlewood and Whyte River Districts, they cannot be said to have had a fair trial. The galena is mostly of a high grade, and the prospects at several of the mines warrant the expenditure of further capital in legitimate mining. The high freights charged on the Waratah-Burnie railway, £2 per ton, have retarded the progress of the fields, but I have been informed that a substantial reduction would be made for parcels of 40 or 50 tons. Limestone and ironstone could be easily and cheaply obtained for fluxing purposes, but until much more development work has been done it would be quite premature to consider the question of erecting furnaces.

Magnet Mine.—From the Whyte River Bridge the road rises about 1000 feet in 3 miles to the top of the Magnet Hill, whence a pack track about three miles long leads to the Magnet mine. This property consists of one 20 acre block, 3705–87M, and two blocks of 40 acres each, 2074–91M and 2075–91M, lying to the north and south respectively of the smaller block on which the workings are situated. The lode has been traced by trenches through the section, and shows a strong body of very promising looking gossan with veins of galena, showing banded structure on either wall. Its strike is apparently about north-east and south-west, and at the surface it is nearly vertical, but in the upper tunnel underlays considerably to the north-west. To the east of the lode the ground falls rapidly towards a large creek running into the Arthur River, the outcrop being about 250 feet above it. No. 1 tunnel, which is only between 30 and 40 feet below the outcrop, was driven nearly due west. At 12 feet from the entrance a vein of galena was cut, and beyond this 13 or 14 feet of gossan were passed through with another vein of galena on the west wall. The cross-cut was continued to 114 feet through decomposed igneous rock, probably porphorite. North of the cross-cut the lode has been driven on 88 feet, and on the south side a drive of 50 feet was put in along the footwall, and a drive of 135 feet along the hanging wall of the lode. From the north end a rise was put up to the surface, and a little stoping has been done on either side of this as well as over the back of the south drive, and between 70 and 80 tons of high grade galena and oxidised ore have been sent away. Mr. Meredith, legal manager of the company, has kindly showed me the returns received from about 50 tons sent away between August, 1896, and April, 1897. The average net price received was between £19 and £20 per ton, the highest being £23 3s. 6d., and the lowest £13 12s. 11d., the latter for a parcel of oxidised ore low in lead.

There are several small veins of clean galena, but the bulk of the lode-matter at No. 1 level consists of gossan containing crystals of cerussite (carbonate of lead), crocoisite (chromate of lead), and leadhillite (sulphato-carbonate of lead.) In the north end the lode is somewhat broken, and contains a good deal of dolomite, and throughout the lode bunches of carbonate of lime and iron occur, surrounded by a crust of galena, forming so-called "ring ores."

No. 2 tunnel, about 40 ft. below No. 1, and a little to the north of it, was driven about 225ft. bearing N. 55° W. In this tunnel a hard bar of dolomite was encountered, showing in places threads of galena, and a little native silver is also said to have been found. Near the end a cross-drive has been put in 28 ft. S.S.W. In the face of this a little galena was showing through the dolomite, and at the time of my visit preparations were being made to continue this drive. Since my return I have heard that good galena has been cut, considerably enhancing the value of the property.

The oxidised ores from No. 1 level contain between 20 and 25 per cent. of moisture, and on account of the high freights it is found advisable to dry this before mixing with the sulphide ore. Only what is considered the best of it is sent away, and there is a large pile of stuff which is not considered good enough to ship at present, but which should pay well to smelt on the spot.

The trenches to the south of the tunnels show the lode to have the same favourable appearance. The ground here falls much more rapidly to the east, and it would be very advantageous to put in a low level cross-cut.

From the mine to the top of the hill the track is very steep, after which it has a good grade but is in many places in a terrible state, and the cost of getting the ore to Waratah is naturally heavy, viz. 27s. 6d. per ton. In a direct line the distance is only about four miles, but the intervening country is very broken and rugged. I am informed, however, that a good grade for a tramway could be obtained in 8 or 9 miles, and this will probably be eventually constructed, but in the meantime cording of track to the main road is urgently required.

This mine has undoubtedly very good prospects, and deserves more vigorous development.

From here to Waratah the old Waratah-Corinna track was followed, crossing the Arthur River, and passing through the old West Bischoff Company's property. On Section 1416-93M, formerly 2481-87M, a little work has been done on a small lode carrying sulphantimonite of lead (probably zinkenite or jamesonite), zinc blende, and a little pyrites. One sample is said to have given 52 per cent. antimony, so it is probable that stibnite also occurs. Two short tunnels have been driven along the lode through black slate. In the top tunnel there is about six inches of ore in the face, and in the lower one about ten inches. The ore is said to carry traces of gold and a little silver, but not in payable quantities, and the lode is too small to encourage much work being done on it.

On Section 1445-93M, formerly 922-91M, known as Kegan and Daly's, a tunnel bearing E.S.E. was driven 363 feet. At about 180 feet from the entrance a dyke of quartz porphyry was cut, which proved to be about 30 feet wide. This is said to carry a little tin throughout, but not in payable quantities. The country on either side of the dyke consists of altered slates and grits, in places a good deal iron-stained, and I noticed one small vein of carbonate of lime and carbonate of iron, but nothing of any value.

On the surface several trenches have been cut across an iron-stained outcrop, samples from which are said to have given from 4 to 34 ozs. silver per ton. This looks like the decomposed capping of another igneous dyke. It could be best prospected by continuing the tunnel, but I am not very sanguine as to its proving of any value.

The only other property visited in the vicinity of Mount Bischoff was the old Silver Cliff mine, Section 1209-93M, 40 acres, formerly 28-91M. After the original company ceased active operations, the mine was let on tribute, and I believe some 50 tons of high grade galena were obtained from what is known as No. 2 lode. A tunnel 90 ft. long on the course of this, about N.N.W., shows the lode to be 3 ft. to 4 ft. wide at the entrance, but it has cut out in the end. It has, however, been traced further up the hill, and some high assays are said to have been obtained from the outcrop. 42 ft. from the mouth a winze (now full of water) was sunk to a depth of 50 ft. below the level of the tunnel, and there is said to be very good ore in the bottom of this, but water became too strong, work was abandoned by the tributors, and the section was forfeited. It was then taken up by a small party of men, who are doing their best to prove the value of the lode. A short distance south of the tunnel a small shaft (now full of water) was sunk on the lode, and a little driving done at a depth of about 40 ft. by the old company, who also started a crosscut for the lode about 130 ft. below the shaft. The present owners continued this crosscut from 86 ft. to 220 ft. At 196 ft. a small vein carrying pyrites was cut, and this has been followed a little west of north for 127 ft., widening in places to 2 ft., with occasional bunches of cubical galena associated with jamesonite, zinc blende, and pyrites, with carbonate of iron and quartz, but so far nothing payable has been met with. The present intention is to drive under the winze from the tunnel (a further distance of about 130 ft.), and rise against this to work the shoot of ore in the winze, with the hope of cutting other shoots on the way. The lode has well-defined walls, and the enclosing slates are of a kindly nature, but so far the results have not been very encouraging.

From the foregoing brief account it will be seen that the extensive area of country covered by this Report is exceptionally rich in minerals, and every inducement should be given for further prospecting by constructing new tracks and improving old ones, as there is great probability of other valuable discoveries being made.

The distance from Waratah to Corinna by the present route is 40 miles. From Waratah a good road has been made as far as the Heazlewood Bridge at the 16-mile Camp, and this is now being continued round the Bald Hill, where the old track is particularly bad. At the Corinna end there is a good cart road for five or six miles, and between these points is a fair bridle track which, at no very great expense, could be made wide enough for cart traffic. The tracks branching off from this are mostly in a very bad state, and when it is considered that everything has to be packed over such tracks, I think that too much credit cannot be given to the hardy prospectors.

In conclusion, I wish gratefully to acknowledge the kindness and hospitality with which I was everywhere received, and have also to thank Mr. Hall, M.H.A., and others for the great assistance rendered me.

I have, &c.

J. HARCOURT SMITH, B.A.,
Government Geologist.

The Secretary for Mines, Hobart.

REPORT ON THE SHEPHERD AND MURPHY'S TIN MINE, BELL MOUNT.

Mines Office, Launceston, July 26th, 1897.

SIR,

ON the 5th of June, in accordance with instructions, I visited the Shepherd and Murphy's Tin Mine, Bell Mount, and have the honour to present the following brief Report thereon:—

This property is situated 22 miles south-west from Sheffield, at an elevation of about 2000 feet above sea level. The River Forth is crossed at an elevation of 250 feet, 9 miles west from Sheffield, the rise on either side being very steep. The road passes most of the way through rich agricultural land of a chocolate colour, characteristic of the weathering of basalt. Going down into the Forth valley a small belt of sandstone and conglomerate is crossed, but basalt is again seen on the other side of the river, and the land has been taken up for agricultural purposes for some six miles further. About $2\frac{1}{2}$ miles from the bridge the road junctions with the road running down the Forth valley to Leith, and thence continues in a southerly direction along the divide between the Forth and Wilmot Rivers. The road has been cleared to the end of the agricultural holdings, (about 15 miles from Sheffield), but the last three miles are only partly formed. From this point, Hall's surveyed track to Middlesex was followed; the grade is on the whole good, but the track is even now almost impassable in places, and with much traffic would become quite so. The basalt country, covered with dense myrtle forest, continues as far as Bell Mount, where slates, sandstones, and conglomerates are seen, but the basalt again occurs about two miles further south, and continues, I believe, as far as Middlesex Plains.

The Shepherd and Murphy Tin Mining Company, No Liability, originally held Sections 1437-91M and 1456-91M, of 80 acres each, but Section 2134-91M, of 78 acres, known as Sykes' section, lying to the east of the other two, has been recently purchased. The greater part of the southern section (1456) and the western portion of 1437 is covered with basalt, but on the east sandstones, quartzites, and slates are seen. The principal workings are situated on the eastern half of block 1437, on a ridge sloping to the north between two small creeks which run through the section a little west of north, and junction with what is known as the Seven-mile Creek. Crossing this ridge in an east and west direction, a series of six small parallel quartz lodes have been discovered at distances of one to two chains apart, carrying oxide of tin, sulphide, and carbonate of bismuth, and wolfram; topazes, too, are occasionally found.

The most northerly lode yet discovered, known as No. 6 Lode, is exposed in a long trench, and shows about a foot wide of quartz containing crystals of oxide of tin. In one place it is split into two veins of about ten inches each, separated by a "horse" of sandstone, and on the southern wall is a soft clayey vein very rich in tin. I saw several dishes washed from the stuff broken from this lode, which all gave good prospects of coarse crystalline tin ore, but little or no bismuth or wolfram.

Very little work has been done on No. 5 lode; where exposed, it is from six to nine inches wide, and contains both tin and bismuth. On No. 4 lode, about a chain higher up the hill, a good deal of trenching has been done, and a tunnel driven 150 ft. along its course from the fall into the eastern creek. Where cut on the surface it was only about eight inches wide, but in the tunnel it was in places over two feet wide, the average width being about a foot. One very rich shoot of sulphide and carbonate of bismuth was cut, and the lode also contains a good deal of tin ore and wolfram. Several small parcels of hand-picked bismuth ore were obtained by former tributors from a deep trench along this lode, and the company is now sluicing the stuff thrown on one side, with very good results. This lode has, I believe, been traced through Sykes' section into Section 1-93M, further to the east, but I had no time to examine these sections.

On No. 3 lode there is a shallow trench, about 3 chains long, and what is probably the continuation of this lode, has been cut in the bottom of a deep trench running in a south-east direction on the west side of the hill. This cross trench also connects with a deep trench about six chains long on No. 2 lode, which gives good prospects for tin and bismuth, but is small. Small crystals of tin ore can also be obtained in places by crushing the soft friable enclosing sandstone. To the west the lode dips under the alluvial.

No. 1 lode, several chains south of No. 2, is about six inches wide, but very little work has been done on it.

Near the southern boundary of the section several shallow trenches have been cut through surface stuff, giving fair prospects of tin and a little gold, so it is probable that other lodes exist under the basalt further south. In the northern part of the section good prospects for tin, with a few colours of gold, can be obtained from the surface stuff, mainly of basaltic origin, which is here of considerable depth. To the west of the Western Creek a shaft was sunk to a depth of 20 feet through waterworn wash, which is said to contain tin and gold, but I did not see this.

In the cross trench above alluded to from No. 2 lode, the wash is in places about 10 feet deep, and gives good prospects for tin and bismuth. The bed-rock dips to the west, and everything points to the existence of deep ground under the basalt to the west of the creek, and to the east there is a considerable quantity of ground which should be worth sluicing if a good supply of water were available. The fall from the southern to the northern boundary of this section is nearly 400 feet, so that there are good natural facilities for sluicing, but the present water supply is quite inadequate for extensive operations. Mr. Mitchell, the mine manager, informed me that a good supply could be obtained from what is called the Weaning-paddock Creek, by cutting a race some five miles in length, and steps are being taken to have a survey made. A small but effective dressing shed has been erected in which the ore obtained by sluicing is further concentrated, and there are now about four tons of concentrates ready for shipment. These "concentrates" contain tin ore, wolfram, and carbonate and sulphide of bismuth, but I do not know in what relative proportions. It is impossible to make a complete separation of these minerals mechanically owing to their specific gravities being so close together, and the concentrates will be shipped to England for further treatment.

The directors of the company are hopeful of being paid for the wolfram as well as the tin and bismuth contents, but, as the separation involves costly treatment, the charges will be proportionately high. Hitherto the only ore shipped has been hand-picked bismuth ore, and Mr. Hinman has kindly shown me a copy of the account sales dated 18th March, 1897, of three small parcels totalling 19 cwts. The ore assayed from 57.1 to 60.1 per cent. bismuth, which was paid for at the rate of 3s. 11d. per lb., and the gross value of the 19 cwts. was £243 8s., but the charges for sampling, assaying, commission, &c. amounted to £24 10s., reducing the net value to £218 18s. The demand for bismuth is very limited, but even if the price should fall considerably a good margin of profit should remain. The lodes are small, but an effort should certainly be made to prove them at a greater depth, and this could best be done by driving adits in a southerly direction across their course. These lodes are probably connected with the granite which occurs further to the east in the old Dolcoath Company's ground. At present it costs £7 per ton for carriage of ordinary mining supplies from Sheffield to the mine, and for rations 1d. per lb., ore being taken as back freight for £3 10s. per ton, and a better track from the end of the made road is urgently required.

I have, &c.

J. HARCOURT SMITH, B.A., *Government Geologist.*

The Secretary for Mines, Hobart.