CONTENTS.

1913.

NEW ZEALAND.

MINES STATEMENT,

BY THE HON. W. FRASER, MINISTER OF MINES.

MR. SPEAKER,—

I have the honour to present to Parliament the Mines Statement for the year ended the 31st December, 1912.

The value of the mineral output for the year amounted to £3,042,224, as against £3,492,403 during 1911, being a decrease of £450,179, such decrease being due to the disastrous strikes by which the mines at Waihi, Reefton, and Blackwater—our most productive quartz-mining fields—were rendered idle from May to November. The shortage in the value of bullion from the mines affected is estimated at £450,000.

The value of the bullion produced from our gold-mines amounted to £1,429,870 for the year, as against £1,948,369 for 1911. Dividends paid during 1912 by registered gold-mining companies amounted to £368,638.

The output of coal amounted to 2,177,615 tons, being an increase of 111,542 tons above that of the previous year.

Satisfactory increases also occurred in the value of the kauri-gum and scheelite exported during 1912.

The most important development during the past year has been in connection with drilling operations in search of petroleum in the North Island, where six companies equipped with modern rotary drills are now engaged. The second Government bonus of £2,500 has been won by the Taranaki Oil-wells (Limited) upon their producing 500,000 gallons of crude petroleum from their Moturoa wells, where the company recently laid down a refinery for the treatment of their crude oil.

In the Provincial District of Marlborough a beginning has at last been made to establish the mining industry on a scale of some magnitude. The Dominion Consolidated Company have developed at Wakamarina a promising gold-scheelite lode, and have installed a treatment plant. Towards the end of the year crushing was commenced, with satisfactory results.

On the Ohinemuri River the Waihi-Paeroa Gold-extraction Company, having installed works of considerable magnitude for the treatment of tailings discharged into that river from the Waihi and Karangahake mines, experienced most satisfactory results, obtaining bullion to the value of £33,811, which enabled the payment of a substantial dividend.

On the Buller Coalfield an important development of a new coal area has been made by the Westport-Stockton Coal Company, who, by means of drilling, have located a block of workable bituminous coal, in extent about 600 acres, and containing at least 9,000,000 tons of coal. This discovery having been connected by electric tramway to the company's main haulage-system, the prospects of the company have materially improved.

At Ross work has been resumed by the Ross Goldfields (Reconstructed) (Limited) upon the once-famous deep leads at Ross Flat. With systematic development there is a reasonable prospect of an important mine being established.

MINERAL-PRODUCTION.

The following table shows the quantity and value of gold, silver, and other minerals, coal, and kauri-gum, exported during the years 1911 and 1912, also the quantity of native coal consumed in the Dominion during the same periods :—

Product.	Year ending 31st December, 1911. Quantity.	31st December, 1911. Value.	31st December, 1912. Quantity.	31st December, 1912. Value.
		£		£
Gold	455,226 oz.	1,816,782	343,163 oz.	1,345,131
Silver	1,311,043 "	131,587	801,165 "	84,739
Mixed minerals	3,470 tons	22,241	1,729 tons	20,571
New Zealand coal exported	223,275 "	204,379	229,012 "	216,170
New Zealand coal used in New Zealand	1,842,798 "	921,707	1,948,603 "	974,301
Kauri-gum	7,587 "	395,707	7,908 "	401,305
Coke	..	...	4	7

	£
Total value of production for 1911	3,492,403
" 1912	3,042,224
Total decrease	**£450,179**

AURIFEROUS-QUARTZ MINING.

The value of the bullion obtained from our quartz-mines during the few months the most important of them were worked amounted to £906,189, as a result of treating 335,651 tons of ore, the dividends paid amounting to £314,903 10s.

The following is a statement of the quantity of quartz treated, the value of bullion obtained, and the amount of dividends paid by the most important quartz-mines during 1912 :—

Name of Company.	Quantity of Quartz treated.	Value of Bullion.	Dividends paid by Registered Companies only. 1912.	Dividends paid by Registered Companies only. Total to End of December, 1912.
	Imperial Tons.	£	£	£
Waihi Gold-mining Company (Limited)	131,989	316,724	148,772	4,379,357
Waihi Grand Junction Gold-mining Company (Limited)	37,242	74,371	19,219	38,437
Talisman Consolidated (Limited)	42,780	246,569	125,062	685,353
New Big River Gold-mining Company (Limited) ..	7,666	36,657	15,600	67,200
Waihi-Paeroa Gold-extraction Company (Limited) ..	*	33,811	6,250	6,250
Other quartz-mines	115,974	198,057	Nil	Nil
Totals	**335,651**	**906,189**	**314,903**	**5,176,597**

* Re-treated tailings (84,178 tons).

ALLUVIAL AND DREDGE MINING.

Gold to the value of £266,348 was obtained from alluvial mines during 1912, being £8,868 less than that obtained during the previous year, and £77,884 more than during 1911. This increase may be attributed to a more general rainfall during the two past years rather than to an improvement in the development of the sluicing claims.

The value of the production from our gold-dredges during 1912 amounted to £257,333, as against £297,900 for 1911; but dredge mining is now acknowledged to be long past its zenith. The dredges in commission numbered eighty-seven,

twenty-eight of which, the property of registered companies, paid dividends amounting in the aggregate to £38,841. Fifteen dredges are operating on the West Coast and seventy-two in Otago and Southland.

The following is a statement regarding the gold-production and dividends by the most important gold-dredges during 1912 :—

Name of Dredge.	Production during 1912.	Dividends paid*	
		During 1912.	Total to End of 1912.
	£	£	£
Worksop	15,159	8,400	24,300
Pactolus	5,877	2,500	65,000
Hessey, Cameron, and Co.	5,488	1,560	6,255
Crewe	5,699	2,250	8,625
Masterton	4,609	1,750	33,250
Rising Sun	6,367	2,400	18,400
Magnum Bonum	4,873	2,000	10,875
Electric (two dredges)	7,702	2,600	128,692
Kohinoor	2,455	1,424	1,424
Paterson's Freehold (two dredges)	7,032	4,500	19,500
Seventy-five other working-dredges	192,072	9,457	†
Totals	**257,333**	**38,841**	†

* Dividends paid as here recorded are by registered companies only. The majority of the dredges are privately owned, and the profits therefrom are not known. † Unknown.

SCHEELITE.

The quantity of scheelite concentrates exported during the year amounted to 135 tons, valued at £13,347, being a slight increase (as regards value only) over the output during the previous year. This mineral is usually obtained in conjunction with auriferous-quartz mining in Otago and Southland, but during 1912 a quartz-scheelite mine of some magnitude has been opened at Wakamarina Valley, Marlborough.

KAURI-GUM.

The quantity of kauri-gum exported during 1912 amounted to 7,908 tons, valued at £401,305, as against 7,587 tons, value £395,707, during the previous year. The total value of kauri-gum exported to the end of 1912 amounted to £16,210,457.

COAL-MINING.

The output of coal during 1912 amounted to 2,177,615 tons, as against 2,066,073 tons during 1911, being an increase of 111,542 tons. There has also been a considerable increase in the quantity of coal imported into the Dominion, 364,359 tons having been imported during 1912, as compared with 188,068 tons during 1911. The quantity of coal exported during 1912 was 229,012 tons, and during 1911 223,275 tons. Our annual consumption of coal has therefore increased by about 282,096 tons during the past year.

The following is a comparative statement of the coal and lignite raised during the years 1910, 1911, and 1912 :—

Inspection District.	Output for 1911.	Output for 1912.	Increase or Decrease, 1911 and 1912.		Output for 1910.	Increase or Decrease, 1910 and 1911.	
	Tons.	Tons.		Tons.	Tons.		Tons.
Northern	397,872	383,847	Decrease	14,025	400,664	Decrease	2,792
West Coast ..	1,218,693	1,301,461	Increase	82,768	1,341,032	,,	122,339
Southern	449,508	492,307	,,	42,799	455,666	,,	6,158
Totals ..	**2,066,073**	**2,177,615**	**Increase**	**111,542**	**2,197,362**	**Decrease**	**131,289**

The comparative tonnage of the various classes of coal, &c., for the years 1911 and 1912 is summarized as follows :—

Class of Coal.	Output for 1912.	Output for 1911.	Increase or Decrease for 1912.
	Tons.	Tons.	Tons.
Bituminous and semi-bituminous ..	1,417,608	1,358,357	Increase 59,251
Pitch-coal	4,115	4,411	Decrease 296
Brown coal	544,675	601,093	,, 56,418
Lignite	211,217	102,212	Increase 109,005
Totals	**2,177,615**	**2,066,073**	**Increase 111,542**

The most important development in connection with the coal-mining industry during the year has been at the new State mine at the Seven-mile Creek, near Greymouth, where a colliery has been laid down to deal with an estimated output of 2,000 tons of bituminous coal per day. This new mine has been connected by rope-haulage inclines and a short branch railway with the Government line at Runanga, where a State colliery has for some years been in operation. By the kind permission of His Excellency the Governor it is proposed to name this new colliery after him; it will therefore be known in future as the "Point Elizabeth (Liverpool) Colliery," and the township now in course of formation is to bear the name of Liverpool. The quality of the coal now in course of development at this mine is superior for steam-production, household purposes, smithy use, gas and coke making, and may shortly be procured by the public at any of the State coal-depots established in the chief towns of the Dominion.

In the North Island important collieries are being laid down upon the Waikato Coalfield by the Waipa Railway and Collieries (Limited) and by the Pukemiro Company. The Taupiri Company, whose output exceeded all other North Island collieries combined, have largely increased their plant and scale of operations.

On the Buller Coalfield, of which a geological survey has recently been made by the Geological Survey Branch of the Mines Department, an important development of a new coal-bearing area has been made by the Westport-Stockton Company, as referred to in my preliminary remarks.

The production of coal and shale from the mines of the Dominion is shown in the following table :—

Name of Colliery.	Class of Coal.	Output for 1912.	Total Output to 31st December, 1912.
		Tons.	Tons.
Taupiri	Brown	258,108	2,495,263
Westport Coal Company—			
Millerton	Bituminous	329,430	3,761,423
Denniston	,, ...	298,636	6,344,435
Westport-Stockton	,, ...	125,031	457,160
State coal-mines—			
Seddonville	,, ...	72,693	472,797
Point Elizabeth	,, ...	188,835	1,602,298
Blackball	,, ...	202,878	1,672,824
Kaitangata	Brown	127,761	2,841,492
Nightcaps	Lignite	89,874	878,449
Other collieries	Various	484,369	14,949,095
Totals	..	**2,177,615**	**35,475,236**

PERSONS ENGAGED IN MINING.

The number of persons employed in and about the mines of the Dominion during 1912 is estimated at 9,567. The number employed in connection with the metalliferous mines was 5,239, and at coal-mines 4,328. The number of gum-diggers is not ascertainable.

The following table shows the number of miners in each inspection district, and the branch of mining in which they are engaged :—

Classification.	Inspection District.			
	Northern.	West Coast.	Southern.	Total.
Gold and silver	2,681	1,097	1,384	5,162
Coal	852	2,499	977	4,328
Other minerals	..	9	68	77
Totals	**3,533**	**3,605**	**2,429**	**9,567**

MINING ACCIDENTS.

The number of fatalities recorded in connection with all mining operations during 1912 is fourteen, and the number of men reported as seriously injured twenty-seven. The fatalities which occurred in and about the coal-mines total nine, or five less than during the previous year—a most satisfactory decrease. The number of serious but non-fatal colliery accidents was eighteen, as against twenty in 1911. At metalliferous mines the fatalities during the year numbered five, being the same number as during 1911. The number of serious non-fatal accidents at such mines was nine, as against nineteen during 1911. The fatalities per thousand persons employed in metal-mines were 0·95, and in coal-mines 2·08, or an average of 1·46 per thousand for metalliferous and coal-mines combined.

STATE COLLIERIES.

The two old collieries—neither of which was a new mine when acquired by the Government—are approaching exhaustion. The opening of the new Point Elizabeth (Liverpool) Colliery will not only enable the Department to fully maintain its trade, but will admit of a reasonable degree of expansion.

In the latter part of last session I laid upon the table a report by the Under-Secretary of Mines recommending considerable further writing-off for depreciation, on account of some of the assets of the State Coal-mines Account not being worth their book value (Parliamentary Paper C.–3A).

He also advised that 10 per cent. instead of 5 per cent. be annually written off for depreciation in future in respect of both the old collieries and the briquette-works, and that such amounts be computed on the gross total capital expenditure in each case, and not merely on the balance not written off as hitherto; the present rate for depreciation (5 per cent. per annum) to be maintained as regards the depots, and to be put in force as regards the new colliery as soon as it reaches the output stage.

In the balance-sheet now submitted all these recommendations have been given effect to, except the last one, and the time for that had not arrived up to the 31st March last.

This will explain the large amounts appearing in the balance-sheet as "Special depreciation," which are in every case in addition to the amounts allowed for annual depreciation.

Changing the rate for annual depreciation from 5 per cent. to 10 per cent., though doubtless a very desirable change indeed, has had the effect of making this year's balance-sheet show a loss of no less than £9,989. If the amount for depreciation had been retained at last year's rate, and had been computed in the same manner, this year's balance-sheet would have shown as good a working result as last year's.

STONE-QUARRIES.

The Stone-quarries Act, which came into operation during 1911, and under which inspection districts were defined and Quarry Inspectors appointed, appears to have considerably improved the safety conditions at those quarries and places to which the Act is applicable. During 1912 the number of quarries inspected was 202, at which 1,899 persons were ordinarily employed under certificated management. Only two fatalities occurred at quarries during 1912, as against five in 1911—a most satisfactory improvement. The Act is being administered by the existing staffs of the Mines and Public Works Departments without additional cost. In mining districts the Inspectors of Mines, in addition to their ordinary work, have been assigned the duties of Inspectors of Quarries, and in the remainder of the Dominion the overseers of the Public Works Department carry out the duties in conjunction with their other duties. In all, forty-one Inspectors have been appointed, of whom six are Inspectors of Mines and thirty-five Public Works officials.

STATE AID TO MINING.

A considerable amount of encouragement has been given by the Government to the development of the mining industry in all its branches. Such encouragement has taken the form of subsidies to prospecting associations and miners, to prospect new ground; loans for the development of mines the prospects of which are reasonably assured; subsidies and direct grants for the construction of roads on goldfields; and subsidies for the exploration of deep levels at existing mines, in cases where private capital is not obtainable and the prospects warrant such exploration. The mining industry has also been materially assisted by the free use of the Government prospecting-drills, and by Government water-races, which supply water to alluvial gold-mines at extremely reasonable charges.

(1.) Subsidized Prospecting.

During the year ended the 31st March, 1913, fifty-six approved prospecting parties were granted subsidies amounting to £5,843, of which sum £2,533 was expended during that period. As a result of such expenditure 8,407 ft. of drives have been put in, 390 ft. of shafts have been sunk, and thirty-nine boreholes have been drilled, all in search of gold. In addition to the above expenditure, £2,867 granted during previous years was expended during the financial year 1912–13. As much of the work for which the above grants were made during the past financial year is still in progress, it is impossible to state definitely the result of the whole of the prospecting operations; but of thirty-two subsidized operations already completed, in twenty-one cases the results were valueless and in eleven cases the results warrant further development of the claims. In no instance was a new goldfield proved, or anything of considerable value, the operations being mostly confined to the testing of ground in the vicinity of proved fields. The result to the mining industry is small, but to the successful prospectors, all of whom are miners who operate on a moderate scale, they are of material benefit.

Since the discovery of the Blackwater quartz-mining field during 1905 by a Government-subsidized prospecting party no new goldfield or find of great importance has been made for the expenditure of about £25,000 in subsidies to prospectors since that year. Without the assistance of Government subsidies, in all probability the exploration of the back country for minerals would almost entirely cease, as year by year there appears to be a growing disinclination, notwithstanding greatly improved means of access, to leave the more congenial atmosphere of the towns, where work is plentiful, for the arduous and primitive life of a prospector, in which the chances of success are gradually becoming more remote. The experience of New Zealand in this respect is similar to that in all the Australian States, and other mining countries.

(2.) Loans for the Development of Mines.

Since 1905, when statutory provision was made for advances by way of loans for mining development, three new companies have been assisted, to the aggregate

amount of £15,500, upon the security of their mines and equipment. It is satisfactory to state that the repayments of loan-instalments have hitherto been punctual, and the amount of interest in arrears is very small. In one case the results have been satisfactory both to the owners and to the mining industry, for by means of the loan a productive alluvial gold-mine has been developed, and employment given to a number of persons, who absorb about £5,000 per annum in wages. In another case a small undertaking was assisted to introduce a somewhat novel method of alluvial mining, and the result attained has enabled the borrowers to refund a considerable proportion of the money lent before it became due. In the third case—viz., that of a deep quartz-mine—owing to the work not being sufficiently advanced it is premature to express an opinion.

The experience, however, in the Australian States regarding mining loans has been very unsatisfactory, losses having almost invariably resulted, owing doubtless to advances having been made without adequate investigation. In New Zealand, however, it is required that the Government mining advisers shall, after personal examination, report upon the application, stating specially if there is a reasonable probability of the proposed mining operations proving remunerative, and giving reasons for such opinion. The Board constituted to report to the Minister upon such applications consists of four officers, but, owing to the difficulty in bringing that number together to inspect properties in remote places, it is proposed to reduce the Board to three members—viz., the Inspecting Engineer of Mines, the Inspector of Mines for the district to which the application relates, and one other person to be appointed by the Minister of Mines as the necessity arises.

ROADS AND TRACKS ON GOLDFIELDS.

The necessity of opening up remote and hitherto inaccessible districts in which workable minerals have been, or are likely to be, found is fully appreciated by the Government. The expenditure on roads and tracks constructed by subsidies and direct grants during the financial year ended the 31st March, 1913, amounted to £36,761 3s. 4d. The annual expenditure by the Minies Department upon roads and tracks is therefore considerable, when to direct grants and subsidies are added the goldfields revenue and gold duty, which are credited to local bodies each year. During 1911 this assistance amounted to £27,552 goldfields revenue and £26,197 gold duty, and during 1912 to £16,185 goldfields revenue and £17,874 gold duty. With the completion of most of the necessary roads and tracks to open up mineral lands the time has now arrived when local bodies should provide for the maintenance of the existing roads out of the goldfields revenue and gold duty with which they are credited by the Government, or from their local revenue.

GOVERNMENT PROSPECTING-DRILLS.

There has been a considerable demand for the Government diamond drills, of which there are four in commission, and for the two Keystone placer drills, and the results obtained have in all cases been conclusive. This form of State aid to mining has been entirely successful, as small parties of miners as well as substantial companies have had lent to them, free of charge, modern drilling equipment by which a fair estimate of the mineral contents of their property may be made at the cost only of the wages, repairs, and material used. The drills have been utilized in prospecting for lodes, coal-seams, and auriferous alluvium. During the year 156 holes of an aggregate depth of 6,670 ft. were drilled by two Keystone drills in alluvial gravel, and three holes of an aggregate depth of 1,158 ft. were drilled in search of coal.

DEEP-MINING EXPLORATION.

For the purpose of finally solving the problem as to the existence or non-existence of ore below the impoverished zone at the Thames Goldfield, from above which zone gold to the value of several millions of pounds has been won during past years, an agreement was entered into during 1910 between the Government and the

mining companies interested for the driving of a crosscut at a depth of 1,000 ft., connecting the Queen of Beauty and Kuranui-Caledonian shafts—a distance of 2,748 ft. After an expenditure of £12,000 by the companies the Government paid as a subsidy £5,000, as previously agreed upon. After this sum also was absorbed upon the work the companies added £3,754. Upon this sum being expended, to prevent the stoppage of the crosscut, on the 26th September, 1912, a further grant of £1,000 was made by the Government. To avoid a formidable fault known as the Moanataiari Slide the course of the crosscut was altered by means of a deviation of 650 ft. via the shaft of the Waiotahi Mine. It is to be regretted that the result of this deep-level exploration has hitherto been somewhat discouraging, no lode of a payable character having yet been disclosed, although several small quartz veins have been intersected.

GOVERNMENT WATER-RACES.

The Mount Ida Water-races continue to serve a few miners in the Naseby district, but the number of working claims is gradually diminishing, and, as the irrigation of an extensive area of the Maniototo Plains may be carried out by means of these conduits, their purpose will doubtless be changed from mining to agriculture at no distant date. During 1912–13 the receipts from sales of water amounted to £1,147 19s. 3d., the expenditure in upkeep and supervision being £1,836 11s. 9d.

The Waimea-Kumara extensive water-race system on the West Coast has effectively prolonged the life of the alluvial sluicing claims in the neighbourhood of Kumara and Waimea.

The newly constructed extension of the Kumara Race by siphon, which crosses the valley of the River Taramakau and delivers 36 cubic feet of water per second, has added a fresh lease to the life of the claims situated on the hills north of that river. The purchase by the Government of the privately owned Erin-go-Bragh Water-race, which seriously obstructed the extension of the claims into the terraces at Westbrook, has resulted in a considerable area of payable ground hitherto unavailable being rendered accessible.

To increase the capacity of the Waimea Water-race the construction of a branch race from the Arahura-Wainihinihi Creek to the Kawaka Creek is now in progress, together with a branch race from McPherson's Creek. These conduits are expected to assist materially the development of claims in the Waimea and Stafford districts. In addition, two parties of miners have been assisted in the construction of their branch races from the Government main race.

The receipts for water sold from the Waimea-Kumara Races during 1912–13 were £1,440 1s. 5d., and the cost of upkeep and supervision £1,446 19s. 6d.

SCHOOLS OF MINES.

The attendance at the Government-subsidized schools of mines situated at the principal mining centres—Waihi, Thames, Karangahake, Coromandel, Westport, and Reefton—still continues to decline to such an extent that it is doubtful if some of the schools really justify their existence. These schools of mines during their twenty-eight years' career have received subsidies from the Government to the amount of £52,022 10s. 5d., of which £2,206 7s. 4d. was granted during the financial year 1912–13. The conditions regarding the six Government scholarships offered annually to students of these schools have, during 1912, been considerably simplified, and as a result three scholarships have been won, amounting in value in each case to £50 per annum and being tenable for three years at the Otago University; in addition to which no charge is made for class fees from such scholars. Some of the earlier winners of these scholarships now occupy prominent positions abroad in the mining world.

GOLD-MINERS' RELIEF FUND.

This fund became unfinancial about the beginning of September, 1912, and no payments could be made for some time. From that date to the 1st May, 1913, 284 claims had been received, and as funds came to hand payments were made. All claims received up to the 30th November, 1912, had been settled at the end

of April, 1913. The position is still unsatisfactory. The claims received from the time the fund became unfinancial to the 30th April, 1913, amounted to £4,475 12s. 3d., and the receipts for the same period totalled only £2,413 16s. 5d. This deficiency may be attributed partly to the legislation passed in 1911, which provided that the clause referring to allowances to widows should be retrospective; and it may be partly attributed to the Waihi strike, though since the resumption of work in that district the total receipts have been only sufficient to meet the current claims. For instance, the receipts for the period commencing with the 1st January, 1913, and ending at the 30th June, 1913, amounted to £2,504 2s. 2d., while the claims for that period totalled £2,406 19s. 4d. From this it will be seen that some time must elapse before the receipts will be sufficient to liquidate all the outstanding claims. The latter on the 30th June, 1913, amounted to £1,587 18s. 9d.

Owing to the inadequacy of the relief fund to meet all demands made upon it, an amount of £1,000 was voted by Parliament as a contribution to the fund. Instead, however, of paying this into the fund it was decided to use the amount, or so much of it as might be required for that purpose, in relieving cases of miners suffering from pneumoconiosis and in paying to the widows of such miners as have died from this disease a sum not exceeding £50 and funeral expenses up to £20 in each case. The amount disbursed in this manner up to 31st March last was £263.

The fund, although gradually recovering, is still not able to meet its liabilities exactly at their due dates, but as the mines have now resumed work, and as presumably all the old claims have now been sent in, it is hoped that the fund will soon be on a good financial footing again.

GEOLOGICAL SURVEY.

Detailed geological surveys have been in progress in the Reefton and Buller-Mokihinui (Westport) subdivisions. A small area near Te Puke was also surveyed in detail. In addition to detail work, officers of the survey have paid a number of flying visits to various localities, but the staff is too small to enable many such inspections to be made, nor is it desirable that the detailed surveys should suffer on this account.

The palæontological branch of the survey has made good progress in its work, and some eminent foreign specialists have volunteered their services for special investigations.

TABLES TO ACCOMPANY THE MINES STATEMENT.

No. 1.

TABLE SHOWING COMPARISON IN QUANTITY AND VALUE OF GOLD ENTERED FOR EXPORTATION, ALSO THE QUANTITY AND VALUE OF OTHER MINERALS, FOR THE YEARS ENDED THE 31ST DECEMBER, 1911 AND 1912, AS WELL AS THE TOTAL VALUE SINCE THE 1ST JANUARY, 1853.

Name of Metal or Mineral.	For Year ending the 31st December, 1912.		For Year ending the 31st December, 1911.		Total from the 1st January, 1853, to the 31st December, 1912.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Precious metals—	Oz.	£	Oz.	£	Oz.	£
Gold	343,163	1,345,131	455,226	1,816,782	20,508,151	80,599,044
Silver	801,165	84,739	1,311,043	131,587	16,808,005	1,834,848
Total gold and silver	1,144,328	1,429,870	1,766,269	1,948,369	37,316,156	82,433,892
Mineral produce, including kauri-gum—	Tons.	£	Tons.	£	Tons.	£
Copper-ore	..	..	..	..	1,495½	19,198
Chrome-ore	..	..	..	..	5,869	38,002
Antimony-ore	..	..	20	92	3,768	54,941
Manganese-ore	..	..	..	4	19,364½	61,905
Hæmatite ore	..	..	..	..	76½	444
Mixed minerals	*1,729 7/10	20,571	†3,469 19/20	22,104	38,513⅗	282,065
Coal (New Zealand) exported	229,012	216,170	223,275	204,379	3,324,283	3,049,922
Coke exported	4	7	24	41	16,463	24,925
Coal, output of mines in Dominion (less exports)	1,948,603	974,301	1,842,798	921,707	32,136,521	15,976,455
Shale	..	..	..	..	14,423	7,215
Kauri-gum	7,908	401,305	7,587	395,707	321,995	16,210,457
Total quantity and value of minerals	2,187,256 7/10	1,612,354	2,077,173 19/20	1,544,034	35,882,782 1/10	35,725,529
Value of gold and silver, as above	..	1,429,870	..	1,948,369	..	82,433,892
Total value of minerals produced, including gold and silver	..	3,042,224	..	3,492,403	..	118,159,421

* Stone, 23 tons; greenstone, 7 7/10 tons; pumice-stone, 1,562 tons; scheelite-ore, 135 tons; pyrites, 2 tons.
† Including auriferous ore, 138 tons; scheelite-ore, 138 tons; unenumerated, 3 tons; pyrites, 2 tons; stone, 34 tons; greenstone, 1 19/20 tons; pumice-stone, 3,151 tons; mercury ore, 2 tons.

No. 2.

TABLE SHOWING THE QUANTITY AND VALUE OF GOLD ENTERED FOR EXPORTATION FROM NEW ZEALAND FOR THE YEARS ENDED THE 31ST DECEMBER, 1912 AND 1911, AND THE TOTAL QUANTITY AND VALUE FROM 1857 TO THE 31ST DECEMBER, 1912.

District and County or Borough.	Year ending 31st December, 1912.		Year ending 31st December, 1911.		Increase or Decrease for Year ending 31st December, 1912.		Total Quantity and Value from January, 1857, to 31st December, 1912.	
	Quantity.	Value.	Quantity.	Value.	Increase.	Decrease.		
AUCKLAND—	Oz.	£	Oz.	£	Oz.	Oz.	Oz.	£
County of Coromandel	2,801	11,757	6,311	26,521	..	3,510	..	..
County of Thames	9,297	35,189	5,375	21,023	3,922	..	..	..
County of Ohinemuri	86,140	321,595	75,616	282,947	10,524	..	..	..
County of Piako	38	159	29	123	9	..	..	..
Borough of Thames	868	3,603	2,488	10,098	..	1,620	..	..
Great Barrier Island	..	..	3	12	..	3	..	..
Borough of Waihi	80,719	321,646	173,969	708,480	..	93,250	..	..
	179,863	**693,949**	263,791	1,049,204	..	83,928	**5,606,204**	**21,369,611**
WELLINGTON	..	..	..	..	..	..	**188**	**706**

No. 2—*continued.*

TABLE SHOWING THE QUANTITY AND VALUE OF GOLD ENTERED FOR EXPORTATION, ETC.—*continued.*

District and County or Borough.	Year ending 31st December, 1912.		Year ending 31st December, 1911.		Increase or Decrease for Year ending 31st December, 1912.		Total Quantity and Value from January, 1857, to 31st December, 1912.	
	Quantity.	Value.	Quantity.	Value.	Increase.	Decrease.		
	Oz.	£	Oz.	£	Oz.	Oz.	Oz.	£
MARLBOROUGH—								
County of Marlborough ..	**439**	**1,643**	229	867	210	..	**90,951**	**354,245**
NELSON—								
County of Waimea ..	40	160	70	281	..	30	..	..
County of Collingwood ..	3,156	12,599	1,995	7,971	1,161	..	..	..
County of Takaka ..	4	16	24	95	..	20	..	..
County of Murchison ..	34	136	60	239	..	26	..	..
	3,234	**12,911**	2,149	8,586	1,085	..	**1,729,740**	**6,857,773**
WEST COAST—								
County of Buller	3,457	13,388	2,921	11,480	536	..	..	..
County of Inangahua ..	42,287	166,741	63,217	251,488	..	20,930	..	..
County of Grey	11,576	46,282	15,561	62,604	..	3,985	..	..
County of Westland ..	9,606	38,796	9,816	39,420	..	210	..	..
Hokitika Borough ..	..	..	..	..	..	..	..	..
Ross Borough	1,343	5,373	888	3,553	455	..	..	..
	68,269	**270,580**	92,403	368,545	..	24,134	**5,758,515**	**22,892,393**
CANTERBURY—								
County of Ashburton ..	..	..	..	..	..	..	**99**	**387**
OTAGO—								
County of Taieri	469	1,866	475	1,860	..	6	..	..
County of Tuapeka ..	15,409	61,693	16,820	67,832	..	1,411	..	..
County of Vincent ..	25,951	103,966	30,792	124,440	..	4,841	..	..
County of Maniototo ..	6,946	27,399	5,105	20,282	1,841	..	..	..
County of Waihemo ..	966	3,725	1,145	4,420	..	179	..	..
County of Waitaki ..	2,320	9,115	2,189	8,535	131	..	..	..
County of Bruce	1,333	5,339	832	3,284	501	..	..	..
County of Lake	3,471	13,778	3,480	14,055	..	9	..	..
County of Wallace ..	4,231	16,918	3,601	14,440	630	..	..	..
County of Fiord	3	12	18	71	..	15	..	..
County of Southland ..	28,634	115,873	31,024	125,684	..	2,390	..	..
County of Clutha.. ..	876	3,556	667	2,711	209	..	..	..
	90,609	**363,240**	96,148	387,614	..	5,539	**7,320,952**	**29,118,182**
Unknown	**749**	**2,808**	506	1,966	243	..	**1,502**	**5,747**
Totals	**343,163**	**1,345,131**	455,226	1,816,782	..	112,063	**20,508,151**	**80,599,044**

No. 3.

GOLD PRODUCED, 1857 TO 1912.

TABLE SHOWING THE TOTAL QUANTITY AND VALUE OF GOLD ENTERED FOR EXPORTATION FROM THE 1ST JANUARY, 1857, TO THE 31ST DECEMBER, 1912. (This Return shows the Output of the various Goldfields. Gold entered at Nelson from Hokitika, Greymouth, and Westport is put under the Head of "West Coast," and Gold from Invercargill and Riverton under the Head of "Otago.")

Year.	Auckland.		Nelson.		Marlborough.		West Coast.		Otago.		Wellington.		Canterbury.		Grand Totals.	
	Oz.	Value.	Oz.	Value.	Oz.	Value.	Oz.	Value.	Oz.	Value.	Oz.	Value.	Oz.	Value.	Oz.	Value
		£		£		£		£		£		£		£		£
1857 ..	..	..	10,437	40,422	..	..	..	..	..	..	..	..	..	..	10,437	40,422
1858 ..	308	1,192	13,226	51,272	..	..	..	..	..	..	..	..	..	..	13,534	52,464
1859 ..	..	..	7,336	28,427	..	..	..	..	..	..	..	..	..	..	7,336	28,427
1860 ..	..	..	4,538	17,585	..	..	..	..	..	..	..	..	..	..	4,538	17,585
1861 ..	..	..	6,335	24,552	..	..	..	..	187,696	727,321	..	..	..	..	194,031	751,873
1862 ..	1,239	4,098	10,422	40,386	..	..	..	..	399,201	1,546,905	..	..	..	..	410,862	1,591,389
1863 ..	4,483	13,853	9,580	37,120	..	..	..	..	614,387	2,380,750	..	..	..	..	628,450	2,431,723
1864 ..	3,448	10,552	14,410	55,841	24,838	95,231	1,463	5,560	436,012	1,689,653	..	..	..	..	480,171	1,856,837
1865 ..	5,449	17,096	12,137	47,030	7,952	30,814	289,897	1,127,370	259,139	1,004,163	..	..	..	..	574,574	2,226,474
1866 ..	5,814	17,463	7,650	29,643	469	1,818	552,572	2,140,946	168,871	654,647	..	..	..	..	735,376	2,844,517
1867 ..	6,637	18,277	9,123	35,918	501	1,978	511,974	2,018,874	158,670	623,815	..	..	..	..	686,905	2,698,862
1868 ..	53,660	168,874	5,999	38,396	404	1,616	405,762	1,608,844	171,649	686,596	..	..	..	..	637,474	2,504,326
1869 ..	132,451	434,687	10,631	42,524	666	2,664	317,169	1,269,664	153,364	613,456	..	..	..	..	614,281	2,362,995
1870 ..	85,534	319,146	12,244	48,692	1,852	7,408	280,068	1,121,525	165,152	660,694	30	120	..	..	544,880	2,157,585
1871 ..	330,326	1,188,708	10,014	40,056	1,867	7,468	232,882	931,528	154,940	619,760	..	..	..	..	730,029	2,787,520
1872 ..	104,890	369,341	8,175	32,700	2,057	8,228	172,574	690,296	157,574	630,696	..	..	..	..	445,370	1,731,261
1873 ..	119,449	437,123	13,697	54,786	1,274	5,050	188,501	756,442	182,416	734,024	..	..	..	..	505,337	1,987,425
1874 ..	76,910	305,068	5,642	22,158	1,198	4,748	157,531	631,203	135,107	542,154	..	..	..	..	376,388	1,505,331
1875 ..	69,485	262,156	4,577	17,866	1,159	4,636	158,678	635,480	121,423	487,632	..	..	..	..	355,322	1,407,770
1876 ..	56,057	221,905	14,018	55,862	450	1,796	133,014	531,274	118,477	473,491	..	..	..	..	322,016	1,284,328
1877 ..	99,081	403,627	5,367	21,092	870	3,197	153,198	612,823	113,169	455,341	..	..	..	..	371,685	1,496,080
1878 ..	55,982	220,454	4,463	17,223	404	1,617	144,634	578,508	105,003	422,277	..	..	..	..	310,486	1,240,079
1879 ..	37,901	154,295	2,993	11,424	879	3,460	142,822	571,061	102,869	407,868	..	..	..	..	287,464	1,148,108
1880 ..	42,720	176,416	3,222	12,223	1,550	5,650	144,090	575,258	113,666	457,705	..	..	..	..	305,248	1,227,252
1881 ..	35,516	141,326	3,453	13,039	1,378	4,531	127,544	509,971	102,670	411,923	..	..	..	..	270,561	1,080,790
1882 ..	33,059	131,007	3,289	12,494	1,352	5,400	130,048	519,978	83,446	333,804	10	37	..	..	251,204	1,002,720
1883 ..	41,291	163,618	2,064	7,724	636	2,524	116,905	467,152	87,478	352,334	..	..	..	..	248,374	993,352
1884 ..	36,087	143,564	2,159	8,002	1,079	4,306	111,686	446,517	78,810	318,932	101	380	24	96	229,946	921,797
1885 ..	42,989	170,416	2,798	10,337	540	2,160	117,861	471,325	73,183	294,378	..	..	..	..	237,371	948,615
1886 ..	32,271	128,140	2,582	9,979	404	1,451	112,671	446,287	79,104	317,543	47	169	..	..	227,079	903,569
1887 ..	30,697	121,564	2,914	10,829	1,041	3,759	98,774	395,430	70,443	279,518	..	..	..	..	203,869	811,100
1888 ..	35,223	139,556	3,027	11,320	699	2,547	100,139	400,405	62,107	247,142	..	..	24	96	201,219	801,066
1889 ..	28,655	113,191	3,252	12,310	5,189	20,167	101,696	406,451	64,419	256,430	..	..	..	..	203,211	808,549
1890 ..	31,745	125,760	2,856	11,049	6,073	24,285	89,096	356,368	63,423	255,976	..	..	..	..	193,193	773,438
1891 ..	45,392	181,185	4,445	16,896	5,649	22,576	109,268	437,126	87,209	349,573	33	132	..	..	251,996	1,007,488
1892 ..	45,555	183,655	2,535	9,604	3,898	15,429	103,106	412,383	82,933	333,467	52	206	..	..	238,079	954,744
1893 ..	45,714	186,553	2,145	8,187	2,165	8,644	99,127	396,516	77,660	313,238	..	..	..	..	226,811	913,138
1894 ..	52,916	211,974	2,860	10,634	2,536	10,123	86,950	347,464	76,353	307,644	..	..	..	..	221,615	887,839
1895 ..	111,213	430,862	2,460	9,016	2,695	10,771	89,429	357,719	87,694	353,796	..	..	..	..	293,491	1,162,164

No. 3—*continued.*

GOLD PRODUCED, 1857 TO 1912—*continued.*

TABLE SHOWING THE TOTAL QUANTITY AND VALUE OF GOLD ENTERED FOR EXPORTATION FROM THE 1ST JANUARY, 1857, TO THE 31ST DECEMBER, 1912. (This Return shows the Output of the various Goldfields. Gold entered at Nelson from Hokitika, Greymouth, and Westport is put under the Head of "West Coast," and Gold from Invercargill and Riverton under the Head of "Otago")—*continued.*

Year.	Auckland.		Nelson.		Marlborough.		West Coast.		Otago.		Wellington.		Canterbury.		Grand Totals.	
	Oz.	Value.	Oz.	Value.	Oz.	Value.	Oz.	Value.	Oz.	Value.	Oz.	Value.	Oz.	Value.	Oz.	Value.
		£		£		£		£		£		£		£		£
1896 ..	92,346	350,355	2,753	10,333	916	3,588	79,317	317,161	88,362	359,991	..	..	..	..	263,694	1,041,428
1897 ..	105,477	392,337	1,892	7,055	810	3,195	58,817	235,430	84,649	342,187	..	..	..	..	251,645	980,204
1898 ..	142,383	527,786	1,720	6,882	781	3,003	79,948	319,789	55,343	223,231	..	..	..	..	280,175	1,080,691
1899 ..	168,769	624,737	419	1,571	..	..	90,031	360,149	130,311	526,605	..	..	28	111	389,558	1,513,173
1900 ..	166,342	605,398	3,718	14,605	535	2,147	73,923	295,733	129,075	521,629	..	..	23	90	373,616	1,439,602
1901 ..	191,968	695,551	7,212	28,138	133	513	113,286	454,006	142,940	575,492	..	..	22	83	455,561	1,753,783
1902 ..	201,583	721,977	5,947	23,649	601	2,404	118,796	475,272	181,116	728,124	..	..	2	7	508,045	1,951,433
1903 ..	232,681	832,334	7,962	31,710	972	3,845	125,241	501,090	166,458	668,852	..	..	..	..	533,314	2,037,831
1904 ..	223,010	791,529	5,049	20,141	473	1,890	122,310	489,177	169,478	684,764	..	..	..	..	520,320	1,987,501
1905 ..	232,215	935,602	6,469	25,862	..	..	109,704	438,258	172,098	694,214	..	..	..	..	520,486	2,093,936
1906 ..	295,417	1,195,541	2,944	11,746	..	..	104,743	414,292	160,739	649,325	..	..	..	..	563,843	2,270,904
1907 ..	298,101	1,187,079	3,893	15,274	795	3,009	87,069	343,146	118,352	478,982	..	..	..	..	508,210	2,027,490
1908 ..	296,971	1,171,375	3,196	12,783	297	1,145	86,052	335,722	119,907	483,900	..	..	..	..	506,423	2,004,925
1909 ..	288,614	1,142,098	2,572	10,286	39	155	95,014	369,930	120,132	484,431	..	..	..	..	506,371	2,006,900
1910 ..	286,526	1,136,057	117	466	53	212	92,036	358,099	99,556	401,494	..	..	..	..	478,288	1,896,328
1911 ..	263,791	1,049,204	2,149	8,586	229	867	92,403	368,545	96,654	389,580	..	..	..	..	455,226	1,816,782
1912 ..	179,863	693,949	3,234	12,911	439	1,643	68,269	270,580	91,358	366,048	..	..	..	..	343,163	1,345,131
Totals ..	5,606,204	21,369,611	310,321	1,226,616	90,797	353,668	7,178,088	28,524,127	7,322,345	29,123,495	273	1,044	123	483	20,508,151	80,599,044

No. 4.

TABLE SHOWING THE TOTAL QUANTITY AND VALUE OF MINERAL ORES OTHER THAN GOLD (THE PRODUCT OF NEW ZEALAND MINES), COAL, COKE, AND KAURI-GUM EXPORTED FROM THE DOMINION UP TO 31ST DECEMBER, 1912.

Year.	Silver.		Copper-ore.		Chrome-ore.		Antimony-ore.		Manganese-ore.		Hæmatite Ore.		Mixed Mineral Ores.*		Coal.		Coke.		Kauri-gum.		Totals.		
	Oz.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Oz.	Tons.	Value.
		£		£		£		£		£		£		£		£		£		£			£
1853 ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	830	15,972	..	830	15,972
1854 ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,661	28,864	..	1,661	28,864
1855 ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	355	4,514	..	355	4,514
1856 ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,440	18,591	..	1,440	18,591
1857 ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2,522	35,251	..	2,522	35,251
1858 ..	..	..	351	5,000	3	25	..	..	..	..	..	..	..	..	2	4	..	..	1,811	20,037	..	2,167	25,066
1859 ..	..	..	245	2,605	8	120	..	..	..	..	..	..	..	..	..	..	..	..	2,010	20,776	..	2,263	23,501
1860 ..	..	..	137	1,590	116	1,440	..	..	..	..	..	..	..	..	1	2	..	..	1,046	9,851	..	1,300	12,883
1861 ..	..	..	110	1,300	52	520	..	..	..	..	..	..	..	..	..	..	..	..	856	9,888	..	1,018	11,708
1862 ..	..	..	51	1,024	3,843	24,719	..	..	..	..	..	..	..	..	..	..	..	..	1,103	11,107	..	3,997	36,850
1863 ..	..	..	..	..	595	4,318	..	..	..	..	..	..	..	..	..	..	..	..	1,400	27,026	..	1,995	31,344
1864 ..	..	..	..	..	768	4,910	..	..	..	..	..	..	..	..	..	..	..	..	2,228	60,590	..	2,996	65,500
1865 ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,867	46,060	..	1,867	46,060
1866 ..	..	..	..	..	281	1,315	..	..	..	..	..	..	..	..	261	400	..	..	2,535	70,572	..	3,077	72,287
1867 ..	..	..	246	2,700	..	..	..	..	..	..	..	..	..	..	973	1,228	..	..	2,685	77,491	..	3,904	81,419
1868 ..	..	..	84	977	..	..	..	..	..	..	..	..	..	..	1,027	1,210	..	..	2,690	72,493	..	3,801	74,680
1869 ..	11,063	2,993	..	..	..	..	..	..	..	..	..	..	..	..	750	800	..	..	2,850	111,307	11,063	3,600	115,100
1870 ..	37,123	11,380	7	120	..	..	..	..	..	..	..	..	..	..	1,672	1,508	..	..	4,391	175,074	37,123	6,070	188,082
1871 ..	80,272	23,145	..	..	..	..	..	..	..	..	..	..	..	..	1,696	1,612	..	..	5,054	167,958	80,272	6,750	192,715
1872 ..	37,064	9,910	..	..	..	..	..	..	..	..	..	..	..	..	990	855	21	50	4,811	154,167	37,064	5,882	164,982
1873 ..	36,187	9,850	..	..	..	..	..	..	..	..	..	..	..	..	724	655	..	..	2,834	85,816	36,187	3,558	96,321
1874 ..	40,566	10,380	..	..	..	..	..	..	..	..	..	..	..	..	1,463	1,363	87	228	2,569	79,986	40,566	4,119	91,957
1875 ..	29,085	7,569	..	..	..	..	..	..	..	..	..	..	..	..	3,385	3,129	15	51	3,231	138,523	29,085	6,631	149,272
1876 ..	12,683	3,171	..	..	..	..	..	..	..	..	..	..	3,180	14,824	1,854	1,954	53	189	2,888	109,234	12,683	7,975	129,372
1877 ..	33,893	7,556	..	..	..	..	..	..	..	..	..	..	2,366	9,664	2,658	2,071	25½	72	3,633	118,348	33,893	8,682½	137,711
1878 ..	23,019	5,755	6	115	..	..	4	102	2,516	10,416	..	..	2	8	6,362	5,139	85	177	3,445	132,975	23,019	12,120	154,687
1879 ..	20,645	4,512	55	1,105	..	..	..	..	2,140	8,338	..	..	..	..	7,144	6,187	154	324	3,229	147,535	20,645	12,722	168,001
1880 ..	20,005	4,500	..	..	..	..	60	612	2,611	10,423	..	..	2,674	11,335	7,020	5,977	87	135	4,725	242,817	20,005	17,177	275,799
1881 ..	18,885	4,236	5	36	..	..	2	24	1,271	3,283	..	..	1,955	4,303	6,621	5,610	223	353	5,461	253,778	18,885	15,538	271,623
1882 ..	5,694	1,286	9	41	..	..	30	900	2,181	6,963	..	..	2,784	8,597	3,207	2,380	275	480	5,533	260,369	5,694	14,019	281,016
1883 ..	16,826	3,785	46	678	..	..	31	804	384	1,155	0½	12	22	110	6,522	4,879	1,430	2,057	6,518	336,606	16,826	14,953½	350,086
1884 ..	24,914	5,125	20	106	..	..	..	..	318	809	..	..	..	..	6,104	4,461	236	372	6,393	342,151	24,914	13,071	353,024
1885 ..	16,624	3,169	..	..	..	..	666	5,289	602	1,716	50½	208	114	993	43,893	51,257	267	385	5,875¾	299,762	16,624	51,468¾	362,779
1886 ..	12,108	2,946	20	390	..	..	62	1,784	328½	1,316	..	..	445	1,846	46,136	52,133	497	715	4,920¾	257,653	12,108	52,409¼	318,783
1887 ..	20,809	3,453	..	..	..	..	134	3,989	305	895	..	..	144	4,142	44,129	44,650	183⅓	266	6,791	362,449	20,809	51,686⅓	419,844
1888 ..	403	71	2	75	..	..	376	6,246	1,085	2,404	..	..	162	2,955	68,087	64,971	953	1,646	8,482	380,933	403	79,147	459,301
1889 ..	24,105	4,043	..	..	..	..	493	5,319	1,080	2,569	..	..	199	9,985	86,405	84,347	2,132	3,407	7,519	329,590	21,105	97,828	439,260
1890 ..	32,637	6,162	..	..	..	..	515	11,121	482	1,004	1½	5	19	273	69,614	67,003	2,218	3,334	7,438	378 563	32,637	80,287⅓	467,465
1891 ..	28,023	5,151	0¼	4	..	..	413	4,950	1,153	2,634	..	1	2	6	91,664	91,173	2,544	3,658	8,388	437,056	28,023	104,164¼	544,633
1892 ..	22,053	3,996	..	..	..	..	364	4,900	521	1,239	..	..	84	631	78,911	80,225	4,306	5,691	8,705	517,678	22,053	92,891	614,360

TABLE SHOWING THE TOTAL QUANTITY AND VALUE OF MINERAL ORES OTHER THAN GOLD (THE PRODUCT OF NEW ZEALAND MINES), COAL, COKE, AND KAURI-GUM, EXPORTED FROM THE DOMINION UP TO 31ST DECEMBER, 1912—*continued.*

Year.	Silver.		Copper-ore.		Chrome-ore.		Antimony-ore.		Manganese-ore.		Hæmatite Ore.		Mixed Mineral Ores.*		Coal.		Coke.		Kauri-gum.		Total.		
	Oz.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Oz.	Tons.	Value.
		£		£		£		£		£		£		£		£		£		£			£
1893 ..	63,076	9,743	..	..	..	..	331	3,467	319	943	..	..	37	650	69,136	72,699	51	53	8,317	510,775	63,076	78,191	598,330
1894 ..	54,177	6,697	..	..	..	..	44	761	534	1,156	..	..	25	353	75,004	73,438	107	160	8,338	404,567	54,177	84,052	487,132
1895 ..	85,024	10,679	..	..	..	..	54	1,486	210	525	..	..	62	880	85,987	83,342	288	715	7,425	418,766	85,024	94,026	516,393
1896 ..	94,307	10,589	..	..	..	..	21	450	65	205	..	..	37	1,335	79,524	71,984	105	263	7,126	431,323	94,307	86,878	516,149
1897 ..	183,892	20,872	..	2	..	..	10	157	180	541	..	..	1,561	5,892	76,073	69,595	..	..	6,641½	398,010	183,892	84,465½	495,069
1898 ..	293,851	33,107	2¼	70	..	..	..	..	217	703	..	..	1,828	4,792	56,332	50,381	9	14	9,905	586,767	293,751	68,253¼	675,834
1899 ..	349,338	40,838	..	..	..	..	..	..	135	407	..	..	1,309	6,591	89,480	83,085	18	9	11,116	607,919	349,338	102,058	738,849
1900 ..	326,457	38,879	12	45	28	110	3	101	166	588	..	..	2,126	12,751	112,707	98,136	..	..	10,159	622,293	326,457	125,201	772,903
1901 ..	571,134	65,258	3	105	..	..	30	136	208	614	..	..	696	7,775	159,643	142,176	..	..	7,541	446,114	571,134	168,121	662,178
1902 ..	674,196	71,975	..	..	175	525	..	..	..	..	17	116	415	4,422	188,677	154,747	..	..	7,430	450,223	674,196	196,714	682,008
1903 ..	911,914	91,497	6	123	..	..	..	..	70	210	..	1	625	7,014	152,332	128,927	..	..	9,357	631,102	911,914	162,390	658,874
1904 ..	1,094.461	112,875	..	..	..	..	..	..	196	570	7	96	1,404	10,168	165,220	139,898	..	..	9,203	501,817	1,094,461	176,030	765,424
1905 ..	1,179,744	120,542	4	17	..	..	..	..	55	165	..	..	632	8,136	122,817	107,062	15	15	10,883	561,444	1,179,744	134,406	797,381
1906 ..	1,390,536	143,572	..	..	..	..	..	..	16	40	..	..	1,297	18,421	141,641	122,614	5	6	9,154	522,486	1,390,536	152,113	807,139
1907 ..	1,562,603	169,484	56	595	..	..	98	2,118	5	26	..	5	1,492¼	30,448	128,950	114,737	15	15	8,708	579,888	1,562,603	139,324¼	897,316
1908 ..	1,731,336	175,337	13	275	..	..	5	73	..	..	..	..	1,690½	16,179	100,502	85,846	2	4	5,530	372,798	1,731,336	107,742½	650,512
1909 ..	1,813.830	180,872	5	100	..	..	2	60	6	29	..	..	1,836¾	11,709	201,685	183,961	22	23	8,250	552,698	1,813,830	211,806¾	929,452
1910 ..	1,711,235	171,562	..	..	..	..	..	..	5	15	..	..	2,088$\frac{9}{20}$	22,202	277,011	259,562	6	10	8,693	465,044	1,711,235	287,803$\frac{9}{20}$	918,395
1911 ..	1,311,043	131,587	..	..	..	..	20	92	..	4	..	..	3,469$\frac{19}{20}$	22,104	223,275	204,379	24	41	7,587	395,707	1,311,043	234,375$\frac{19}{20}$	753,914
1912 ..	801,165	84,739	..	..	..	..	..	..	..	..	..	..	1,729$\frac{7}{10}$	20,571	229,012	216,170	4	7	7,908	401,305	801,165	238,653$\frac{7}{10}$	722,792
Totals	16,808,005	1,834,848	1,495½	19,198	5,869	38,002	3,768	54,941	19,364½	61,905	76½	444	*38,513$\frac{3}{5}$	*282,065	3,324,283	3,049,922	16,463	24,925	321,995	16,210,457	16,808,005	3,731,828$\frac{1}{10}$	21,576,707

* The following are the principal minerals included under this heading :—

Year.	Scheelite-ore.		Auriferous Ore.		Sulphur.		Mixed Minerals.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.
		£		£		£		£
1898	..	..	22	380	1,765	4,097	..	315
1899	32	2,788	5	153	1,227	3,483	..	167
1900	54	2,635	219	4,450	1,692	4,824	..	842
1901	2	83	390	6,663	143	360	..	669
1902	39	1,200	231	2,560	100	475	..	187
1903	42	1,439	472	4,449	..	..	..	1,126
1904	17	791	977	8,898	..	..	..	479
1905	28	1,848	535	5,997	..	..	..	291
1906	55	3,407	1,186	13,940	..	..	..	1,074
1907	137	15,486	1,244	14,650	..	..	..	312
1908	68	6,055	654	6,993	..	..	..	3,131
1909	58	4,263	182	2,450	..	..	..	4,996
1910	143	15,070	100	1,538	..	..	..	5,594
1911	138	11,853	138	1,419	..	..	..	8,832
1912	135	13,347	..	..	..	..	..	7,224
Totals	948	80,265	..	..	..	..	..	..

No. 5.

TABLE SHOWING THE INCREASE OR DECREASE IN THE ANNUAL PRODUCTION OF COAL AND SHALE IN THE DOMINION, AND THE QUANTITY OF COAL IMPORTED SINCE 1878.

Year.	Coal raised in the Dominion.		Coal imported.		
	Tons.	Yearly Increase or Decrease.	Tons.	Increase over Preceding Year.	Decrease over Preceding Year.
Prior to 1878	709,931	..	..	..	..
1878	162,218	..	174,148	..	..
1879	231,218	69,000	158,076	..	16,072
1880	299,923	68,705	123,298	..	33,778
1881	337,262	37,339	129,962	6,664	..
1882	378,272	41,010	129,582	..	380
1883	421,764	43,492	123,540	..	6,042
1884	480,831	59,069	148,444	24,904	..
1885	511,063	30,232	130,202	..	18,242
1886	534,353	23,290	119,873	..	10,329
1887	558,620	24,267	107,230	..	12,643
1888	613,895	55,275	101,341	..	5,889
1889	586,445	*Dec. 27,450*	128,063	26,722	..
1890	637,397	50,952	110,939	..	17,124
1891	668,794	31,397	125,318	14,379	..
1892	673,315	4,521	125,453	135	..
1893	691,548	18,233	117,444	..	8,009
1894	719,546	27,998	112,961	..	4,483
1895	726,654	7,108	108,198	..	4,763
1896	792,851	66,197	101,756	..	6,442
1897	840,713	47,862	110,907	9,151	..
1898	907,033	66,320	115,427	4,520	..
1899	975,234	68,201	99,655	..	15,772
1900	1,093,990	118,756	124,033	24,378	..
1901	1,239,686	145,696	149,764	25,371	..
1902	1,365,040	125,354	127,853	..	21,911
1903	1,420,229	55,189	163,923	36,070	..
1904	1,537,838	117,609	147,196	..	16,727
1905	1,585,756	47,918	169,046	21,850	..
1906	1,729,536	143,780	207,567	38,521	..
1907	1,831,009	101,473	220,749	13,182	..
1908	1,860,975	29,966	287,808	67,059	..
1909	1,911,247	50,272	258,185	..	29,623
1910	2,197,362	286,115	232,378	..	25,807
1911	2,066,073	*Dec. 131,289*	188,068	..	44,310
1912	2,177,615	111,542	364,359	176,291	..

No. 6.

TABLE SHOWING THE OUTPUT OF COAL FROM THE VARIOUS COALFIELDS, AND THE COMPARATIVE INCREASE AND DECREASE, FOR THE YEARS 1911 AND 1912, TOGETHER WITH THE TOTAL APPROXIMATE QUANTITY OF COAL PRODUCED SINCE THE MINES WERE OPENED.

Name of Coalfield.	Output of Coal.		Increase.	Decrease.	Approximate Total Output of Coal up to 31st December, 1912.
	1912.	1911.			
	Tons.	Tons.	Tons.	Tons.	Tons.
North Auckland	116,147	139,159	..	23,012	3,024,403
Waikato	263,938	254,902	9,036	..	3,230,768
Mokau	3,762	3,811	..	49	81,560
Nelson	29,071	23,325	5,746	..	224,604
Buller	826,105	770,291	55,814	..	11,478,628
Inangahua	11,046	13,896	..	2,850	215,886
Grey	435,239	411,181	24,058	..	6,782,216
Canterbury	16,764	18,812	..	2,048	657,041
Otago	294,063	282,870	11,193	..	7,658,649
Southland	181,480	147,826	33,654	..	2,107,059
Totals	**2,177,615**	2,066,073	111,542	..	**35,460,814**

No. 7.

TABLE SHOWING THE DIFFERENT CLASSES OF COAL FROM THE MINES IN THE DOMINION.

Name of Coal.	Output of Coal.		Increase.	Decrease.	Approximate Total Output of Coal up to the 31st December, 1912.
	1912.	1911.			
	Tons.	Tons.	Tons.	Tons.	Tons.
Bituminous and semi-bituminous	1,417,608	1,358,357	59,251	..	21,326,053
Pitch	4,115	4,411	..	296	1,991,197
Brown	544,675	601,093	..	56,418	10,450,092
Lignite	211,217	102,212	109,005	..	1,693,472
Totals	**2,177,615**	2,066,073	111,542	..	**35,460,814**

No. 8.

RETURN SHOWING THE TOTAL QUANTITY AND VALUE OF COAL IMPORTED INTO AND EXPORTED FROM NEW ZEALAND DURING THE YEAR ENDED THE 31ST DECEMBER, 1912.

Imported.			Exported.		
Countries whence imported.	Quantity.	Value.	Countries to which exported.	Quantity.	Value.
	Tons.	£		Tons.	£
New South Wales	364,351	365,404	United Kingdom	137,922	138,387
Victoria	8	10	Victoria	7,139	4,511
			New South Wales ..	34,390	28,472
			South Australia	3,774	3,375
			Western Australia ..	5,670	4,059
			Tasmania	5,615	4,217
			Fiji	12,543	12,178
			Norfolk Island	59	67
			Canada	2,860	2,942
			Japan	20	20
			U.S.A. (West Coast) ..	3,653	2,946
			Chile	599	629
			Bismarck Archipelago ..	2,783	1,937
			Caroline Islands	350	236
			Friendly Islands	5,607	5,771
			Marshall Islands	514	347
			Navigator Islands ..	560	569
			New Caledonia	264	274
			New Hebrides	177	199
			Society Islands	2,804	2,968
			Solomon Islands	59	66
			Whale Fisheries	1,400	1,750
			Antarctica	250	250
Totals	**364,359**	**365,414**	Totals	**229,012**	**216,170**

No. 9.

NUMBER OF PERSONS ORDINARILY EMPLOYED IN MINING DURING THE YEAR ENDED 31ST DECEMBER, 1912.

District.	Alluvial Miners.		Quartz-miners.		Totals.		Grand Totals 1912.
	European.	Chinese.	European.	Chinese.	European.	Chinese.	
GOLD-MINING.							
AUCKLAND—							
Coromandel County	..	..	164	..	164	..	164
Thames Mining District	..	..	331	..	331	..	331
Ohinemuri	..	..	693	..	693	..	693
Te Aroha, Piako County	..	..	14	..	14	..	14
Waihi Borough	..	..	1,479	..	1,479	..	1,479
	..	..	2,681	..	2,681	..	**2,681**
MARLBOROUGH—							
Blenheim and Havelock	11	..	44	..	55	..	**55**
NELSON—							
Wangapeka, Takaka, and Motueka	11	..	..	..	11	..	11
Collingwood	10	..	24	..	34	..	34
Inangahua	65	..	431	..	496	..	496
Ahaura	50	..	2	..	52	..	52
Westport, including Charleston, Addison's, Northern Terraces, Waimangaroa, North Beach, Mokihinui, Karamea, and Lower Buller Valley	71	..	6	..	77	..	77
Lyell	..	..	15	..	15	..	15
Murchison	15	..	..	..	15	..	15
Owen							
	222	..	478	..	700	..	**700**
WESTLAND—							
Ross	39	..	..	..	39	..	39
Stafford and Goldsborough	102	10	..	..	102	10	112
Hokitika and Kanieri	40	8	..	..	40	8	48
Kumara	50	10	..	..	50	10	60
Greymouth and Arnold	41	12	24	..	65	12	77
Okarito	6	..	..	..	6	..	6
	278	40	24	..	302	40	**342**

No. 9—*continued.*

NUMBER OF PERSONS ORDINARILY EMPLOYED IN MINING DURING THE YEAR ENDED 31ST DECEMBER, 1912—*continued.*

District.	Alluvial Miners.		Quartz-miners.		Totals.		Grand Totals, 1912.
	European.	Chinese.	European.	Chinese.	European.	Chinese.	
GOLD-MINING—*continued.*							
OTAGO—							
Tuapeka, Gabriel's Gully, Waipori ..	131	6	..	..	131	6	137
Lawrence, Roxburgh, Black's, Alexandra, and Clyde	323	20	12	..	335	20	355
Cromwell	152	10	..	..	152	10	162
Waikaia, Nokomai, and Gow's Creek	156	20	6	..	162	20	182
Waiau	70	20	7	..	77	20	97
Orepuki and Preservation							
Roundhill							
Wakatipu Goldfields — Queenstown, Arrow, Macetown, Cardrona, Kawarau, Bracken's, and Motatapu	108	6	35	3	143	9	152
Naseby	140	10	..	..	140	10	150
St. Bathan's							
Hyde							
Macrae's							
Gore	149	..	..	..	149	..	149
	1,229	92	60	3	1,289	95	1,384
SUMMARY.							
AUCKLAND, NORTHERN INSPECTION DISTRICT	..	..	2,681	..	2,681	..	2,681
MARLBOROUGH, NELSON, WESTLAND — WEST COAST INSPECTION DISTRICT	11	..	44	..	55	..	55
	222	..	478	..	700	..	700
	278	40	24	..	302	40	342
OTAGO, SOUTHERN INSPECTION DISTRICT	1,229	92	60	3	1,289	95	1,384
Totals	1,740	132	3,287	3	5,027	135	5,162

SUMMARY OF PERSONS ORDINARILY EMPLOYED IN OR ABOUT NEW ZEALAND MINES DURING 1912.

Gold-mines	5,162
Other metalliferous mines	77
Coal-mines	4,328
Total	9,567

DIAGRAM showing QUANTITY & VALUE of GOLD exported annually from N.Z.

For the years 1857 to 1912

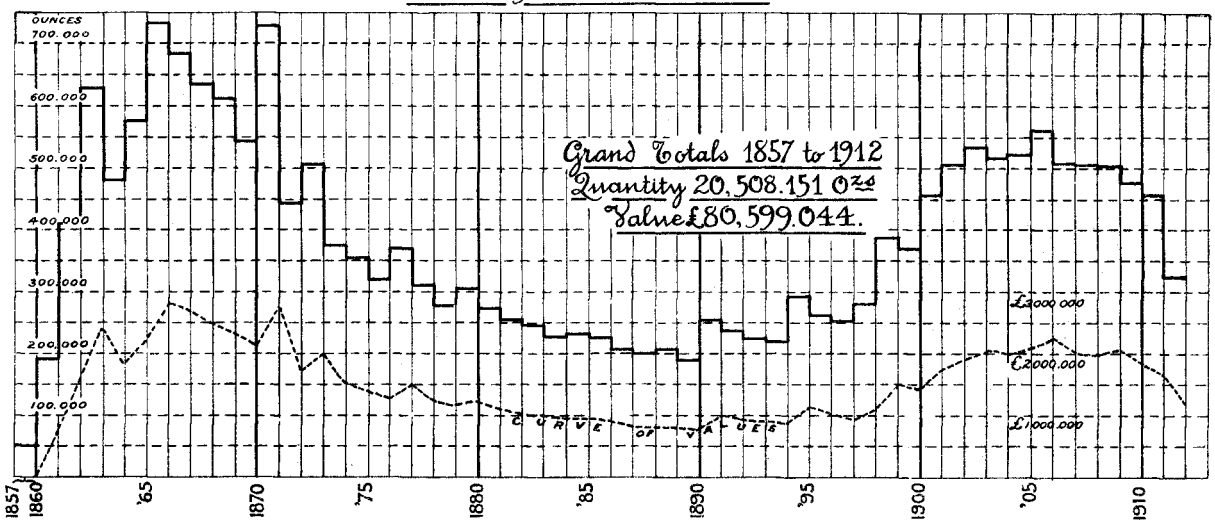


DIAGRAM showing QUANTITY & VALUE of KAURI GUM exported annually from N.Z.

For the years 1853 to 1912

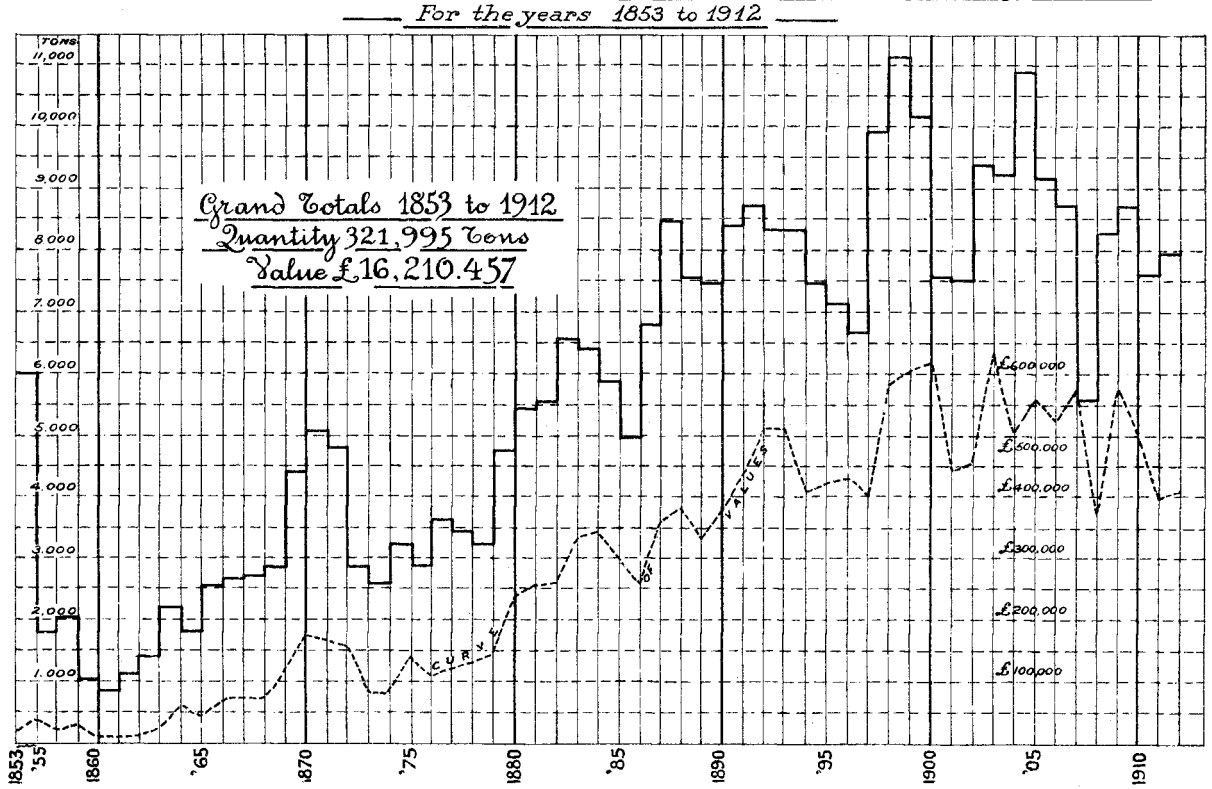
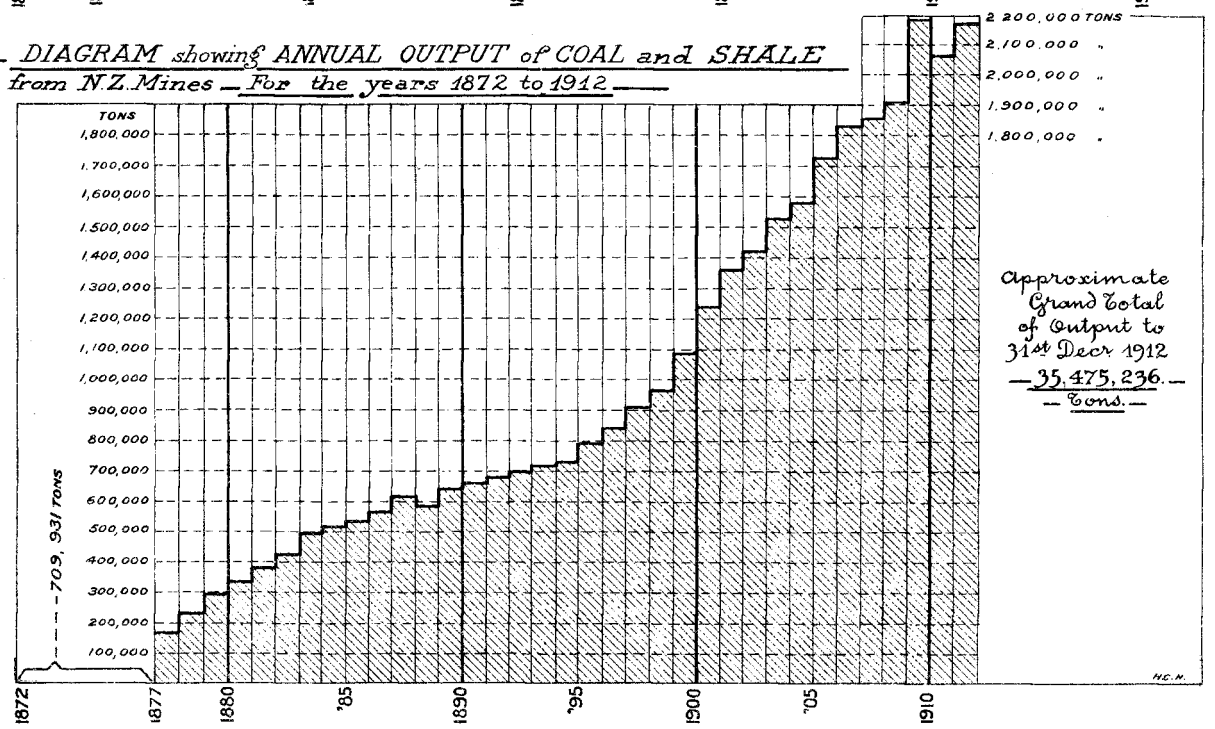


DIAGRAM showing ANNUAL OUTPUT of COAL and SHALE from N.Z. Mines — For the years 1872 to 1912



APPENDICES TO THE MINES STATEMENT.

APPENDIX A.

REPORTS RELATING TO METALLIFEROUS MINES AND STONE-QUARRIES.

The INSPECTING ENGINEER OF MINES to the UNDER-SECRETARY OF MINES.

SIR,— Wellington, 2nd July, 1913.

I have the honour to present the annual reports of inspection of mines and stone-quarries, together with extracts from the reports of Wardens and other officers, accompanied by statistical information in regard to the metalliferous mines and stone-quarries of the Dominion, for the year ended 31st December, 1912.

In accordance with the usual practice, the tables showing expenditure through the Mines Department on roads, bridges, tracks, prospecting operations, &c., are for the period covered by the financial year—viz., from the 1st April, 1912, to the 31st March, 1913.

The reports, &c., are divided into the following sections :—

I. Production of Minerals.

II. Persons employed.

III. Accidents.

IV. Gold-mining.
- (1.) Quartz.
- (2.) Dredging.
- (3.) Alluvial.

V. Minerals other than Gold.

VI. Stone-quarries.

VII. State Aid to Mining.
- (1.) Subsidized Prospecting.
- (2.) Loans for Development of Mines.
- (3.) Subsidized Roads on Goldfields.
- (4.) Government Prospecting-drills.
- (5.) Government Water-races.

VIII. Schools of Mines.

Annexures.—Reports of—
- (*a.*) Inspectors of Mines.
- (*b.*) Wardens.
- (*c.*) Water-race Managers.
- (*d.*) Mining Statistics.
- (*e.*) Examinations under the Mining Act, 1908, and Lists of Certificate-holders.

I. PRODUCTION OF MINERALS.

The following statement shows the value of the exports from metal-mines and kauri-gum fields from the 1st January, 1853, to the 31st December, 1912 :—

Classification.	1911.	1912.	Increase or Decrease.	Total from the 1st January, 1853, to the 31st December, 1912.
	£	£	£	£
Gold	1,816,782	1,345,131	471,651*	80,599,044
Silver	131,587	84,739	46,848*	1,834,848
Other minerals	22,200	20,571	1,629*	456,555
Kauri-gum	395,707	401,305	5,598†	16,210,457
Totals	**2,366,276**	**1,851,746**	**514,530***	**99,100,904**

* Decrease. † Increase.

The considerable decline in the production of bullion from our gold-mines has been to a great extent due to the disastrous strikes, by which the majority of the most important quartz-mines in the Dominion, situated at Waihi, Blackwater, and Reefton, were rendered idle from 13th May to 2nd October. The shortage in the value of bullion during that period may be estimated at about £450,000. There has also been a decline in the value of the gold-production by dredges, amounting to £40,567 ; but this branch of mining is long past its zenith, and the annual decrease was anticipated. Small increases in the value of the production from the kauri-gum fields and scheelite-mines have occurred, together with a substantial increase in the coal-output.

II. PERSONS EMPLOYED.

The following statement shows the number of persons ordinarily employed in or about the metalliferous mines of the Dominion during the year :—

Classification.	Inspection District.			Total, 1912.
	Northern.	West Coast.	Southern.	
Gold and silver	2,681	1,097	1,384	5,162
Iron	...	9	...	9
Scheelite	...	...	68	68
Totals for 1912	**2,681**	**1,106**	**1,452**	**5,239**

III. ACCIDENTS.

It is satisfactory to report that the marked decline in the number of fatalities at metal-mines during the previous year was repeated in 1912. This gratifying result may be justly attributed to increased all-round vigilance, to a certain extent created by the investigations and report of the Mines Royal Commission of 1911.

Of the four fatal accidents which happened, and by which five lives were lost, during 1912, none could be charged to serious official neglect. The fatality at the May Queen Mine, Thames, by which two miners were asphyxiated by black-damp, was of a remarkable character, and there still remains some doubt as to the place of origin of the fatal gas. A brief description of this and other fatal accidents appears in this report.

The following is a summary of persons killed or seriously injured in metalliferous mines during 1912 :—

Inspection District.	Explosions.		Falls of Ground.		In Shafts.		Miscellaneous Underground.		Surface.		About Dredges.		Total.	
	Killed.	Seriously Injured.	Killed.	Seriously Injured.	Killed.	Seriously Injured.	Killed.	Seriously Injured.	Killed.	Seriously Injured.	Killed.	Seriously Injured.	Killed.	Seriously Injured.
Northern	...	...	1	2	1	3	2	...	...	1	...	...	4	7
West Coast	...	...	...	2	...	...	...	...	...	...	1	...	1	2
Southern	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Totals	...	...	**1**	**4**	**1**	**3**	**2**	...	...	**1**	**1**	...	**5**	**9**

Being at the rate of 0·95 fatalities per 1,000 persons employed.

TABLE SHOWING NUMBER OF DEATHS FROM ACCIDENTS AT NEW ZEALAND METAL MINES AND DREDGES DURING THE YEARS 1906 TO 1912.

Cause of Accident.	1906.	1907.	1908.	1909.	1910.	1911.	1912.
Explosion	3	...	3	2	2	1	...
Fall of ground	3	2	2	1	1	2	1
In shafts	1	...	1	3	5	...	1
Miscellaneous: Underground ...	...	...	2	1	...	...	2
,, On surface ...	1	2	6	5	3	2	...
About dredges	6	3	1	2	4	...	1
Total killed ...	14	7	15	14	15	5	5
Number of employees	8,716	9,389	8,880	7,651	8,121	7,400	5,239
,, persons killed per 1,000 employed	1·60	0·84	1·69	1·83	1·84	0·67	0·95

The following is a brief description of the fatal accidents at New Zealand metalliferous mines during 1912:—

Name of Sufferer.	Mine.	Nature of Accident.
John Fenton .. (19/7/12)	Coronation (Coromandel)..	Deceased, an experienced miner, working singly in a surface drive, was killed by a large stone falling from between two clay heads in the roof. The verdict of the Coroner's jury was "accidental death," with a rider that "no tribute should be let in isolated mines unless two miners were engaged at all times," a very reasonable suggestion.
Timothy Higgins .. (19/12/12)	Waihi Grand Junction ..	Deceased fell through the temporary staging in the pumping compartment of the No. 3 sinking shaft, a distance of 25 ft., to the penthouse below. No one witnessed this accident. The Coroner's jury returned a verdict that no blame was attachable to any one.
John Williams and Thomas Guy (11/1/12)	May Queen (Thames) ..	The two deceased with five other miners were stoping above the No. 6 (750 ft.) level, which connects with the Queen of Beauty main shaft, used for upcast ventilation, pumping, and winding. At the 1,000 ft. level from this shaft extensive crosscutting is being carried out by several companies; during these operations considerable exudations of ground carbon-dioxide and nitrogen gas occasionally occurred. Owing to a temporary cessation of ventilation caused by the blower air-pipes becoming obstructed by water, an accumulation of gas occurred at the 1,000 ft. level, which, when eventually liberated by the restoration of the ventilating-current, ascended the upcast shaft and inundated the No. 6 level, above which the deceased and others were stoping. Upon receiving warning these men, in their attempt to regain the main shaft (also used for winding), entered the gaseous No. 6 level and were asphyxiated. The verdict of the Coroner's jury was that the gas came from the 1,000 ft. level, and they added as a rider that in their opinion all stoppages and restarting of the ventilating-blower at the main shaft should be notified to all mines connected therewith; they recommended to the notice of the Royal Humane Society two miners—Joseph Henry James and Michael Crowley—for heroic conduct in their attempt to rescue deceased and others. This recommendation was given effect to.
George Roberts .. (18/3/12)	Smeaton Dredge (Reefton)	Deceased, an engineer, was killed while attending to the top of an elevator-shaft when the elevator was in motion; at the time deceased was wearing a loosely fitting coat. A cover had been carelessly left off the elevator-shaft, around which the deceased was wound. This was a preventable accident; the deceased was blameworthy for his rash action, and the dredge-master was lax in leaving the shaft uncovered. No dredge machinery should be oiled or adjusted when in motion; loose garments should not be worn; moving parts should be protected by rails or covers.

IV. GOLD-MINES.

The following statement shows the value of the bullion-production and dividends declared, also the number of persons ordinarily employed, and number of gold-mines and dredges working during the year:—

——	Production of Bullion, 1912.* (All mines.)	Dividends paid, 1912. (By registered companies only.)	Number of Persons ordinarily employed.	Number of Working Mines, Dredges, and Claims.
	£	£		
Quartz-mining	906,189	314,903½	3,290	123
Dredge mining	257,333	38,841†	694	87
Alluvial mining	266,348	14,893½‡	1,178	256
Totals, 1912 ...	**1,429,870**	**368,638**	**5,162**	**466**

* In addition to the gold produced from the gold-mines, silver was obtained from them, hence the word "bullion" is used in preference to "gold."

† The bullion-production is from 87 dredges, but the dividends given are only from 28 of these, the property of registered companies. The profits of privately owned dredges and mines are unobtainable, which renders this statement incomplete.

‡ The bullion-production is from 256 alluvial claims, but the dividends are only ascertainable from those few that are the property of registered companies.

(1). QUARTZ-MINING.

The following is a statement showing the tons of ore treated, the value of bullion produced, and the amount of dividends paid by quartz-mining companies in each of the inspection districts during the years 1911 and 1912 :—

Inspection District.	Tons of Ore treated. (2,240 lb.)		Value of Bullion.		Dividends paid. (By registered companies only.)	
	1912.	1911.	1912.	1911.	1912.	1911.
			£	£	£	£
Northern	264,831	507,280	781,716	1,141,235	299,303	401,273
West Coast	55,098	128,244	116,408	228,512	15,600	50,696
Southern	15,722	10,467	8,065	5,506	...	...
Totals	**335,651**	645,991	**906,189**	1,375,253	**314,903**	451,969

The following is a statement of the production, working-cost, dividends declared, and the number of persons employed at the principal quartz-mines during 1912 :—

Name of Company.	During 1912.			Dividends paid.		Number of Persons ordinarily employed.
	Quantity of Quartz treated.	Value of Bullion.	Average Value per Ton.	1912.	Total to End of December, 1912.	
	Imperial Tons.	£	£ s. d.	£	£	
Northern District—						
Waihi Gold-mining Company (Ltd.)*	131,989	316,724†	2 7 11·9	148,772	4,379,357	1,200
Waihi Grand Junction Gold-mining Company (Ltd.)	37,242	74,371	1 19 11·2	19,219	38,437	250
New Zealand Crown Mines (Ltd.) ..	22,839	40,798	1 15 8·7	..	70,000	170
Talisman Consolidated (Ltd.) ..	42,780	246,569	5 15 3·2	125,062	685,353	320
Komata Reefs (Ltd.)	5,464	16,636	3 0 10·7	...	33,333	65
New Sylvia Gold-mining Company (Ltd.)	10,459	15,044	1 8 9·2	..	..	55
Waihi-Paeroa Gold-extraction Company (Ltd.)	‡	33,811	0 8 0·3	6,250	6,250	67
West Coast District—						
Blackwater Mines (Ltd.)	11,538	26,604	2 6 1·3	..	87,496	100
Progress Mines of New Zealand (Ltd.)	8,770	12,543	1 8 7·2	..	326,562	100
Consolidated Goldfields of New Zealand (Ltd.)	10,936	17,509	1 12 0·2	..	..	60
New Big River Gold-mining Company (Ltd.)	7,666	36,657	4 15 7·6	15,600	67,200	57
112 other quartz-mines throughout New Zealand	45,968	68,922	1 10 3·6	..	§	846
Totals, 1912	**335,651**	**906,189**	..	**314,903**	§	**3,290**

* The total value of the output of this company at the end of the year was £10,118,217. The dividends here given are free of income-tax.

† In the annual report of the directors of this company for 1912 the value of the bullion-production is stated to be £332,786, but the figures given in the table above are the official returns from the company to the Inspector of Mines. The discrepancy occurs owing to the actual value of the bullion not being known until it is refined in England.

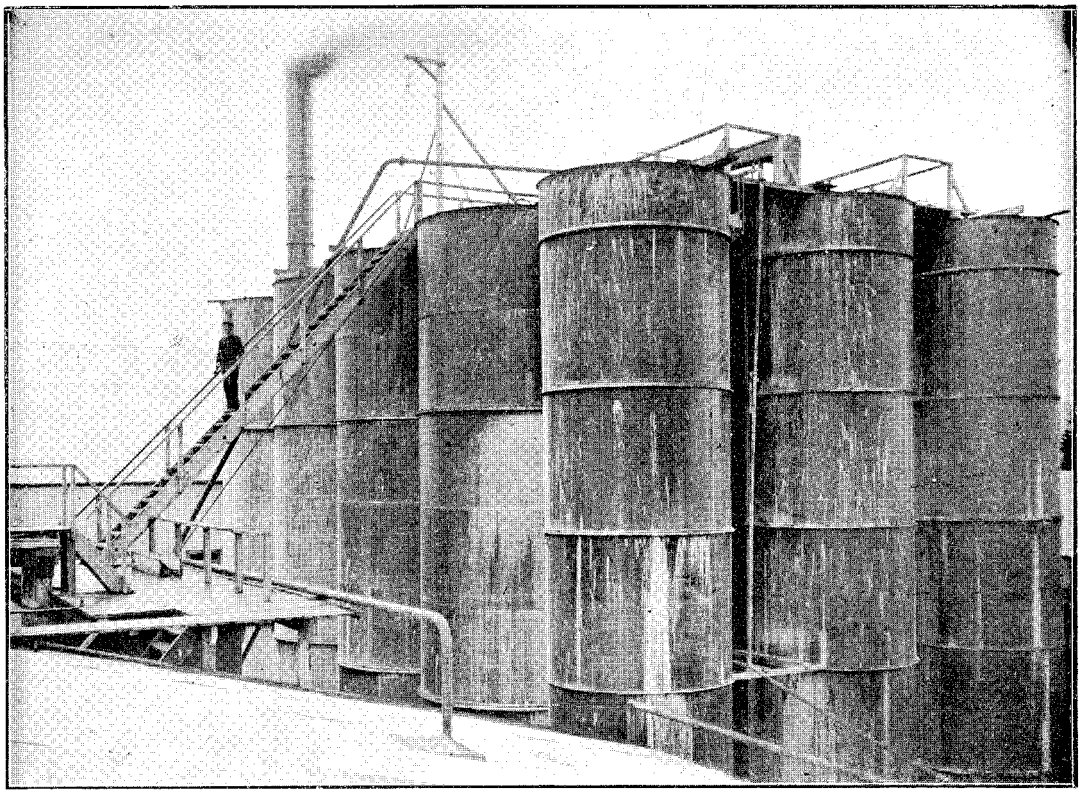
‡ 84,178 imperial tons of old tailings from Waihi and Karangahake Mines dredged from Ohinemuri River sludge-channel, crushed during former years and recorded therein, but re-treated during 1912.

§ Unknown.

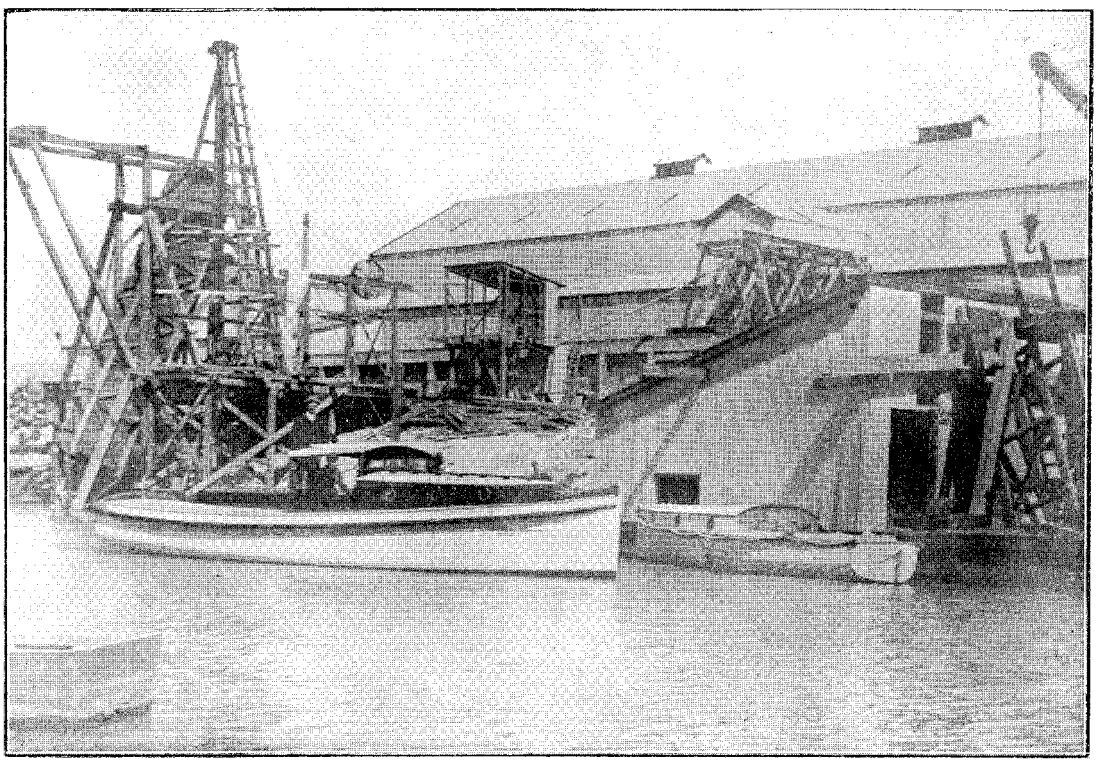
Northern Inspection District.

Waihi Goldfield.—Owing to the Federation of Labour refusing to allow its members to work with the Waihi Engine-drivers' Union, who had seceded from the Federation and formed a new union (subsequently registered under the Arbitration Act), for nearly six months following the 13th May mining operations were suspended at Waihi. The result, therefore, of operations during 1912 is no criterion of the capacity of the mines.

On the 13th May, 1913, I inspected this mine, and found at the 1,151 ft. or deepest level that the Martha lode maintained its width at the western face, but pinched out to the eastward, and, with the exception of small isolated pockets of sulphide ore, the quartz had been leached of its value throughout the level, especially towards the north, or foot-wall side, from whence the impoverishment commenced in the levels immediately above. As the greater portion of the bullion won by this company has been obtained from the Martha lode this continued impoverishment is unfortunate, but it is satis-



Waihi-Paeroa Gold-extraction Company (Limited).—Portion of Ohinemuri River Tailing Plant.



Waihi-Paeroa Gold-extraction Company (Limited).—Conical Air Slimes-agitators.

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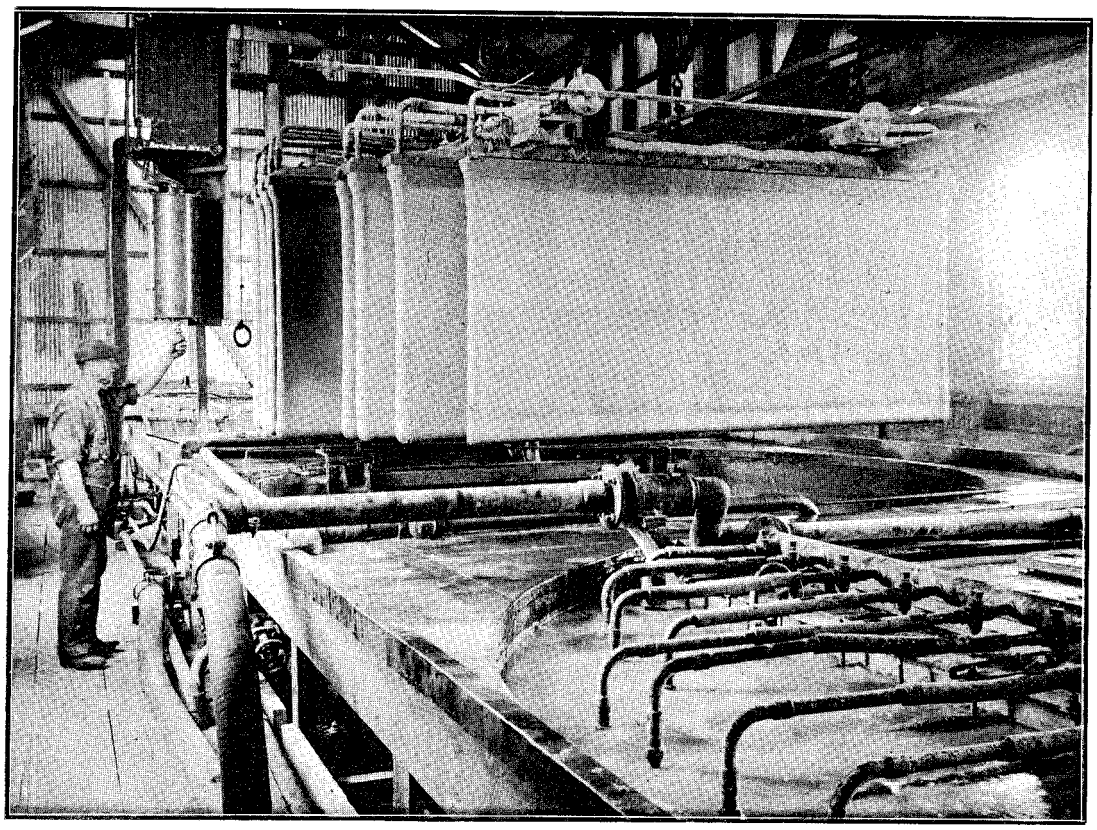
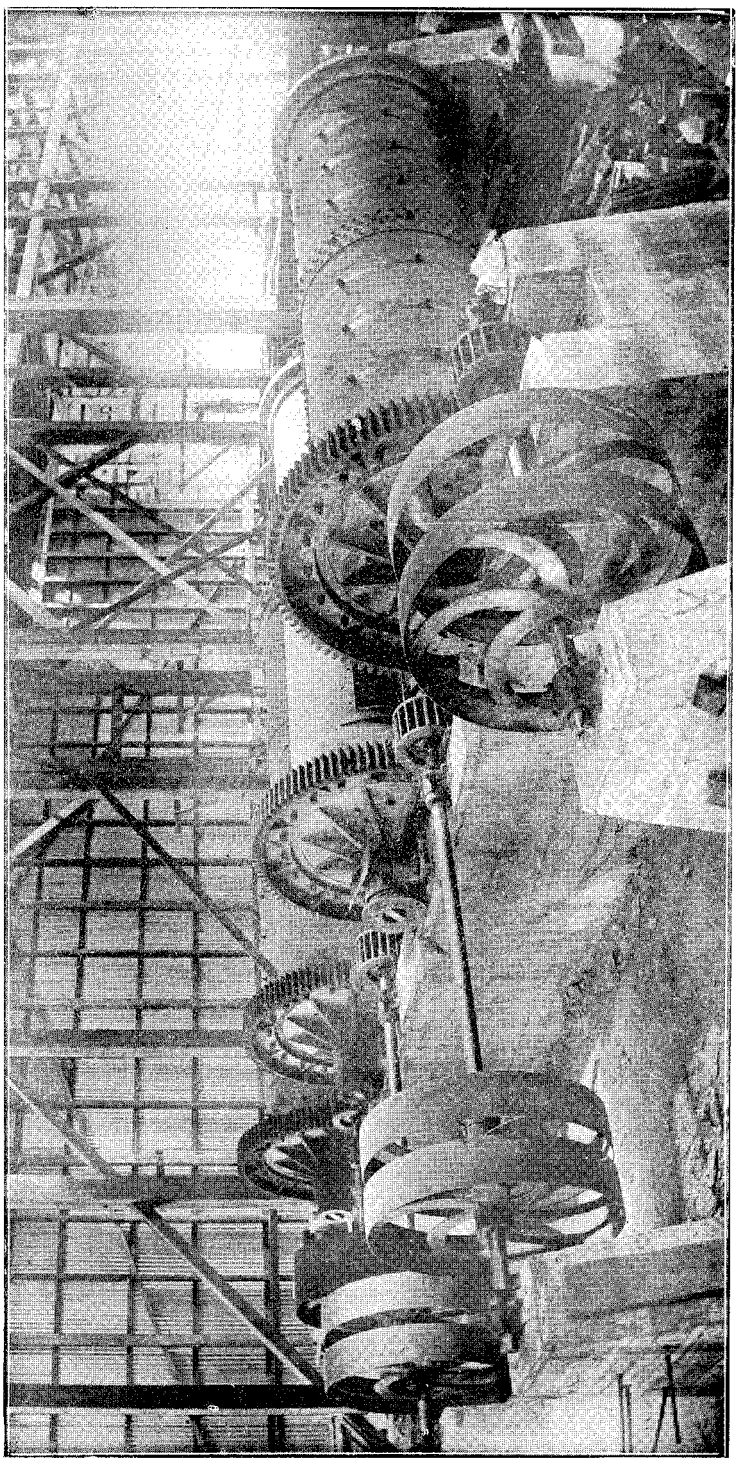
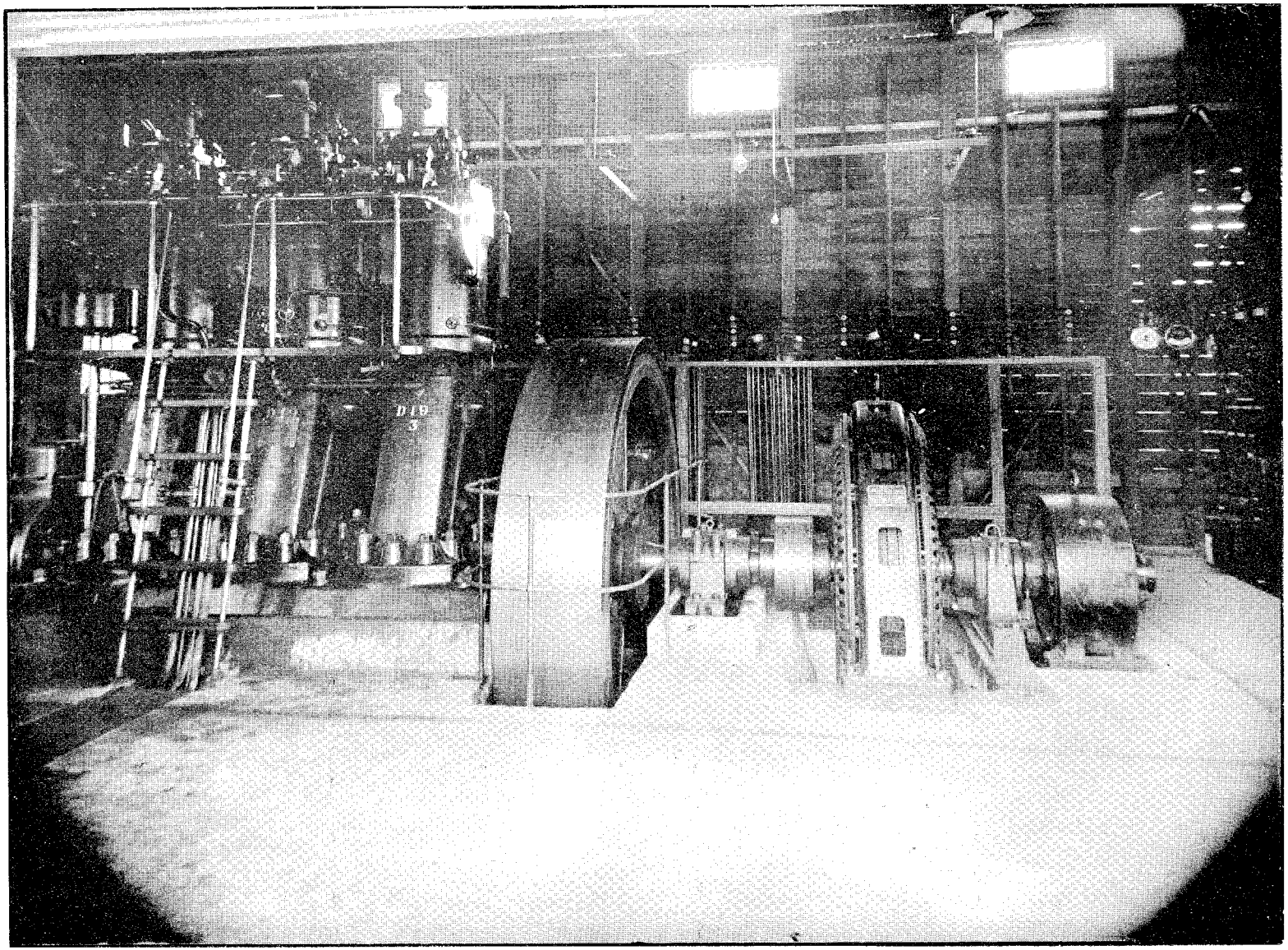


Waihi-Paeroa Gold-extraction Company (Limited).—Vacuum Filters, showing Basket lifting 15-ton Cake.



Waihi-Paeroa Gold-extraction Company (Limited).—Belt-driven Tube Mills during Erection.



Ross Goldfields Reconstructed (Limited).—250 Horse-power Diesel Engine used as a Stand-by to the Hydro-electrical Power at the Mine.

factory to note that it is confined to the Martha, and that the Empire lode at the 1,151 ft. level shows ore of equal value to that in the upper levels. At the western face of the level this lode is 12 ft. wide, and contains very good ore. At the same level the Edward lode westward is a wide and rich ore-body; a winze therein sunk near the face to a depth of 100 ft., the deepest development on the goldfield, proved the value to descend unimpaired. The Royal lode at both faces of the level showed 14 ft. of ore of fair grade. An important development of recent date is the intersection of a new lode, the Dreadnought, at a depth of 1,236 ft. when sinking the No. 4 shaft. This lode, which occurs in promising hard dacite country, bears 33°, underlying about 1 in 3, N.W., and in the shaft is about 5·5 ft. in width, the assay value being payable. Unfortunately a considerable influx of water from the intersection of the lode system in the No. 4 shaft has caused a temporary cessation of sinking operations.

Good progress has been made with this company's Hora Hora hydro-electric power scheme. It is anticipated that during the current year power therefrom will be available at the Waihi Mine.

The Waihi Grand Junction Mine was similarly affected by the strike, this year's operations being confined to less than five months' work. At this mine an extension of the lode-system developed in the Waihi Mine occurs. None of the lodes in this mine as yet developed show signs of leaching, as in the case of the Martha lode at the Waihi Mine; but the Royal lode at the 1,082 ft. or deepest level is rubbly and crushed, is inclined to pinch, and the value is low. The Martha lode has been valueless below the No. 4 or 794 ft. level.

At other Waihi mines no development of importance occurred during the year.

On the *Karangahake Goldfield* the Talisman Mine worked throughout the year with profitable results, producing its record output, value £246,569, and declaring £125,062 10s. in dividends. At the deepest, or No. 14, level (being 700 ft. below the Waitawheta drainage adit) a considerable amount of driving north and south was carried out, and the Bonanza and Dubbo shoots were proved. Driving is being continued in search of the Talisman shoot, not yet proved at this level. Development at depth has been considerably retarded during the year owing to the heavy flow of water, but short drives on the lode north and south from No. 12 winze, sunk about 45 ft. below No 14 level, show the Dubbo shoot to split at the north face, and to be inferior generally to what was found in the level above. Unfortunately, this development has been suspended for some time owing to excessive water. The Woodstock shaft, which it is proposed to utilize as the main pumping and winding shaft for the mine, had at the end of the year reached a depth of 454 ft. below the engine-chamber. After sinking a further 50 ft. it is proposed to prepare a chamber for No. 14 level and to install the Cornish pumps (in two sections). Driving will then be proceeded with to connect with the principal mine-workings.

The New Zealand Crown Mine has suffered a decline both in the value of bullion produced and in the quality of ore treated; nor has mining-development disclosed anything of importance. A vacuum filter plant has been installed, by which an improved extraction is anticipated.

The Waihi-Paeroa Gold-extraction Company have been very successful with their newly laid-down gold-extraction plant, consisting of union vanners, twenty-two tube mills, pneumatic tanks, and vacuum filters installed on the banks of the Ohinemuri River near Paeroa, below the Waihi and Karangahake Mines, for the purpose of re-treating the sands discharged into this river from those mines. The Gold-extraction Company elevate the sand by air-lift from the banks and river-bed into barges of about 80 tons capacity, by which it is transported to the works, the air-lift system being generally adopted at the works. During the year 84,178 tons (of 2,240 lb.) were treated, for a return of £33,811, being an average recovery value of 8s. per ton, which is slightly less than the average return from the sand treated by the same company in their original works situated higher up the stream. The evidence supplied by this profitable reduction of the average Waihi tailing discharged into the sludge-channel is not favourable to the milling practice formerly in operation at Waihi. This company declared dividends amounting to £6,250 during the year.

Thames Goldfield.—During the past year interest in this once famous goldfield was almost solely confined to the Government-subsidized exploration of the 1,000 ft. level. Under an agreement dated the 8th February, 1910, between the Government and the companies interested, it was decided to drive a main crosscut at a depth of 1,000 ft. from the Queen of Beauty main pumping and winding shaft to a point directly under the Kuranui-Caledonian shaft, a total distance of 2,748 ft., and from such crosscut to drive subsidiary crosscuts, in length 1,300 ft., into the claims of the contributors. After the companies had expended £12,000 in terms of the agreement, the Government paid a previously agreed-upon subsidy of £5,000 for expenditure upon this work, which was subsequently continued by the companies, who, by the 20th August, 1912, had expended £15,754 in addition to the Government grant. On the 26th September a further grant of £1,000 was made by the Government, conditionally upon the companies providing a similar amount. When 2,362 ft. had been driven in the main crosscut, broken ground was encountered, presumably in the vicinity of the Moanataiari slide or fault. In the interest of life, and in compliance with the Mining Act (section 254), Mr. B. Bennie, Inspector of Mines, directed that a borehole should advance ahead of driving operations. Accordingly, a horizontal hole was projected by Government diamond drill, and at a distance of 128 ft. the main slide was penetrated, from which a powerful influx of water, mud, and gas occurred, which inundated the end of the drive, and caused the men to hasten from the mine. A pressure-gauge subsequently attached to a tube inserted in the borehole registered a pressure of 300 lb. per square inch, equivalent to a static head of 700 ft. As a result of this broken ground having been proved, it was decided to discontinue driving upon that course, and to divert the crosscut by driving direct from under the Waiotahi main shaft to a point 50 ft. west of the Kuranui-Caledonian shaft, the ultimate terminus, a distance of 650 ft., thereby keeping to the westward of the slide. In addition to 2,362 ft. of main crosscut driven, the subsidiary crosscuts had been driven therefrom at the end of 1912 in the Saxon Mine 400 ft. towards a point below the Saxon shaft. Towards the Moanataiari Mine 400 ft.

was driven eastwards; and at the Waiotahi Mine 538 ft. was driven towards the Victoria Mine westward, passing under the Waiotahi shaft, from which the proposed diversion of the main crosscut begins. That shaft is now being deepened to connect with the 1,000 ft. level. It is to be regretted that the results of this deep-level exploration have been so far very disappointing, for, although several small quartz veins have been passed through, nothing of a payable character has yet been discovered, notwithstanding that from the upper levels of the claims traversed bullion to the value of about £7,000,000 was obtained.

At the Waitangi Mine the beach level having been driven a total length of 3,763 ft. was discontinued. A lode formation about 60 ft. in width was intersected 2,891 ft. from the entrance, but the ore-shoot proved near the surface failed to live down to the beach level. Operations are now confined to the upper workings.

The New Sylvia Mine proved during the year the most productive in the district. As a result of treating 10,459 tons of ore, bullion to the value of £15,044 was obtained, a considerable increase above the return for the previous year. Development has proved a new lode of promising appearance at the 200 ft. level. The No. 5 (450 ft.) level was extended to 1,986 ft. towards the New Sylvia reef.

At *Coromandel* mining operations failed to disclose anything of importance, although several small companies continue to operate in that district.

West Coast Inspection District.

It is reported by the Inspector of Mines, Mr. T. O. Bishop, A.O.S.M., that the most important mining development in his district during the year has been that carried out at the gold-scheelite mine situated in the Wakamarina Valley, the property of the Dominion Consolidated Company, where the lode has developed satisfactorily, and maintains fair average value in gold and scheelite. A 25-stamp mill, equipped with jigs and concentrators, has been installed, and during four months' operations at the latter part of the year 3,500 tons of ore were treated, for gold-value £1,839, equivalent to 10s. 6d. per ton, and scheelite-value £3,259, averaging 18s. 7½d. per ton. This is one of the very few instances where the year's operations at a new mine have been satisfactory.

At Mokihinui, near Westport, the Swastika, a prospecting company, has been formed to further develop the Red Queen Mine, which was worked many years ago, when the reef was found to carry gold, but was small, and the greywacke country proved very hard. The new company is now developing the lode at a point about 100 ft. lower down the hill, where an outcrop of quartz of considerable width has been proved by assays, taken by the Inspector of Mines from across the face of the drive, to average in value 5s. 2½d. per ton; but this was, of course, a too limited test to definitely prove the lode.

At the New Big River Mine, as the result of treating 7,666 tons, bullion was obtained to the value of £36,657, and dividends amounting to £15,600 were distributed, this being the only quartz-mine on the West Coast which paid a dividend during 1912. The whole of the ore milled was obtained from stopes above the No. 10 level (1,575 ft.). The most important development during the year has been the successful sinking of a winze 50 ft. below No. 10 level, for the whole of which depth the lode was proved to carry good ore. A new hoisting plant of increased capacity has been installed at the mine, also air-compressors for rock-drills and winches.

Owing to labour disputes, the Progress Mines, together with the Wealth-of-Nations and Blackwater Mines, were idle for about eight months of the year, and during the few months worked the principal operations carried out at the former mine consisted in the search for the lost lode at No. 11 level (1,420 ft.), of which there are reasonable prospects of success.

Upon the *Blackwater Goldfield* (discovered during 1905), the Blackwater Mine—drawings of which accompany this report—was restricted to only four months' work during 1912, owing to the labour troubles previously referred to, which caused a cessation in the regular payment of dividends. At this mine the lode keeps a direct course to a remarkable extent for the whole length of 3,000 ft. developed. The ore also maintains its value with the attainment of depth, and development is well in advance of milling requirements.

During the year several parties of miners have been engaged developing their claims elsewhere on this goldfield, but, with the exception of the operations at the Millerton (gold) Mine at Snowy Creek, the results have been unimportant. At the Millerton property a quartz lode, varying considerably in width and value, has been driven upon for 280 ft., but as the "backs" proved do not exceed 100 ft. the prospects of the mine are uncertain.

Southern Inspection District.

In *Otago* and *Southland* quartz-mining was unremunerative. None of the twenty-two mines paid a dividend during 1912. Bullion to the value of £8,065 was obtained, and 138 men were employed upon this hitherto unprofitable work.

(2.) Dredge Mining.

Owing to the exhaustion of ground suitable for dredge mining, the increasing popularity of the hydraulic sluicing and elevating method of working placer ground, and the fact that during the dredging boom of a decade past a number of dredges were placed on untested ground, dredge mining

is now long past its zenith, and continues to decline at a rapid rate, as is shown by the following table giving the result during the past seven years :—

Year.	Total Number of Dredges working.	Value of Production.	Average Production per Dredge.	Dividend-paying Dredges owned by Registered Companies.		Number of Persons employed.
				Number.	Dividends.	
		£	£		£	
1906 ..	167	505,199	3,025	66	103,722	..
1907 ..	128	419,634	3,278	65	89,707	1,150
1908 ..	123	373,818	3,039	47	75,800	1,013
1909 ..	111	327,676	2,952	37	56,788	893
1910 ..	104	315,237	3,031	35	51,918	838
1911 ..	93	297,900	3,203	31	45,318	775
1912 ..	87	257,333	2,958	28	38,841	694

Of the above eighty-seven working-dredges, fifteen are operating on the west coast of the South Island, and seventy-two are in Otago and Southland.

The dividends paid by twenty-eight dredges the property of registered companies amounted to £38,841 during 1912; the profits of privately owned dredges are unobtainable.

The following is a statement regarding the most productive dredges owned by registered companies :—

Name of Dredge.	Production during 1912 of all Dredges.	Dividends paid by Dredges owned by Registered Companies.	
		During 1912.	To 31st December, 1912.
West Coast District—	£	£	£
Stafford	3,599	759	4,046
Hessy, Cameron, and Tacon (Limited) ...	5,488	1,560	6,255
Worksop	15,159	8,400	24,300
North Beach	2,630	350	...
Pactolus	5,877	2,500	65,000
Blackwater River	4,393	947	12,441
Southern District—			
Crewe (2)	5,699	2,250	8,625
Waikaia	4,474	1,225	14,700
Koputai	3,707	1,225	13,810
Earnscleugh (3)	12,437	1,100	25,850
Masterton	4,609	1,750	33,250
Hartley and Riley	910	650	84,337
Golden Bed	4,455	637	15,911
Kohinoor	2,455	1,424	1,424
Rising Sun	6,367	2,400	18,400
Magnum Bonum	4,873	2,000	10,875
Electric (2)	7,702	2,600	128,692
Paterson's Freehold (2)	7,032	4,500	19,500
Ngapara	4,216	525	525
Manuherikia	2,965	600	34,181
Bruce	2,721	738	738
Willowbank	2,947	400	2,400
Lower Nevis	2,519	300	1,260
59 other working-dredges (registered or privately owned)	140,099	*	*
Totals	**257,333**	**38,841**	...

* Unrecorded.

The fifteen West Coast dredges are situated in the following localities—namely, two each on the Buller River and Nelson Creek, and one at each of the following places : Greenstone Creek, Blackwater, Antonio's Flat, No Town Creek, Slab Hut Creek, Capleston, Cronadun, Moonlight Creek, Brennan's Creek, North Beach (Cobden), and Waimea Creek. The most profitable dredging operations in the Dominion were carried out by the Worksop dredge at Antonio's Flat, which obtained gold to the value of £16,284, and paid £9,300 in dividends. The No Town Creek earned £7,486, of which £5,400 was distributed in dividends.

In Otago and Southland the fleet of seventy-two dredges in commission was distributed as follows: Waikaka Valley, 16; at or near Alexandra, 14; Waikaia, 6; at or near Cromwell, 3; Miller's Flat, 5; Manuherikia, 3; Lowburn Ferry, 2; Nevis, 4; Charlton, 3; two at each of the following places—Glenore, Cardrona, and Roxburgh; and single dredges are working at Poolburn, Kyeburn, Waimumu, Kelso, Kawarau River, Clutha, Bannockburn Creek, Ettrick, Waipori, and Mataura.

During the year five dredges were dismantled—namely, the Orcadian, on the Mataura River; the Lady Roxburgh, at Roxburgh; the Kyeburn, at Kyeburn; and upon the Buller River the Old Diggings and Smeaton Syndicate dredges. The number of dredges in active commission at the end of the year was reduced to 82.

(3.) Alluvial.

A somewhat unexpected feature in connection with the gold-mining industry is that the output of gold from sluicing claims is being maintained. During 1912 bullion to the value of £266,348 was obtained, as against £275,216 for 1911, and £188,464 for 1910. This satisfactory condition is due to several causes, chiefly, however, to more general rainfall throughout Otago, Southland, and Westland, the principal alluvial-mining provinces. By the systematic testing of alluvial ground with Keystone drills, placer mining in New Zealand has been rendered less speculative, and although the profits from alluvial claims are not frequently large, there still appears to be shown considerable interest in this branch of mining.

On the West Coast the most important alluvial mines are situated at Ross, where the old Mont d'Or Mine, with a paid-up capital of £10,800, produced gold to the value of £4,665, and returned £2,400 in dividends, the sum so distributed by this company now amounting to £54,000. It is proposed in the near future to undertake a considerable amount of development to enlarge the scale of operations, in addition to which a lower tail-race will be opened up.

The Ross Goldfields (Reconstructed) during 1912 again unwatered the Ross Mine, but owing to failure in electrical surface-transmission through defective insulation three stoppages of pumping were experienced. To overcome this contingency a Diesel engine of 250 h.p. was installed at the mine as a stand-by. A prospecting-drive has been driven at No. 6 level (315 ft.) from near the shaft to a point about 20 ft. below the nearest and deepest workings of the old Cassius Mine, and from this drive six boreholes were put up to drain the Cassius and those other old workings abandoned through influx of water in 1872. After two months continuous pumping by one stationary and one sinking three-stage turbine pump at the rate of about 2,000 gallons per minute, the ground was unwatered at the end of June, 1913, and a rise is now being put up into the Cassius Mine. During thirty-two-and-a-half weeks' operations in 1872, immediately prior to their inundation, 11,543 oz. of gold was obtained from the Cassius, Morning Star, and Excelsior Mines now included in this company's lease, since then £197,000 has been expended by four different companies in their endeavour to unwater and work these mines.

At the old Montezuma Claim, on the Hokitika Beach, Messrs. Lincoln and party have installed a steam-driven 8 in. centrifugal gravel-pump of Kershaw type to elevate the black sand from their paddock, water for hydraulic elevating being unavailable. The pump is driven by a Robey semi-portable engine of 18 N.H.P. The capacity of the pump is claimed to be 30 cubic yards of material per hour. At this claim the black-sand faces are broken down by ground-sluicing, for which purpose drainage-water is pumped from the paddock and conveyed by flume and pipe to the faces, from whence it again flows back into the paddock. The gold is saved on matting in the usual manner. Sluicing was commenced during December, 1911, and to the 25th September, 1912—the date of my inspection—about 13,500 cubic yards of sand had been worked, for a return in gold of £235, being an average of 4d. per cubic yard, equivalent to £1 per working-day. As four men were employed and 1 ton of slack coal was consumed at the boiler per day, the operations were not profitable. During 1912 this party produced gold to the value of £345. As a result of these operations a considerable area of black-sand country has been pegged out in claims in the neighbourhood, but it is evident that the cost of fuel will somewhat handicap steam-pumping operations on poor ground. Operations at the Montezuma Claim have recently been transferred a few chains to the northward on the beach where a more extensive plant has been installed and new paddock opened.

In the Southern Inspection District the most profitable work was carried out by the Nokomai Hydraulic-sluicing Company, who obtained from their claim, the faces of which maintain a uniform depth of about 60 ft., gold to the value of £10,354, and distributed in dividends £4,800.

The Blue Spur and Gabriel's Gully Consolidated Gold Company discontinued operations during the year. Their plant and mining privileges, sold to satisfy the claims of the mortgagee, were purchased by the Gabriel's Gully Sluicing Company, who propose to work the claim in conjunction with their own ground. The history of the Blue Spur Mine is unfortunate. The subscribed capital amounted to £91,266, and, although gold to the value of £135,771 was obtained from about 50 acres of deep ground, no dividend has been paid since the registration of the company in 1888. The causes of non-success were the necessity of blasting the fluvio-glacial conglomerate, and frequent shortage in the water-supply.

The Muddy Terrace Sluicing Company, near Waikaia, from whose operations much is expected, have obtained during the year gold to the value of £7,500, the total production since the commencement of sluicing in December, 1909, being £22,941. The total capital expenditure by this company amounts to £36,500, nearly all of which has been applied to the construction of lengthy conduits for sluicing purposes. The auriferous ground within this company's area is already extensive, but a new field of operations adjoining—at Long Gully, to the east of Muddy Terrace—has been secured by the company, and it is proposed to commence sluicing operations thereon at once. Contemporaneously the usual work at the claims on the western slopes and flat will proceed. The following is the average monthly yield from the Muddy Terrace Claim during the past three years: 1910, £618; 1911, £544; 1912,

PLAN OF THE
BLACKWATER GOLDFIELD, N.Z.,
1913.

Showing Mining Areas, Position of Main Lodes, and Topography

Compiled by the Mines Department, from Official Surveys.
(T.O.Bishop, A.O.S.M., Inspector of Mines)

Scale of Chains
10 5 0 10 20 30 40 50 60 70 80

Blackwater Ck
Drive 18" Outcrop
18" Outcrop
27" Outcrop
30' Winze
P. Lic. Saraty Syn.
Outcrop 24"
P. Lic. D. O'Connor
P. Lic. Tin Dish Syn.
P. Lic. T. H. Lee
Outcrop
Drive f. on Reef 18'
Outcrop 3 1/2'
Leaders
Quartz Blow 35' × 12'
Special Claim 100 A 0R. 0P. G 68
P. Lic. 100A. 0R. 0P.
County Road
P. Lic. 4 M. from Quinn's House
3/66
50A.0R. 0P.
Proposed Battery Site
Line of Reef
Drive
Winze 40' deep
Outcrop
Mitterton G.M. Coy
P. Lic. 50A. 0R. 0P.
P. Lic. 100A. 0R. 0P.
P. Lic. 100A. 0R. 0P.
Line of Proposed Water Race
SNOWY RIVER
Tramway to Hukarere Station 7 Miles

G 53
Blackwater Creek
Bush Track
98A. 2R. 00P.
Branch of
White's Gully and Claim
Block IX, Waitahu S.D.
" XIII "
Craigheads Claim
Right Hand
G 52 Lena Rachel Tremain 99A. 0R. 00P.
G 51 99A. 0R. 00P.
Scott's Special Claim 10 AC.
Shaft
Block IX, Waitahu S.D.
" XIII "
G 57
Coorang Creek
Blackwater-Waiuta Road
Metalled track towards Big River
G 41 98A. 2R. 19P.
N.50 E.
Very rich leader worked here
Trig Stn ◎M 1830'
95A. 1R. 00P.
Greek's Creek
Shafts Blackwater Mines
G 42
Blackwater Co's Tramway
81A. 0R. 00P.
Quartz Outcrops
Mines Ltd.
School Site
Reef
Birthday
G 58 97A. 3R. 15P.
Blackwater
G 65 76A. 1R. 11P. Treatment Plant
Ore Bin
Incline
6
Battery Special Claim Blackwater Mines Ltd.
G 45 91A. 0R. 20P.
G 66 Blackwater Mines Ltd. 96A. 2R. 08P.
100A.0R. 0P.
Drive
G 46 Blackwater Sth. Syn. 33A. 0R 37P.
Snowy Reef
Empire Reef
8
100A. 0R. 00P.

NOTE.—At the end of 1912, from the Blackwater Mine, bullion to the value of £300,925 had been obtained from 133,892 Imperial tons of ore treated, and £87,496 had been distributed in dividends.

G.E.H del.

1800.8.13.360.

By Authority: John Mackay, Government Printer.

THE BLACKWATER MINES, LTD., N.Z.

1913.

Scale of Feet

100 0 100 200 300 400 500 600 700 800 900 1000

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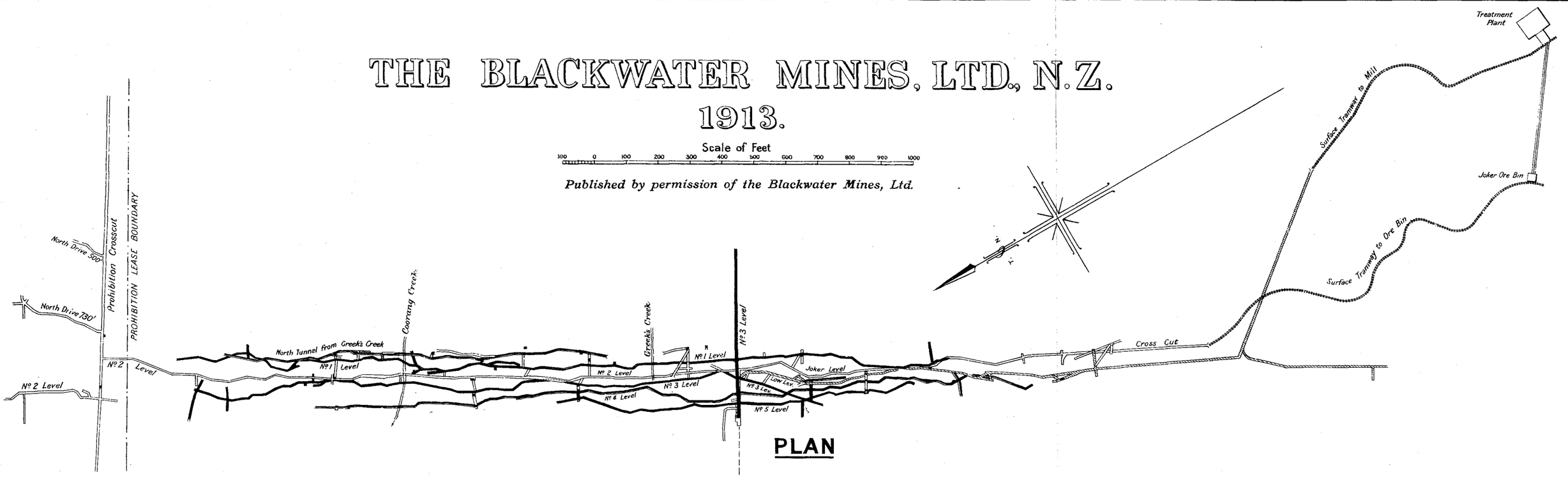
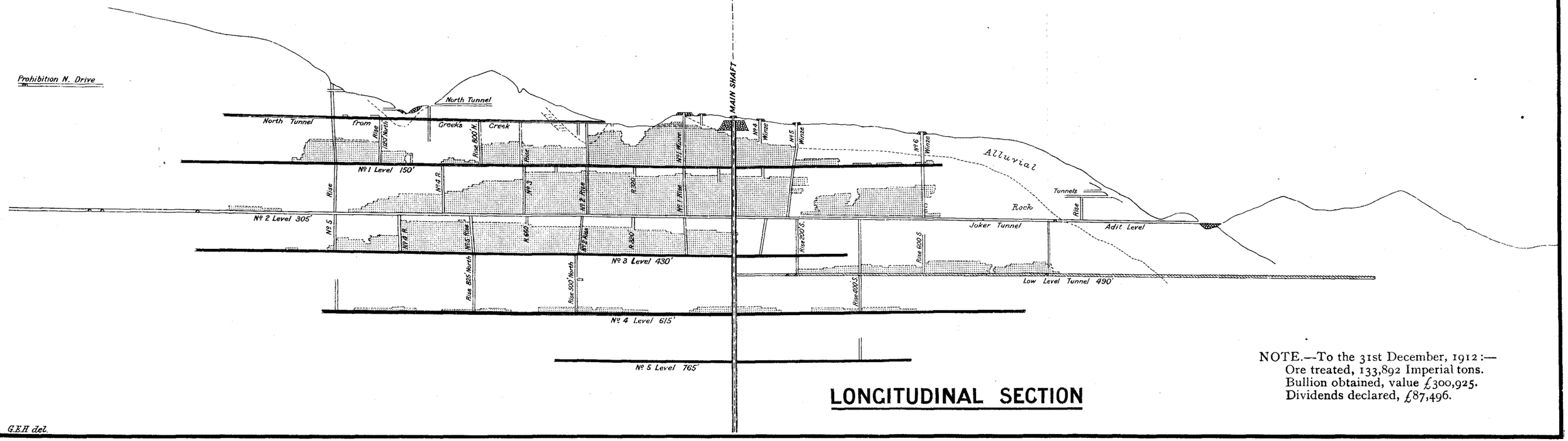


PLAN



LONGITUDINAL SECTION

NOTE.—To the 31st December, 1912:—
Ore treated, 133,892 Imperial tons.
Bullion obtained, value £300,925.
Dividends declared, £87,496.

G.E.H. del.

1800.7.13.361.

£635. With a recently increased water-supply from Boundary Creek, and the Steeple Creek Water-race supply in prospective, the average monthly yield should continue to increase.

Near Roxburgh the Teviot-Molyneux Sluicing Company are constructing extensive water-races from the River Teviot, and laying down a modern sluicing plant to work, on the hydraulic sluicing and elevating principle, an ancient bed of the River Clutha subsequently filled in with sand and shingle. This ground has been tested by systematic Keystone drilling. The overburden is somewhat deep, but the samples of wash are stated by the prospectors to be payable. The Ladysmith dredge, working a short distance upstream of this claim, is obtaining satisfactory returns.

The following is a statement showing the value of production and dividends paid by the principal registered sluicing companies during 1912 :—

Name of Company or Party.	Value of Gold produced.	Dividends declared.	
		During 1912.	Total to end of 1912.
Westland.	£	£	£
Mont D'Or Gold-mining and Water-race Company	4,665	2,400	54,000
Otago and Southland.			
Naseby Dredging and Hydraulic-sluicing Company	1,080	625	4,125
Deep Stream Gold-mining Company	1,244	312	1,437
Gabriel's Gully Sluicing Company	1,530	270	1,605
Golden Crescent Sluicing Company	2,253	612	8,750
Sailor's Gully Gold-mining Company	1,769	800	4,400
Havelock Sluicing Company	3,419	1,800	3,200
Messrs. George and Munro (P.O. Creek)	1,048	400	..
Round Hill Gold-mining Company	5,292	847	8,473
Nokomai Hydraulic-sluicing Company	10,354	4,800	33,683
Ladysmith Gold-mining Company	2,994	992	9,428
Undaunted Gold-mining Company	1,709	562	14,437
Tinkers Gold-mining Company	1,904	473	472
243 other alluvial claims (mostly privately owned)	227,087	*	*
Totals	266,348	14,893	..

* Unknown.

In addition to the foregoing, many privately owned claims returned considerable profits, the amount of which is not ascertainable.

V. MINERALS OTHER THAN GOLD.

Scheelite.

The quantity of scheelite exported during the year amounted to 135 tons, valued at £13,347, as compared with 138 tons, valued at £11,853, in 1911. The following statement shows the quantity and value of scheelite exported since the year 1899 :—

Year.	Quantity.	Value.	Year.	Quantity.	Value.
	Tons.	£		Tons.	£
1899	32	2,788	1907	137	15,486
1900	54	2,635	1908	68	6,055
1901	2	83	1909	58	4,263
1902	39	1,200	1910	143	15,070
1903	42	1,439	1911	138	11,853
1904	17	791	1912	135	13,347
1905	28	1,848			
1906	55	3,407	Totals ..	**948**	**80,265**

In the following table is shown the quantity of quartz crushed and scheelite (tungsten trioxide) concentrates obtained, together with their value, during the year 1912 :—

Name of Mine or Company.	Locality.	Quartz crushed.	Scheelite (Tungstic Trioxide) Concentrates obtained.	Estimated Value.
Marlborough.		Tons.	Tons cwt.	£
Dominion Consolidated Development Company	Wakamarina Valley ..	3,500	33 7	3,259
Otago and Southland.				
Glenorchy Scheelite Syndicate / Nine parties of miners ..	Glenorchy, Lake County	514	80 8	7,641
Nil Desperandum Claim	Macrae's District ..	14	2 10	210
Thomas and Hore	,, ..	10	2 8	192
Maritana Mining Company ..	,, ..	1,290	2 6	161
Forbes Mining Syndicate ..	,, ..	5	5 10	440
Golden Bar Gold-mining Company	,, ..	536	1 14	163
Gold and Scheelite Prospecting Company / Golden Point and Mount Highlay Claims	,, ..	11,779	10 5	1,016
Totals	..	17,648	138 8	13,082

IRON.

There has been no attempt made to work any of the ironstone-deposits of the Dominion, leaseholders appearing to hold their titles with a view to sale, while taking advantage of any relaxation of the labour-conditions of their leases which they may secure. The Parapara Iron Company continue to pursue the even tenor of its way, by doing very little work upon its extensive and valuable property. Since this company's Cadman lease was issued, on the 5th August, 1905, I estimate after inspection that the total value of the development in the form of prospecting-drives and all preliminary surface arrangements carried out by this company does not exceed £4,600, which is not remarkable considering that during the above period the company has received total protection from or reduction of the labour-conditions of its Cadman lease for several periods, aggregating thirty-six months.

Some publicity has been given to this company during the year owing to a parliamentary Committee having inquired into and rejected certain proposals by an influential London syndicate to erect iron and steel works at Parapara if subsidized to a very substantial extent by the Government.

By means of the prospecting-drives alluded to, information regarding the value of the ore-body has been obtained by the Government. These drives, four in number, aggregate in length 1,860 ft., and were driven from the outcrop at various levels (within a vertical height of about 240 ft.) in the Washbourne Block ore-body from both sides at its central or widest part, and bearing east and west. To ascertain if the ore contained within the hill was of equal value to the general sample of outcrop ore as obtained by Dr. J. M. Bell, and referred to by him in Bulletin No. 3, page 81, of the New Zealand Geological Survey, samples of ore were taken systematically along the whole course of the drives and crosscut by Mr. T. O. Bishop, A.O.S.M., Inspector of Mines, the general sample of which more correctly represents the average value of ore that may be sent to a furnace than those of outcrop ore. The samples thus taken by Inspector Bishop were forwarded to the Dominion Analyst, who had assayed the samples submitted to him by Dr. J. M. Bell previously alluded to. A comparison of the results is of interest, as showing the difference in value between surface ore and ore from the mine :—

	Outcrop Ore, General Sample; Average of Twenty-eight Samples taken by Dr. Bell. Per Cent.	Ore from Drives, General Sample; Average of Fifteen Samples taken by Inspector Bishop during 1913. Per Cent.
Silica (SiO_2)	9·56	16·42
Alumina (Al_2O_3)	3·36	5·39
Ferric oxide (Fe_2O_3)	71·25	64·32
Ferrous oxide (FeO)	1·94	..
Manganous oxide (MnO)	0·65	0·71
Lime (CaO)	0·51	Nil.
Magnesia (MgO)	0·10	0·16
Titanic-dioxide (TiO_2)	0·63	0·49
Phosphoric anhydride (P_2O_5)	0·35	0·31
Sulphuric anhydride (SO_3)	0·21	0·18
Carbon-dioxide (CO_2)	0·10	0·46
Alkalies	0·08	
Water, and loss on ignition	11·84	11·56
	100·58	100·00
Equivalents.		
Metallic iron	51·38	45·02
Phosphorus	0·15	0·13
Sulphur	0·08	0·075

From the foregoing it will be observed that the bulk ore within the ore-body is 6·36 units lower grade than the average outcrop ore; but the hidden ore-body carries slightly less phosphorus, which, however, is of no advantage, as the ore contains more than 0·05 to 0·06 per cent. of phosphorus, the maximum proportion for the manufacture of acid or Bessemer steel. For the conversion of Parapara pig iron into steel it will therefore be necessary to employ the more costly and less efficient basic process. Incidentally it should be stated that the designation "acid process" is due to the lining of the open hearth bath, in which the molten pig iron is treated, consisting of silica, an acid substance; but with such a lining the elimination of the phosphorus is impossible. In the basic process the lining of the bath is composed of dolomite (magnesian limestone) as a base, and in this process the phosphorus can be eliminated, and comes out of the pig iron in the form of phosphate of lime in the slag.

It is to be regretted that no suitable deposits of dolomite for the furnace-lining are known to exist in Australasia. For a similar purpose at the Lithgow Ironworks, New South Wales, calcined dolomite in casks is imported from Middlesbrough, England, at a cost of about £5 per ton c.i.f., which quantity is necessary to repair once a 15-ton furnace—*i.e.*, for each charge of 16 or 17 tons. It is a most expensive item. In the United Kingdom phosphoric pig iron may generally be estimated as worth 11s. per ton less than pig iron from non-phosphoric ore, and the difference in the average value of phosphoric and non-phosphoric ore is about ½d. per unit in favour of the latter. Acid or non-phosphoric steel is preferred as more reliable in the workshops and in the work, and is therefore always specified for boilers or purposes involving high steam-pressure. Roughly, about one-third of British pig iron is made from imported ore, which in 1909 amounted to 6,326,000 tons, nearly 6,000,000 of which was Bessemer, acid or non-phosphoric ore, which are synonymous terms.

The distance from which ore may be profitably imported to the United Kingdom is limited. Freight exceeding 12s. per ton, even on rich ore of the Bessemer quality, would be considered prohibitive.

Petroleum.

To facilitate operations in connection with drilling for and storage of mineral oil, provision was made in the Mining Amendment Act, 1911, by which any district in which there was reasonable possibility of petroleum being discovered could be brought under the Mining Act of 1908. In accordance with such provision the following districts have been defined and gazetted, all during 1912: Hawke's Bay—The whole of Mangatu, Waingaromia, Mangatoro, and Weber Survey Districts, within which the prospecting operations of the New Zealand Oilfields (Limited) and the Kotuku Oilfields (Limited) are being carried out. Taranaki—A large area of irregular shape containing about 700 square miles, extending about forty-nine miles along the coast from the mouth of the Mokau River south-eastward to that of the Pitone Stream; within this area the operations of the Taranaki Oil-wells (Limited) and some other companies are situated. Wellington—The whole of the Mangaone and Mount Cerebus Survey Districts; also Blocks I, II, and III, Mataikona Survey District, within which the prospecting operations of the Mangaone Oilfields (Limited) are being carried out. Westland—The whole of the Brunner, Waimea, Hohonu, and Arnold Survey Districts, within which prospecting for oil has recently been discontinued by the Kotuku Oilfields (Limited). The total area of the above gazetted districts is about 1,850 square miles.

A considerable amount of drilling has been carried out during the year, four different companies having been so engaged in the North Island. The results of the year's operations have not been conclusive, no new oil-supplies having been tapped, although gas-emissions have occurred in some of the holes being drilled.

The Kotuku Oilfields (Limited), who, during 1911, tested unsuccessfully the Lake Brunner district, Westland, have transferred their operations to southern Hawke's Bay, where two wells are now being drilled near Oparae (or Waipatiki), about a mile from the Dannevirke–Weber Road. The drilling-site was selected in the immediate vicinity of a blower of natural gas, which is now utilized as a supplementary fuel for the boiler used in connection with the drill. On 23rd June, 1913, No. 1 bore had been drilled 1,660 ft. and No. 2 bore, 1,322 ft.

The New Zealand Oilfields (Limited), having replaced their percussion drill by a modern rotary drill, are now engaged on the Tertiary rocks at Waihirere and Totangi, near Gisborne. At the No. 1 bore, Totangi, a total depth of 511 ft. has been drilled in soft clay with sandstone bands. Operations were suspended pending the trial of the rotary system of drilling at Waihirere. No. 2 bore, Waihirere: On the 10th April, 1913, the total depth attained was 1,375 ft., being for the most part in papa, with occasional thin bands of Tertiary sandstone. The gas-pressure has been strong at times, with small "shows" of oil in the return water.

During the early part of the year the property of the Taranaki Petroleum Company was sold for £110,000 to the Taranaki Oil-wells (Limited), a new company having a capital of £400,000, about half of which is to be provided for working and the general expenses of the company. This company were successful applicants for the second Government bonus of £2,500 for the production of a second 250,000 gallons of marketable crude oil containing not less than 90 per cent. of products obtainable by distillation, the first bonus of a similar sum having been won by the former company in May, 1911. On the 27th August, 1912, I again gauged the oil impounded in tanks, and found that from all sources since the commencement of operations 528,715 imperial gallons had been won. The following is the

record of official gauging by me, showing the total quantity of oil impounded between the 6th February, 1911, and the 27th August, 1912:—

	Days.	Imperial Gallons.	Average Yield per Day, in Gallons.
Prior to 6th February, 1911	..	226,630	..
6th February, 1911, to 3rd May, 1911	86	39,762	462
3rd May, 1911, to 25th March, 1912	325	155,583	479
25th March, 1912, to 27th August, 1912	155	106,740	689
Total oil impounded to the 27th August, 1912		528,715	..

Prior to the 25th March, 1912, the bulk of the oil was produced by wells Nos. 2 and 3, and after that date by well No. 5 in addition.

Since this property changed ownership there has been greater activity displayed in well-boring, the old cable drill having been superseded by modern rotary drills, by which three wells are now in progress, one (No. 6) at Moturoa being situated about 150 yards from No. 5 producing-well, and two others on Rundle's property, Bell Block, Waitara, distant respectively about five and seven miles from Moturoa. The latter holes, on the 2nd July, 1913, had reached the following depths: No. 1, 2,110 ft.; No. 2, 1,945 ft.

For the treatment of the oil won by this company a refining plant, having a capacity of 10,000 gallons per day and costing about £36,000, has been installed at Moturoa. The plant consists of three round stills and five coking or pot stills; one battery of steam-boilers; paraffin-shed; sweating-stoves; white-wax refinery; spirit or petrol still; tinning plant, workshop, and machinery; together with all the special engines, pumps, pipes, tanks, and fittings necessary for refining the crude oil and pumping the various products obtained therefrom to their respective storage-tanks.

The Government have offered a bonus of £2,500 to be paid to the person or company who first produces by his or its own refining plant 500,000 gallons of refined mineral oil of specified quality.

The Mangaone Oilfields (Limited), a Napier company, having let a contract for 6,000 ft. of drilling in two holes, a steel derrick and modern combination steam rotary and cable drill were erected at a point about twelve miles by road east of Eketahuna, on the land of Mr. F. White, being Section 15, Block IV, Mangaone Survey District. Drilling was commenced on the 28th November, 1912, and on the 18th April, 1913, a depth of 1,750 ft. had been attained. For nearly the whole distance the formation pierced was papa. Emissions of gas have occurred at various depths. Drilling is still in progress. No official geological survey has been made of this locality, but the surrounding country for a considerable distance consists of low hills of Tertiary blue marine clay, locally known as papa. The tracing of anticlines necessary for the location of oil-wells is extremely difficult in this locality. These operations are of a thoroughly legitimate and pioneer character, and are being carried out by experienced men.

In addition to the foregoing, operations have been recommenced by the Bonithon Company to deepen their borehole situated between Moturoa and New Plymouth. This hole is at present 3,004 ft. deep. A modern rotary plant has been recently installed.

A new company, the Taranaki Oil Lands Company (Limited), have acquired land in the vicinity of the Moturoa wells, and have erected a derrick within 150 yards of the No. 5 (productive) well of the Taranaki Oil-wells (Limited). Drilling has not yet commenced.

VI. INSPECTION OF STONE-QUARRIES.

The Stone-quarries Act, providing for the regulation of stone-quarries and places (not being mines within the meaning of the mining statutes) in which explosives are used, or where any rock-face exceeds 20 ft. in depth, came into operation on the 1st April, 1911. Under this statute inspection districts have been defined and Inspectors of Quarries have been appointed. The Inspectorate consists entirely of the existing staff of the Mines and Public Works Departments, who administer the Act in conjunction with their other duties.

It is rather early to determine to what extent safety precautions at the quarries have improved since the introduction of the Act, but there is favourable evidence by the reduction of fatalities at quarries which has already taken place. During 1912 only two fatal accidents occurred, whereas during 1911 there were five.

The number of quarries within the meaning of the Act during 1912 amounted to 274, and at these 2,106 persons were ordinarily employed, under certificated managers or foremen.

The following is a table showing for each inspection district the number of quarries, persons ordinarily employed thereat, also the number of certificated quarry managers and foremen, together with the nature of material quarried during 1912 :—

Inspection District.	Number of Quarries.	Number of Persons ordinarily employed.	Number of Permits granted during 1912.		Total Number of Permits granted.		Material quarried, and Purposes.
			Managers.	Foremen.	Managers.	Foremen.	
Arthur's Pass Tunnel ..	1	167	1	1	1	7	Government railway-tunnel; greywacke.
Auckland	72	207	..	32	..	59	Scoria, metal, sandstone, limestone, bluestone.
Buller County	2	132	..	1	..	5	Harbour-works, railway-construction; rock.
Christchurch	8	81	4	4	4	4	Basalt, scoria, rubble, for road-metal.
Collingwood, Takaka, and Waimea Counties	4	32	..	3	..	5	Granite and marble for building, &c.; limestone for cement.
Gisborne	2	34	1	..	2	1	Road-metal.
Greymouth	4	26	2	3	2	5	Harbour-works, Borough Council, Railway Department, and one private quarry.
Hauraki Mining District ..	14	56	..	9	..	22	Road-metal and ballast; stone-quarries.
Hawke's Bay	12	71	6	7	10	7	Limestone.
Hutt and Makara Counties	10	28	1	29	1	42	Road-metal.
Inangahua County ..	1	3	..	4	..	5	,,
Marlborough, Kaikoura, and Sounds	2	21	2	..	2	2	County Council and Railway Department; rock.
Opotiki	1	6	1	1	1	1	County Council; rock.
Otago and Southland ..	46	792	9	56	34	155	Limestone for building, basalt and schist for ballast, phosphate for manure; also railway-construction.
Rotorua	1	3	..	1	..	1	..
Ruakituri	1	8	..	..	..	1	Road-metal; papa.
Taranaki	4	?	1	..	3	..	Never inspected.
Tauranga	1	23	..	2	..	2	Public Works Department, rock-excavation.
Thames County	6	18	..	..	..	15	Road-metal.
Waikahu	1	36	..	5	..	6	Public Works Department, railway-construction; rock and papa.
Wairarapa	1	5	..	4	..	4	Limestone.
Waitomo	7	40	..	7	1	10	,,
Waimarino	5	30	..	3	..	7	Gravel-pits and papa faces on railway-construction.
Wanganui	1	20	..	..	1	2	Harbour Board quarry; stone.
Waverley	3	12	..	3	..	3	Shell rock, for road-metal.
Whangarei County ..	3	178	..	2	..	12	Limestone, for cement.
Woodville, Dannevirke, and Weber Counties	4	50	2	2	2	5	Limestone and papa, for road-metal.
Victoria Valley	7	27	2	..	12	..	Road-metal.
Totals	274	2,106	32	179	77	379	

The following is a summary of persons killed or seriously injured during 1912 at stone-quarries and places within the operation of the Stone-quarries Act (being in the proportion of 1·05 persons killed per 1,000 employed) :—

Cause of Accident.	Number of Accidents.		Number of Sufferers.	
	Fatal.	Serious.	Killed.	Seriously Injured.
Explosives	1	3	1	3
Falls of ground	..	5	..	5
Machinery	..	6	..	6
Haulage	..	6	..	6
Miscellaneous	1	21	1	21
Totals	2	41	2	41

VII. STATE AID TO MINING.

(1.) Subsidized Prospecting.

During the year ended 31st March, 1913, fifty-six approved prospecting parties were granted subsidies, amounting to £5,843, of which sum £2,533 was expended during that period. As a result of such expenditure, 8,407 ft. of drives have been put in, 390 ft. of shafts been sunk, and thirty-nine boreholes have been drilled, all in search of gold. In addition to the above expenditure, £2,867 granted during previous years was expended during the year ended 31st March, 1913. As much of the work for which the above grants were made during the last financial year is still in progress, it is impossible to state definitely the result of the whole of the prospecting; but of thirty-two subsidized operations already completed, in twenty-one cases the results were valueless, and in eleven cases the results warrant further development of the claims. In no instance was a new goldfield proved, or anything of considerable value, the operations being mostly confined to the testing of ground in the vicinity of proved fields. The result to the mining industry is small, but to the successful prospectors, all of whom are miners who operate on a moderate scale, they are of material benefit. Since the discovery of the Blackwater quartz-mining field during 1905 by a Government-subsidized prospecting party, no new goldfield or find of great importance has been made for the expenditure of about £25,000 in subsidies to prospectors. Without the assistance of Government subsidies, in all probability the exploration of the back country for minerals would almost entirely cease, as year by year there appears to be a growing disinclination, notwithstanding greatly improved means of access, to leave the more congenial atmosphere of the towns, where work is plentiful, for the arduous and primitive life of a prospector, in which the chances of success are gradually becoming more remote. The experience of New Zealand in this respect is similar to that in all the Australian States and other mining countries except those of recent discovery.

The following is a statement showing the amount of subsidies granted during the year ended 31st March, 1913, to prospecting associations and miners; also the result of such subsidized work:—

—	Amount granted during Year ended 31st March, 1913.	Amount expended of the Foregoing Grants.	Quantity of Work done.				Number of Parties.			Results of Work done.			
			Driven.	Timbered.	Sunk.	Boreholes drilled.	Surface prospecting.	Boring.	Working Underground.	Favourable.	Undecided or in Progress.	Valueless.	No Work yet done.
	£	£	Ft.	Ft.	Ft.	No.							
North Island ..	1,051	155	787	..	..	..	4	..	11	5	1	5	4
Nelson Province ..	1,659	987	809	..	310	..	3	..	5	..	1	6	1
Westland Province ..	2,833	1,391	6,811*	1,659	80	39	1	2	29	6	12	10	4
Southland Province ..	300	..	..	..	..	..	..	..	1	..	..	..	1
Totals ..	5,843	2,533	8,407	1,659	390	39	8	2	46	11	14	21	10

* Alluvial.

The following statement shows the total expenditure during the year ended 31st March, 1913, on authorities issued previous to that date, in subsidies to prospecting associations and parties of miners in the different counties:—

Name of County, &c.	Expenditure. £	s.	d.
Coromandel	247	10	0
Thames	80	0	0
Whakatane	26	0	0
Ohinemuri	396	6	2
Takaka	197	0	0
Wairau Road Board	45	5	0
Inangahua	859	12	6
Murchison	66	13	4
Grey	307	0	6
Westland	1,935	8	0
Ross Borough	188	5	0
Maniototo	14	18	0
Prospecting associations, &c.	1,036	9	10
Total	£5,400	8	4

(2.) Loans for the Development of Mines.

Since 1905, when statutory provision was made for advances by way of loans for mining development, three new companies have been assisted to the aggregate amount of £15,500 upon the security of their mines and equipment. It is satisfactory to state that the repayments of loan instalments have hitherto been punctual, and the amount of interest in arrears is very small. In one case the results have been satisfactory both to the owners and to the mining industry, for by means of the loan a productive alluvial gold-mine has been developed, and employment given to a number of persons, who absorb about £5,000 per annum in wages. In another case a small undertaking was assisted to introduce a somewhat novel method of alluvial mining, and the result attained has enabled the borrowers to refund a considerable proportion of the money lent before it became due. In the third case—viz., that of a deep quartz-mine—owing to the work not being sufficiently advanced, it is premature to express an opinion.

The experience, however, in the Australian States regarding mining loans has been very unsatisfactory, losses having almost invariably resulted, owing, doubtless, to advances having been made without adequate investigation. In New Zealand, however, it is required that the Government mining advisers shall, after personal examination, report upon the application, stating specially if there is a reasonable probability of the proposed mining operations proving remunerative, and giving reasons for such opinion. The Board constituted to report to the Minister upon such applications consists of four officers, but, owing to the difficulty in bringing that number together to inspect properties in remote places, it would be better to reduce the Board to two members—viz., the Inspecting Engineer of Mines and the Inspector of Mines for the district to which the application relates.

(3.) Subsidized Roads on Goldfields.

The opening-up by roads of remote or inaccessible mining fields still continues; and when the rugged character of many of these fields is taken into consideration it will be found that the mining industry is now well served as regards roads and bridges. Mining being generally the pioneer for agriculture, the roads constructed in some of the older mining fields are more used by farmers than by miners.

The following schedule shows the amounts expended by subsidies and direct grants out of the Public Works Fund—vote, "Roads on Goldfields"—in the different counties, &c., during the year ended 31st March, 1913:—

——	Subsidies.	Direct Grants.
	£ s. d.	£ s. d.
Thames County	..	732 3 8
Thames Borough	..	300 0 0
Coromandel County	..	2,539 12 4
Ohinemuri County	1,302 0 0	4,235 6 4
Piako County	..	65 16 6
Pelorus Road Board	..	160 0 0
Wairau Road Board	..	200 0 0
Collingwood County	..	748 15 3
Takaka County	..	870 5 0
Waimea County	..	360 0 0
Buller County	52 0 0	7,060 4 7
Murchison County	..	814 16 2
Inangahua County	44 11 10	4,057 13 5
Grey County	..	2,921 0 11
Westland County	78 16 0	2,428 15 8
Ross Borough	..	80 11 4
Mackenzie County	104 0 0	..
Tuapeka County	190 0 0	100 0 0
Vincent County	..	844 1 0
Lake County	..	552 17 5
Wallace County	..	48 15 0
Southland County	701 6 0	150 0 0
Public Works Department	..	5,017 14 11
	2,472 13 10	34,288 9 6

(4.) Government Prospecting Drills.

Three diamond drills of Schram-Harker type, with a boring-capacity of 2,500 ft., 1,500 ft., and 500 ft. respectively, one diamond drill of Sullivan CN type, capacity 800 ft., also two Keystone traction placer drills of 350 ft. capacity, are lent out by the Government to mining companies and local bodies free of charge. The borrowers have, however, to keep the machines in good order, and pay all expenses and wages in connection therewith, including those of the Government Superintendent of the drill.

During the year 156 holes, of an aggregate depth of 6,670 ft., were drilled by two Keystone drills in alluvial gravel, and three holes, of an aggregate depth of 1,158 ft., were drilled in search of coal.

The following table shows the work done by Government prospecting drills during 1912 :—

Type of Drill.	Name of Superintendent.	To whom lent.	Minerals sought for.	Number of Holes drilled.	Approximate Depth drilled.	Diameter of Hole.	Character of Country penetrated.	Average Total Cost per Foot, including Transport.	Results of Drilling.
					Ft.	In.		s. d.	
Diamond (Schram-Harker type)	W. Carter	Westport Harbour Board (site, near Addison's)	Coal ..	1	828	6,* 4†	Clay (marine bottom) saturated sands and boulders; no solid ground	21 6	Inconclusive; necessary depth unattainable.
Diamond (Sullivan CN type)	..	Nelson Coalfields (Limited), (site, near Stoke)	,, ..	1‡	50	6	Moutere gravel ..	..	..
No. 2 Keystone (placer drill)	G. E. D. Seale	Head and party, Kanieri	Alluvial gold	9	670	6	Gravel (greywacke and granite boulders)	2 7¾	Very satisfactory.
Ditto ..	Ditto ..	McLaughlan and party (site, Woodstock)	Ditto	6	236	6	Ditto ..	2 3½	Negative as regards working prospects.
,, ..	,, ..	Tucker Flat Company (site, Kanieri)	,,	15	805	6	,, ..	4 6	Very satisfactory.
,, ..	,, ..	State Colliery No. 1, Point Elizabeth (site, Runanga)	Coal ..	1	280	12	Marl and sandstone	?	Inconclusive; hole lost.
,, ..	,, ..	Duncan McLean (site, Blackball)	Alluvial gold	5	118	6	Gravel ..	5 0	Negative as regards value of wash.
,, ..	,, ..	Frosty Creek Prospecting Association (site, Rimu)	Ditto	3	348	8, 6	Hard cement with large boulders	15 0	Ditto.
No. 1 Keystone (placer drill)	T. McMath	Golden Bed Gold-dredging Company (site, Ettrick, Otago)	,,	42	2,642 (Average, 63 ft.; maximum, 125 ft.)	6	Gravel (mostly schist shingle)	2 8½	Conclusive as regards prospects of dredging.
Ditto ..	,,	Koputai Gold-dredging Company (site, Waikaia)	,,	76	1,851 (Average, 24·36 ft.; maximum, 88 ft.)	6	Ditto ..	2 11	Ditto.

* To 400 ft. † To bottom. ‡ In progress.

From the foregoing table it will be seen that there has been considerable demand for Government drills, and that this form of aid to mining development has been most satisfactory, as it places in the hands of small mining parties and companies modern drilling-machines under competent superintendence, thereby enabling a reasonable estimate of the mineral contents of a deposit to be ascertained without much expense. The drills have been utilized in prospecting for lodes, coal-seams, and alluvial wash. As will be seen, a somewhat phenomenal amount of work has been done during the year by the No. 1 Keystone (placer drill) operating in the auriferous gravels (generally schistose) of Otago; in all, 118 holes of 6 in. diameter were drilled and cased, the total depth drilled aggregating 4,493 ft., at an average gross cost of 2s. 9½d. per foot. During the two years and a half ended 31st December, 1912, this drill (with insignificant repairs) has put down 284 holes, aggregating in depth 11,267 ft., nearly all of which was done to test dredging-ground. At the end of the year a new Sullivan (type CN) diamond drill was put into commission to drill for coal near Nelson.

(5.) Government Water-races.

The Mount Ida Water-races continue to serve a few miners in the Naseby district, but the number of working-claims is gradually diminishing, and, as the irrigation of an extensive area of the Maniototo Plains may be carried out by means of these conduits, their purpose will doubtless be changed from mining to agriculture at no distant date. During 1912–13 the receipts from sales of water amounted to £1,147 19s. 3d., the expenditure in upkeep and supervision being £1,836 11s. 9d.

The Waimea–Kumara extensive water-race system on the West Coast has effectively prolonged the life of alluvial sluicing claims in the neighbourhood of Kumara and Waimea.

The newly constructed extension of the Kumara Race by siphon, which crosses the valley of the River Taramakau and delivers 36 cubic feet of water per second, has added a fresh lease to the life of the claims situated on the hills north of that river; and by the purchase by the Government of the privately owned Erin-go-Bragh Water-race, which seriously obstructed the extension of the claims into the terraces at Westbrook, a considerable area of payable ground hitherto unavailable has been rendered accessible.

To increase the capacity of the Waimea Water-race, the construction of a branch race from the Arahura–Wainihinihi Creek to the Kawaka Creek is now in progress, together with a branch race from McPherson's Creek. These conduits are expected to materially assist the development of claims in the Waimea and Stafford districts. In addition, two parties of miners have been assisted in the construction of their branch races from the Government main race.

The receipts for water sold from the Waimea–Kumara Races during 1912–13 were £1,440 1s. 5d., and the cost of upkeep and supervision £1,446 19s. 6d.

VIII. SCHOOLS OF MINES.

The Government annual examinations of the students attending the schools of mines throughout the Dominion (excluding the Otago School, which, being connected with the University of Otago, holds separate examinations) were held in December, 1912, the following being a summary of the results by senior students from each school, arranged in order of seniority in average marks obtained :—

Position.	Locality of School of Mines.	Average Number of Marks awarded per Paper submitted.	Number of Students examined.	Number of Papers submitted.	Total Marks awarded.
		Per Cent.			
1	Coromandel	66·4	7	18	1,196
2	Waihi	65·5	17	36	2,358
3	Karangahake ..	63·2	13	28	1,770
4	Westport	62·2	5	5	311
5	Thames	56·4	19	30	1,693
6	Reefton	50·0	5	6	301
	Totals, 1912 ..	62·0	66	123	7,629
	,, 1911 ..	53·9	76	148	7,982

Upon comparison with the results obtained at the examination for the previous year, it will be seen that the quality of the work has been improved, but there has been a small decline in the number of students examined, owing, no doubt, to the recent labour troubles at Waihi and Reefton.

The regulations regarding the conditions of the six Government scholarships offered annually to students of these schools have been amended by reducing the number of subjects in which a candidate must pass, from nine subjects to six, and the percentage of marks necessary in each subject from 75 to 60 ; also by making it compulsory that winners of such scholarships shall attend the University of Otago School of Mines.

At the 1912 School of Mines Examinations Government scholarships were obtained by Messrs. W. H. J. Cropp, Thames ; A. H. McClean, Waihi ; and G. E. Hyde, Karangahake. At no previous examination have so many scholarships been won.

The following table shows the expenditure by the Government on schools of mines since their inception, exclusive of subsidies paid to the University of Otago towards the School of Mines in connection with that institution :—

Financial Years.	Subsidies towards the Erection of Schools of Mines, and Maintenance.	Chemicals and Apparatus, also Mineralogical Specimens supplied to Schools of Mines.	Scholarships.	Salaries of Teachers, and Travelling-expenses, &c.	Total Sum paid by the Department towards the Schools of Mines.
	£ s. d.	£ s. d.	£	£ s. d.	£ s. d.
1885–86 ...	...	36 19 9	...	1,223 9 10	1,260 9 7
1886–87 ..	257 16 6	409 1 4	...	2,716 9 3	3,383 7 1
1887–88 ...	253 15 9	253 14 1	...	1,714 9 6	2,221 19 4
1888–89 ...	42 10 0	6 12 9	...	1,139 4 1	1,188 6 10
1889–90 ...	142 2 0	181 14 10	...	716 3 10	1,040 0 8
1890–91 ...	217 6 6	54 8 0	...	620 9 9	892 4 3
1891–92 ...	181 14 0	...	...	689 5 9	870 19 9
1892–93 ...	312 3 4	...	..	670 1 0	982 4 4
1893–94 ...	197 0 5	...	...	858 19 4	1,055 19 9
1894–95 ..	390 0 0	45 10 10	...	773 17 8	1,209 8 6
1895–96 ...	820 0 0	...	50	849 3 0	1,719 3 0
1896–97 ...	352 14 11	58 18 6	100	834 12 8	1,346 6 1
1897–98 ...	1,089 18 6	29 19 9	100	780 19 0	2,000 17 3
1898–99 ...	740 15 2	32 19 7	50	729 10 11	1,553 5 8
1899–1900 ...	990 3 4	24 3 8	50	52 16 3	1,117 3 3
1900–1901 ...	866 10 11	56 3 4	98	77 7 10	1,098 2 1
1901–1902 ...	1,155 12 3	63 5 1	49	69 16 4	1,337 13 8
1902–1903 ...	1,379 15 6	134 18 8	158	111 0 0	1,783 14 2
1903–1904 ...	1,575 15 3	88 18 8	92	109 15 10	1,866 9 9
1904–1905 ...	1,401 2 11	17 3 0	100	362 19 6	1,881 5 5
1905–1906 ...	1,806 19 5	87 2 1	49	440 9 4	2,383 10 10
1906–1907 ...	1,836 6 6	11 15 8	100	388 18 5	2,337 0 7
1907–1908 ...	2,428 19 3	94 6 2	150	345 15 11	3,019 1 4
1908–1909 ...	2,738 11 1	328 9 3	100	642 9 4	3,809 9 8
1909–1910 ...	1,882 2 6	692 2 8	100	587 3 2	3,261 8 4
1910–1911 ...	2,813 0 10	44 5 8	108	1,130 7 3	4,095 13 9
1911–1912 ...	1,852 19 11	38 9 9	92	1,138 6 7	3,121 16 3
1912–1913 ...	1,769 6 10	182 18 4	100	1,227 2 2	3,279 7 4
Totals ...	29,495 3 7	2,974 1 5	1,646	21,001 3 6	55,116 8 6

I have, &c.,
FRANK REED, M.I.M.M., L.S.,
Inspecting Engineer of Mines.

ANNEXURE A.

EXTRACTS FROM THE REPORTS OF INSPECTORS OF MINES.

NORTHERN DISTRICT.

MR. MATTHEW PAUL, INSPECTOR OF MINES, WAIHI.

Waihi Gold-mining Company (Limited).—The amount of work done is small compared with last year, owing to the enforced idleness caused by a strike, which lasted from the 13th May to the 2nd October. The supply of ore is now proceeding satisfactorily, but deep-level development cannot be resumed until the water is lowered to No. 10 level, which it is anticipated will be early in March.

No. 10 level (1,151 ft. from the collar of No. 5 shaft): Martha lode, south section—East of No. 5 shaft north crosscut the level was advanced from 153 ft. to 352 ft. At 153 ft. the lode is 30 ft. wide, and at 200 ft. it is 25 ft. wide. At 302 ft. the lode pinched to a track only, between two slidy walls. At 329 ft. flinty quartz was found, and at 350 ft. a very hard quartz 6 ft. wide, but of no value. West of No. 5 shaft north crosscut the level was advanced from 121 ft. to 419 ft. At 200 ft. the lode is 80 ft. wide. At 300 ft. the lode was partly crosscut, exposing 15 ft. of ore. Elk pass was connected at 220 ft. west. Empire lode—East of No. 5 shaft north crosscut the level has been advanced from 135 ft. to 395 ft. At 210 ft. the lode is 20 ft. wide, and at 300 ft. it is 12 ft. wide. West of No. 5 shaft north crosscut the level has been advanced from 155 ft. to 446 ft. Between 408 ft. and 446 ft. the lode split into small stringers of quartz, and a crosscut will be necessary to prove if it has pinched. At 292 ft. the lode is 22 ft. wide. South-south-west crosscut from No. 5 shaft was advanced from 114 ft. to 147 ft. The Royal lode was intersected at 115 ft., and proved to be 14 ft. wide. Royal lode westward—The level has been extended on the reef 174 ft. Eastward the level has been advanced 186 ft. From 0 ft. to 17 ft. the level was driven in the reef, but from 17 ft. to 120 ft. the level was driven in the country on the south side of lode, owing to proximity of No. 5 shaft; from 120 ft. to 186 ft. is in the reef. Between 150 ft. and 170 ft. the hanging or north wall country rock is exposed, and is of an unfavourable class.

No. 9 level (1,003 ft. below collar of No. 5 shaft): Royal lode—The level has been widened out to full width of lode in ore from 50 ft. to 425 ft. east of No. 5 shaft south crosscut, and also from 490 ft. to 575 ft. in ore. Stoping has been started, and a shrinkage block is in operation east and west of Frog pass at 66 ft. up. Reptile south-east crosscut has been extended 7 ft., making a total of 1,223 ft. from Royal lode. The country rock is of a favourable class. Driving had to be suspended owing to exudation of gas with a falling barometer from the reefs passed through. Empire lode, winzes—Paul pass has been sunk from 63 ft. to 106 ft.; 3 ft. of quartz is exposed. Rose pass was sunk a total of 38 ft.; the quartz pinched. The winze was situated on the north branch of lode. Power pass was sunk a total of 101½ ft., but the pass followed a small stringer in south wall and got off the main part of lode. Coleman pass, situated 500 ft. east of No. 5 shaft crosscut, was sunk a total depth of 80 ft. North crosscut from east end of Empire lode was driven from Empire lode to Martha lode, a length of 376½ ft. The country penetrated is favourable. A 12 in. calcite vein was found at 344 ft. from Empire lode. Edward lode, winzes—Perch pass has been sunk to a total depth of 80 ft. Lode proved by crosscut at bottom shows 29 ft. of sulphide ore, with west wall only showing. Eel pass sunk 65 ft.; 3 ft. of sulphide ore exposed; no walls seen. Salmon pass, situated 350 ft. south of Perch crosscut, has been sunk a total of 101½ ft. The winze is situated in the rubbly portion of lode (3 ft. wide). The lode has been partly crosscut at 100 ft. down, and 22 ft. of mostly sulphide ore has been exposed with east wall only showing. Trout pass, situated 100 ft. north of Perch crosscut, has been sunk a total of 131 ft., and 3 ft. of reef is exposed, containing a good deal of manganese-dioxide, and at points unfavourable reddish-brown oxidized country rock is exposed. Sole south-east crosscut—This crosscut has been driven from Edward lode towards Royal lode a total of 92 ft. in a favourable class of country rock. At 69 ft. there is a quartz vein 5 ft. wide; course, 88° (true) vertical. Welcome lode—Part of the widening on this level was timbered.

Filling in: Approximately 92,757 short tons of filling material have been obtained from the various filling cuttings on the surface and from deadwork crosscuts, &c., underground, and put in stopes. Waste rock hauled up the various shafts and dumped on surface was 8,149 short tons.

Shafts: No. 2 shaft was sunk from a point 1 ft. below No. 9 level to 100 ft. below No. 9 level, making a total depth from surface of 1,179 ft. The water rose in this shaft to within 10 ft. of No. 9 level, owing to stoppage of pumps. At 1,110 ft. quartz 4 ft. wide came in on north side of shaft, and passed out again on south side at 1,149 ft. No. 4 shaft was sunk from a point 1½ ft. below No 10 level to 66½ ft. below No. 10 level, making a total depth from surface of 1,214½ ft. No. 5 shaft was sunk from a point 29 ft. below No. 10 level to 117 ft. below No. 10 level, making a total depth from surface of 1,268½ ft. At 1,180 ft. the Royal lode was met on south side of shaft, and at 1,251 ft. the reef passed clear of the shaft to the north side. The reef contains fissures which give out 1,000 gallons of water per minute. The 28-in.-diameter draw-lift coped with the water. The country rock at bottom is a good class. It is close-grained, and is letting out no water. The water was conveyed down behind the timbers from the reef to the bottom of the shaft.

Hora Hora hydro-electric scheme: Good progress has been made during the past year on this work. The main race is practically finished, and water will shortly be admitted. The power-station has been built, and the machines will soon be ready for a trial run. The plant consists of six 1,500 b.h.p. turbines direct coupled to three-phase alternators, to run at a speed of 187 revolutions per minute, and

generating current at 5,000 volts, with a frequency of 50 cycles. The current is stepped up in the transformer-house to 50,000 volts, and transmitted to Waikino, a distance of 44½ miles. It is then stepped down and used in the Waikino mill at 500 volts. Part of the current is transmitted to Waihi at 11,000 volts, and is stepped down at the mine to 2,000 volts, at which pressure it is used on the motors.

Waihi Grand Junction Gold-mining Company.—All development underground has been at a standstill from the 13th May to the 31st December, owing to a strike; therefore the work done covers only a period of about four months and a half. No. 3 shaft was sunk, making a total depth of 183 ft.

No. 6 level: South-east crosscut—Advanced 700 ft.; total length, 876 ft. From 704 ft. to 716 ft. was quartz. This proved to be the Royal lode; average assay value, £3 3s. 7d. per ton. At 834 ft. the George lode was cut, showing a width of 6 ft. 6 in.; average assay value, £2 0s. 6d. per ton. North-west crosscut—Advanced 329 ft.; total, 437 ft. From 108 ft. to 418 ft. this drive passed through a mixture of quartz and country assaying from 7s. 3d. to £1 0s. 1d. per ton. Dominion lode, east—Drive advanced 128 ft.; value, low. A winze was sunk 45 ft. east of the chamber to a depth of 19 ft.; lode mixed with country; assays averaged 12s. 9d. per ton. Dominion lode, west—A winze was sunk 15 ft. west of shaft chamber to a depth of 21 ft. Exposed the foot-wall, but not the hanging-wall; width, 3 ft. 6 in.; assay value averaged £4 11s. 1d. Republic lode, west—The drive on this lode junctioned with the main body of the Empire lode 80 ft. west of the south-east crosscut; average width exposed by crosscutting, 18 ft. Republic lode, east—Advanced 123 ft.; total, 184 ft.; width, 4ft. 4 in.; average assays, £2 13s. 9d.; both walls exposed (from 60 ft. to 95 ft.). From 95 ft. to 184 ft. the reef was composed of stringers only; no value. Empire lode, foot-wall branch—East drive advanced 151 ft.; total, 244 ft. After driving 71 ft. the junction of the main Empire lode was met with. Crosscuts proved this lode to be over 20 ft. in width, and payable. Drive west advanced 225 ft.; total, 296 ft. At this point it junctioned with the Empire main lode, west. This lode has been broken out the full width, and stoping-timbers placed in position up to 250 ft. west of crosscut. At this point the lode split, and a small branch 15 in. wide running to the south wall was driven on for 8 ft., giving very high assay value; but this gives indications of petering out. A rise was also put up 91 ft. above this level at a point 115 ft. west of crosscut; width of lode, 3ft. 6 in.; south wall only exposed; value highly payable. Royal lode—Drive advanced 29 ft. east of crosscut. At 5 ft. east passed through a small flat fault dipping to the east. East of this fault the lode was split into stringers divided by bands of country. Walls not clearly defined. The average of the assays taken, including the country and stringers, was £1 18s. 7d. for a width of 9½ ft. A rise was also put up 16 ft. above the level, but so far the lode is split and mixed with country. Royal lode—West drive advanced 50 ft. from crosscut; walls of lode irregular; average assay value from a width of 5 ft. 7 in., £3 11s. 3d. Martha lode—Drive west advanced 72 ft.; total, 135 ft. From 20 ft. to 50 ft. a band of mineral appeared cutting out in the roof; from 65 ft. to 72 ft. the drive was in country, and work discontinued. Drive east advanced 109 ft. No walls exposed; quartz, low grade. Mary lode—At a point 430 ft. from the shaft a rise was put up to connect with No. 2 winze. At 77 ft. above the level this rise is in country rock, with a few stringers of no value.

The following is a summary of development done: Main and intermediate drives on lodes, 1,263½ ft.; crosscutting lodes from drives, winzes, and rises, 252 ft.; rises on lodes and through country, 408½ ft.; winzes on lodes and through country, 128 ft.; driving and crosscutting through country, 1,131½ ft.; shaft-sinking, 172 ft: total, 3,356½ ft.

Power-plant extensions: Up to the 31st December, the extensions to the engine and boiler rooms and the three bays of the switchboard annexe have been erected. The new A.E.G. turbine auxiliaries and switchboard-control panels have been installed, and steam, air, and water pipes coupled to the machines.

During stoppage of work by the strike, the air, water, and ventilating mains have been very badly corroded, and on resumption of work will require extensive repairs and replacements. The tramway-tracks have also been eaten away by acid water dripping on them. Beyond these repairs the flooding has apparently caused no other material damage.

Waihi Extended Gold-mining Company (Limited).—No. 6 level (1,100 ft.): Development was commenced by driving north-west 70 ft., at which point the north-west lode was intersected. Twenty feet of driving was done on this lode; value, low. The south-east crosscut is now in a distance of 350 ft. At 245 ft. the south-east lode was intersected, but owing to the mine being shut down very little work was done to prove its value. No. 6 winze was connected with No. 6 level, which greatly improves the ventilation.

Pride-of-Waihi Gold-mining Company.—This mine has been under protection during the year, but I am informed that a meeting of shareholders is being convened in order to decide on future operations.

Waihi Consolidated Gold-mining Company.—Owing to financial difficulties, this claim has been under protection during the year.

Waihi Standard Gold-mining Company.—No. 4 level (257 ft.) was cleared out, and it was found that a reef 4 ft. 6 in. in width had been driven north 54 ft. and south 80 ft. The former was advanced 90 ft., and maintained its width, with encouraging value. A winze was also sunk, the reef proving consistent in width and value. During the labour troubles this mine was under protection.

Owharoa.

Rising Sun Gold-mining Company.—Work during the year has been confined to driving the low-level tunnel, which is now in a total distance of 2,166 ft. Two lodes have been intersected, giving good dish prospects and payable assay value.

Waikino-Waiomoko Claim.—During the year a considerable amount of surface prospecting was done, and a large lode formation was discovered. Two tons treated as a trial crushing proved to be worth £1 5s. per ton.

Waitekauri.

Maoriland Gold-mining Company.—North of No. 2 rise the low level has been extended a total distance of 314 ft. At 220 ft. a large body of quartz was met with, and driven upon for 94 ft.; assay value, 4s. per ton. At the intermediate level stoping is in progress on the east and west wall of the lode. The average width of milling-ore is 5 ft. From ore milled, bullion to the value of £3,585 12s. 11d. was obtained.

Golden Cross Gold-mining Company.—This mine has worked continuously during the year, work being confined to testing several lodes above the creek-level; 875 tons produced gold valued at £1,636 6s. 5d.

Jubilee Gold-mining Company.—The works carried out in this mine have been of a prospecting character. At the different levels 300 ft. of driving has been done, also a considerable amount of surface prospecting, without discovering anything payable.

North-western Syndicate.—The low level has been driven a total distance of 400 ft., and several small leaders intersected, giving good dish prospects; but the large reef exposed on the surface, and from which high assay value was obtained, has not been found in the mine.

Karangahake.

Talisman Gold-mining Company.—Talisman shaft: This has made slow progress on account of the heavy flow of water. The total depth at the end of the year was 553 ft. below river-level. When this shaft is a few feet deeper it is proposed to excavate a chamber, to install a horizontal pump of 50,000 gallons per hour capacity to raise the water to the adit above river-level, and thus avoid intermediate pumping. Woodstock shaft: This shaft is now sunk 454 ft. below the engine chamber, and it is intended to sink 40 ft. to 50 ft. deeper before opening out for No. 14 level. The first section of the Cornish pumping plant has been placed in the shaft, and the second set will be installed when No. 14 level is opened up, when the plant will be started, thus making the Woodstock the main drainage-shaft of the mine. At No. 13 level the south drive has been extended to the boundary of ore in the Dubbo section, but as the country is still favourable it is intended during the ensuing year to resume driving south, also to crosscut east and west. At No. 14 level the north drive has been advanced beyond the boundary of the Bonanza ore-shoot, with a view of picking up the Talisman shoot, which has not yet been found. The south drive at No. 14 level has passed the southern boundary of ore in the Bonanza section, and is now being advanced toward the Dubbo section, where the reef proved is of fair size, but of low value. No. 12 winze was sunk a few feet during the year, and drives from the same were put out north and south to relieve the Talisman shaft of a portion of the water. A new fitting-shop and a new change-house are the principal items in the way of construction-work for the year.

Dominion Gold-mining Company.—In this mine the eastern low level which was put in to intersect lodes found outcropping on the surface, varying from 3 ft. to 30 ft. in width, has been extended a total distance of 819 ft. Unfortunately, at this point a large body of water was met with. Considerable time was spent in attempts to secure the face of this drive, but owing to the broken country and heavy pressure of water this work proved to be very slow and expensive. It was therefore decided to remove the men and further test the outcrops of these reefs, in order to allow the water sufficient time to drain off.

New Zealand Crown Mines (Limited).—The following development has been carried out on the Welcome, Crown, and Maria reefs at this mine during 1912:—Welcome lode, from four levels above and four levels below (400 ft.) the Waitawheta or river-level: 2,054 ft. of driving, 1,671 ft. of rising, 255 ft. of sinking, 817 ft. of crosscutting, and 17,758 ft. of stoping: produced 21,319 tons of ore. Crown reef, from three levels above Waitawheta: Driving, 453 ft.; rising, 344 ft.; sinking, 7 ft.; stoping, 362 ft.: produced 747 tons of ore. Maria reef, Hauraki section: Driving, 290 ft.; rising 123 ft.; crosscutting, 423 ft.; and stoping, 172 ft.; ore obtained, 724 tons. This section, which is being worked from a drive on what is known as the Hill track, has been connected with the main tramline leading to the mill by an aerial tram-line 1,100 ft. long, with requisite hopper accommodation erected at both ends. Number of tons treated, 22,839; bullion recovered, 17,023 oz., valued at £40,798 7s. 5d. Mill: A vacuum filter plant has been installed for the treatment of slimes, and is working very satisfactorily. The slime-vats are being fitted with mechanical agitators, and it is anticipated a higher percentage of bullion will be recovered during the incoming year.

Paeroa.

Waihi-Paeroa Gold-extraction Company.—The new plant commenced operations on the 22nd January, but some time elapsed before the whole of the machinery was thoroughly adjusted and put in working-condition, so that up till the 8th March only 1,500 tons had been treated. Up to date the sands treated have been obtained from the lower river claim, which four years ago contained very little tailings, so that it is evident the material treated is a recent product from the mines above, and estimated to be the lowest grade in the river. This section, however, had to be dredged to get floating-room for the barges. Although the material treated has only yielded an actual extraction of 8s. per ton (of 2,240 lb.) the profit over working-expenses has been satisfactory, owing to the very low working-costs. A dividend of 1s. per share was paid in November, and it is anticipated by the management that during the current year higher-grade sands will be obtained. The dredging and elevating plant have done excellent work in what is considered a poor section of the river, and for

cheap handling it is claimed that the system adopted would be difficult to improve on. Its efficiency is best shown by the fact that 1,000 tons of tailings have been dredged and delivered into the storage hoppers in twelve hours. The air-lift system, as used on the dredge, has been installed successfully throughout the whole plant for handling the tailings and pumping the slimes. The adoption of this system is largely responsible for the low working-costs in elevators and repairs. Two extra tube mills have been installed during the year, making a total of twenty-two mills now at work. The improved system of vacuum filtration, although considered at first to be experimental, has proved to be one of the most successful features of this plant, having handled the required tonnage without difficulty and at a very low cost. One man on a shift can treat with ease 500 tons of slimes per day, and as much as 600 tons have been filtered and washed in twenty-four hours. Assays showed the washing of the cakes to be very clean, and loss of cyanide reduced to a minimum. The total consumption of cyanide in the whole treatment of the sands is considerably under 1 lb. per ton. The power section of this plant has proved most satisfactory. A spare air-compressor has been erected, and a 100-H.W. generator is now being erected. During the year 84,178 long tons of tailing was treated, yielding bullion valued at £33,811 6s. 5d.

Komata.

Komata Reefs Gold-mining Company.—Komata reefs section (No. 8 level): The old drive south on Wilson's lode has been retimbered for a distance of 310 ft., and driving south has been resumed after a lapse of ten years. Te Ao Marama section (No. 4 level): A little work was done on this level in extending the crosscut towards the boundary, and Lavington's lode was intersected, but proved to be low grade. The crosscut west was not extended during the year. Stoping: This has been confined chiefly to Nos. 5 and 6 levels, which produced 6,061 tons. No. 7 level produced 59 tons, making a total of 6,120 tons, worth £17,104, equal to £2 15s. per ton. Of this value, the milling process saved £16,633 9s. 8d., equal to 97·4 per cent. of the total value. The final tailing assayed 1s. 5d. per ton. It has since been decided to close this mine, the working of which is unprofitable.

Maratoto.

Silver Stream Mines (Limited).—Operations have been chiefly confined to driving a crosscut from the Julia reef to the Queen reef at the low level. The latter lode was opened up north for a distance of 122 ft., and a little stoping done. Some very rich ore was found in driving, but owing to the hard nature of the country, and consequent slow progress with hand labour, an air-compressor and rock-drilling plant were installed. Ore shipped to Australia (in weight 5 tons) produced bullion in value £103.

Tellurides Proprietary (Limited).—The principal work consisted of the extension of the Gordon low level to intersect the Julia and Silver Queen lodes. A small air-compressor and rock-drilling plant erected last year has proved of great assistance, the country rock in this locality being very hard.

Te Aroha.

Hardy's Mines.—The low level to intersect the Premier lode has been extended a further distance of 600 ft. Unfortunately, the capital of this company became exhausted, and it was found necessary to apply for protection pending a meeting of shareholders.

Bendigo Gold-mining Company.—Altogether 246 tons was crushed, for a return of £33 11s. 7d., which proved so disappointing that it was decided to cease operations.

Waitawheta Gold-prospecting Company.—The Vulcan lode in the surface level has increased in width to 6 ft. of ore, extending into the hill. Development of the Bonanza lode also gives promise of a considerable tonnage of mineralized ore. Crushing was commenced early in September. From 300 tons, bullion value £230 was obtained. There still remains 100 tons of sands in the vats, to be treated by cyanide. Unfortunately, this mill was totally destroyed by fire early in January. It is proposed to immediately proceed with the erection of a new mill.

Royal Oak Gold-mining Company.—This property has been under protection during the year, and the only work done in the mine consisted in driving and stoping on the surface level, which was done by tributers. 8 tons of ore and 300 lb. of picked stone was treated, for a yield of £320 7s. 6d.

Exalt and Ringleader Syndicate.—This ground, after lying idle for a number of years, was recently taken up by the above syndicate. Four men were employed driving on the Exalt lode and prospecting the Ringleader section of this property. Some very fair specimen-stone has been obtained.

Mount Welcome Gold-mining Company.—At the low level a winze was sunk to a depth of 44 ft., but, owing to a sudden influx of water, had to be abandoned. The ore obtained produced gold valued at £270 10s. Early in May application was made for protection, which was granted subject to the mine being let on tribute, and gold valued at £42 14s. has since been obtained.

Gallant Syndicate.—In this mine 371 ft. of crosscutting and 55 ft. of sinking has been done on Scotty's reef, and a little gold was seen in the rubbly quartz. Two men employed.

Venture Claim.—Work confined to driving low level. A total distance of 400 ft. has been driven, and several small leaders intersected, giving good dish prospects, and occasionally yielding a few pieces of specimen-stone.

New Success Gold-mining Company.—A small block of ground was opened up under the floor of Smithy level. 3 lb. of picked stone and one bag of general ore produced gold valued at £51 5s. 11d. For some time past work has been confined to crosscutting for other well-known leaders. Distance driven, 230 ft., through hard country.

Old Hauraki Gold-mining Company.—Mining and development work has been principally confined to what is known as the New reef. At the No. 4 level this reef has been driven on for 400 ft., making

a total distance of 1,200 ft., and stopes are in progress for 300 ft. in length. At No. 3 level a block 300 ft. in length is being stoped and 180 ft. of driving done; also 150 ft. at No. 2 level. Union Beach section: This is being worked by tributers.

Hauraki Reefs Gold-mining Company.—A good deal of work was done on No. 4 reef from the Old Hauraki shaft at the 400 ft. level, and a rise 123 ft. in height connected with No. 3 level, which secured good ventilation. Gold was frequently seen in the quartz, but nothing of a payable character was found. From No. 2 level (200 ft.), Hauraki Reefs shaft, a considerable amount of prospecting was also done, and several lodes intersected. At present operations are confined to driving and stoping on the Golconda lode at No. 1 level, and some fair hauls of picked stone have been obtained, and there is every indication that a highly payable block will be opened up on this lode.

Armstrong Dredging Company.—This claim is situated on the Coromandel foreshore, adjoining the Old Hauraki Mine. At present a body of washdirt varying in thickness from 5 ft. to 15 ft., and 130 ft. in width, is being operated upon. Parcels treated at the Hauraki mill have yielded as high as £1 1s. per ton, which the management considers highly satisfactory. Under this washdirt is a layer of quartz, and rich specimen-stone is frequently obtained; samples sent to the school of mines assayed as high as £10 10s. per ton. The treatment of the washdirt, owing to its clayey nature, has given a great deal of trouble; the usual treatment as employed on dredges was found quite useless. A Huntington mill has been placed on board the dredge for grinding and amalgamation, which has considerably improved the extraction. A disintegrator has been ordered from America for the reduction plant.

Bremner's Freehold Gold-mining Company.—The most important development-work has been the location of Bremner's reef, south of the main break. This lode averages 3 ft. in width. Several small parcels of picked stone have been found, and the prospects are encouraging.

Matamataharakeke.

Mills Reward Gold-mining Company.—Work has been confined to testing Smith's reef from No. 2 and No. 3 levels. The results, however, did not come up to anticipations; consequently, early in November it was decided to suspend operations.

Kuaotunu.

Handsworth United Gold-mining Company.—During the year operations have been confined to the Otama section. A rise was put up from the low level and connected with the surface, which greatly improved the ventilation. The gold occurs in small bunches of rich specimen-ore, generally in the wall or adjacent to flinty lode formations.

New Waitaia Gold-mining Company.—At the low level the main reef located during the latter part of 1911 has been opened up for a distance of 300 ft., carrying ore for the whole distance, 163 tons yielding bullion valued at £2,077 16s. 4d. This level has been connected, by means of rising and sinking a total distance of 150 ft., with the upper workings, thereby providing adequate ventilation. Stoping is in progress, and the mine gives promise of being one of the chief gold-producers in the Coromandel County.

Mountain King Gold-mining Company.—Work has been principally confined to stoping from Nos. 4 and 5 levels. The lode is small, but contains pockets of rich ore. A crosscut has recently been started in the eastern wall to intersect the Blue reef, from which good results were obtained in the surface levels.

Great Barrier.

Barrier Reefs Gold-mining Company.—In this mine work has been confined to driving a low level, with the object of testing the various lodes at a greater depth. An average of five men has been employed during the year.

PETROLEUM.

New Zealand Oil-wells Company (Limited), Taranaki.—A vigorous scheme of operations has recently been commenced, with a view to thoroughly testing the oil-bearing area over which they have acquired boring-rights. No. 3 and No. 5 wells are still discharging, and preparations were being made to clear No. 2 hole, which became blocked a short time ago. In addition to these, three new bores are being put down, one near the present scene of operations and two at Bell Block, about ten miles from New Plymouth. The first-mentioned is being sunk by means of a rotary drill, and had reached a depth of 1,500 ft. at the time of my visit; unfortunately, a portion of one of the boring-tools was lost, and work was confined to fishing. At Bell Block No. 1 hole is down 1,500 ft., and No. 2 800 ft. At both points, I am informed, favourable indications are being met with. At Moturoa a refinery is now under construction for treating 10,000 gallons of crude oil per twenty-four hours, consisting of one bench of three boiler-stills and fire-coking or pot stills for the distillation, paraffin-shed for extracting the paraffin, and sweating-stoves for purification of same, white-wax refinery, spirit or petrol still, a battery of steam-boilers, tinning plant, workshop and machinery, together with all the special engines, pumps, pipes, tanks, and fittings necessary for refining crude oil, and pumping the various products obtained therefrom to their respective storage-tanks.

Taranaki Oil Lands Acquisition and Development Company (Limited).—This company, I am informed, have acquired boring-rights over 1,000 acres of land in close proximity to the above-mentioned company's wells, and have almost completed the erection of a derrick within 150 yards of No. 5 well, and it is anticipated by the promoters that oil will be struck when the required depth is attained. It is also proposed to drill on Mr. Thompson's property at Westown, and, although no boring has yet been done in this neighbourhood, gas and oil seepages exist in a degree which it is considered warrant the necessary expenditure.

Bonithon Freehold Oil Company (Limited).—Preparations are being made by this company to test, by means of a series of boreholes, their property situated midway between Moturoa and New Plymouth Township. A derrick 115 ft. in height has been erected and an up-to-date rotary drilling plant installed, and everything will be in readiness to commence operations early in May.

Inglewood.

No further work has been done in the borehole situated about a mile from the township, which attained a depth of 630 ft., with promising indications. I am, however, informed that there is every possibility of further capital being obtained and work resumed here in the near future.

Eketahuna.

Boring operations were commenced on the 28th November in a valley on Mr. Frank White's farm, situated about eleven miles from the Township of Eketahuna. The plant consists of combination rotary and cable drill. A borehole 10 in. in diameter has been sunk to a depth of 1,508 ft. with indications of both gas and oil.

ACCIDENTS AND FATALITIES.

Fatal.

Coronation Mine, Coromandel.—19th July, 1912: John Fenton, killed by a fall of rock in a surface drive.

Waihi Grand Junction Gold-mining Company (Limited).—19th December, 1912: Timothy Higgins, killed by falling down No. 3 shaft.

Non-fatal.

4th October, 1912: David Johnston, leg broken; John Hayes, injury to head and leg; William White, injury to head, back, and leg. All caused by a fall of ground carrying away the timbers in the Woodstock shaft, Talisman Mine.

There have been numerous minor accidents, but those quoted are the most serious.

MR. BOYD BENNIE, INSPECTOR OF MINES, THAMES.

May Queen Mine.—Operations at No. 10 (1,000 ft.) level (Thames-Hauraki shaft) have been confined to driving a crosscut to prove the continuity of the reefs which in the early days were worked by the Bright Smile Company in the upper levels. Stoping and rising were carried out upon the Exchange reef. The crosscut has been extended a total distance of about 538 ft. At about 520 ft. a promising-looking lode was passed through, containing traces of gold. This was driven on for about 70 ft. on the western and about 50 ft. on the eastern side of the crosscut, when work was suspended owing to difficulties in trucking and ventilation. The Exchange reef has been driven on the western side of the main crosscut for approximately 275 ft. A further 90 ft. of driving should connect with the Bright Smile crosscut. No. 6 level (750 ft., May Queen shaft): Work here consisted principally of stoping on the hanging-wall branch of No. 4 lode, and constructing an intermediate level about 35 ft. above. Owing to the quartz becoming poorer, work was suspended here in August. I inspected the mine on several occasions during the year, and found it in good order. 342 tons of ore was treated, for a return of £709 19s. 8d. There was an average of twenty men employed.

Thames Deep Levels.—Operations in the Deep Levels (1,000 ft.) crosscut have been carried out more or less continuously throughout the year, but progress has not been good, owing, in a great measure, to the unfavourable nature of the rock, which indicated that the drive was entering the broken country, due to the Moanataiari main slide. In the interests of life and property, I gave directions that a borehole must be advanced ahead of the crosscut, as required by section 254 of the Mining Act, 1908. For this purpose a Government diamond drill was obtained, and a horizontal borehole drilled in advance of the crosscut. At a distance of 128 ft. the main slide was penetrated, and a strong flow of water and influx of black-damp occurred, inundating the workings, and causing the men to retreat from the mine. At the borehole a pressure-gauge indicated a pressure of 300 lb. per square inch, equivalent to an effective static head of 700 ft. There appears to be no doubt that the Moanataiari main slide has been penetrated. For a week the large Cornish pump in the Queen of Beauty shaft was kept constantly at work to reduce the flow of water. During 1912 the main crosscut has been extended 886 ft., making the total distance driven from the Hauraki shaft 2,362 ft. A further 386 ft. requires to be driven to connect with a point immediately below the Kuranui-Caledonian shaft, and thereby complete the scheme undertaken by the Deep Levels Mining Board, but the continuation of the crosscut through the Moanataiari slide is inadvisable. The last 770 ft. has been driven in the Waiotahi Company's lease. Several quartz veins have been passed through during the year, but none of them has approached payable value. In addition to the extension of the main crosscut, some subsidiary crosscuts have been driven. The Saxon crosscut has been continued 400 ft. from the main crosscut, towards a point below the Saxon shaft. A further 200 ft. of driving is required to reach a point directly below the shaft, where the connection will be made when the shaft is sunk to this level. The Moanataiari crosscut has been driven in an easterly direction from the main crosscut for a distance of 400 ft., part of which was driven on a quartz formation. The Victoria crosscut has been driven for 430 ft. westward through the Waiotahi ground toward the Victoria Company's claim, and past the point where the Waiotahi shaft will connect when sunk to this level. The Deep Levels crosscut has been specially and frequently examined by me during the year. The ventilation

has been well maintained, and seldom less than 300 to 500 cubic feet per man per minute, but even with this amount of fresh air there was a constant air-temperature of 89° Fahr., fully saturated, in the Victoria and main crosscuts. The men worked only six-hour shifts. The Roots blower fan worked well and continuously throughout the year.

Saxon Mine.—The Saxon Company during the year completed the all-important work of enlarging and retimbering the main shaft from the surface to the No. 6 level (446 ft.). The shaft has also been sunk the first stage of 100 ft. toward connecting with the Deep Levels crosscut. At this point the work of further sinking had been suspended for a time to allow of prospecting operations being carried on from the No. 7 level (546 ft.) opened out from bottom of the shaft. A crosscut has been driven from the shaft at this point to intersect the Saxon Nos. 2 and 3 reefs. At 100 ft. a quartz vein 3 ft. in width, supposed to be the Saxon No. 2 reef, was intersected. Mining has been hindered by inadequate ventilation. Occasionally carbon-dioxide gas was found in such quantities as to necessitate suspending work. The company propose to install a Sirocco fan. I examined the mine-workings on several occasions during the year, and found them in good order, except for defective ventilation. The miners' change-room has been renovated, and bathing facilities with hot and cold water have been provided.

Victoria Mine.—This mine has been protected pending the completion of the Deep Levels crosscut at the 1,000 ft. level. The crosscut is now about 160 ft. from the company's boundary. During the past year a few tributers have been working in the mine occasionally, and have crushed 27 tons 46 lb. of ore for a return of gold valued at £446 3s. 11d. The company has also crushed 3 tons of ore which was obtained the previous year, for a return of £16 18s. 3d. I examined the mine during the year, and found the workings in good order.

Waiotahi Mine.—For the development of the deep levels of the Waiotahi Mine better ventilation was necessary, and with this end in view a Sirocco fan, single inlet, has been installed. On the 4th December a special examination was made, and it was found that the fan delivered 21,500 cubic feet of air per minute, against a water-gauge pressure of 0·68 in. It is driven by a 5 ft. 6 in. Pelton wheel, the water being supplied from a 1 in. nozzle. The effective head is 138 ft. (60 lb.) per square inch pressure, about 31 cubic feet of water per minute being utilized. This is a cheap and at the same time effective means of ventilation. With a 3½ in. nozzle the fan is capable of producing 70,000 cubic feet per minute. An attempt was made during the year to continue the sinking of the main shaft to the 1,000 ft. level, but this important work had to be suspended after sinking 70 ft., owing to the influx of water, which it was found had not yet been drained away by the Deep Levels crosscut, although the crosscut had passed the point immediately below it. This shaft is now down 600 ft., and requires a further 400 ft. of sinking to connect with the Deep Levels crosscut. Prospecting-works have been carried on at the No. 7 level (522 ft.). The main crosscut at this level is also being continued on past the drive on the foot-wall dropper for the purpose of intersecting the main reef, and this may be expected to be cut at any time now. During the year 87 tons of ore was treated, for a return of £393 6s. 7d. An average of eleven men was employed. On the several occasions I examined the mine during the year I found it in good order.

Moanataiari Mine.—The mine has been protected for the past year, pending the development of the Deep Levels crosscut through this company's claim.

Kuranui-Caledonian Mine.—For the past year this mine has been protected, and, with the exception of one or two tributers prospecting occasionally on the surface, no work has been done on the property, but as the Deep Levels crosscut is now only about 170 ft. from this company's boundary they anticipate making a start in the development of their property at the 1,000 ft. level. During the year tributers have crushed 7 tons of ore, for a return of £9 12s. 9d.

Kuranui Mine.—The work at this mine has been principally of a prospecting nature. At the Battery level the Oddfellows reef was driven on for 120 ft. A portion of the reef was stoped, and 30 tons of ore yielded £10 16s. 2d. The Magazine level was extended, to cut several reefs known to exist in that portion of the claim. The drive, being out of the gaseous zone, is ventilated by a water-blast through pipes, which may be effective for some time.

Waitangi Mine.—The Beach (No. 4) level has been extended a further distance of 1,024 ft., making the total distance driven 3,763 ft. The main reef-lode formation, 60 ft. wide, was intersected at 2,891 ft. along the drive. This lode for 20 ft. consisted of a strong body of quartz, the remainder being quartz and country. This reef has been driven on for about 800 ft., the value of ore varying from time to time. At 3,140 ft. from the main crosscut a branch crosscut was driven for 237 ft., and at 35 ft. thereon the main reef, which had been previously displaced by a fault, was cut into and found to be only 5 ft. in width, and of low grade. A connection by rise was made with Nos. 3 and 4 levels. I examined the mine on several occasions during the year, and found it in good order. The ventilation was fair. For a breach of the Mining Act, 1908, section 254, subsection (3) (*b*)—failing to handle and store explosives as required by the Act—the mine-manager and contractor were convicted and fined. During the year 170 lb. of ore was treated, for a return of £18 19s. 2d.

Watchman Mine.—For the year the work carried out at this mine has been chiefly prospecting. The City of Dunedin and parallel reefs were driven on in a most up-to-date manner for the purpose of testing the value of the ore-bodies. There is good reason to believe that this company have a good property, which is well opened up by driving, rising, and sinking on the reefs. During the year the following works were accomplished: Driving, 678 ft.; rising, 608 ft.; sinking, 52 ft.: total, 1,338 ft. A trial crushing of 855 tons of general ore was milled, and treated at the Waiotahi Company's mill for a return of £1,772, or £2 1s. 5d. a ton, a very satisfactory return indeed. I examined the mine on several occasions during the year, and found it in fair order. The ventilation was good. Nineteen men have been employed on an average.

Bonanza Mine.—During September a start was made at a point 1,800 ft. in the drive, where a small but promising quartz reef 12 in. wide was located in driving the main crosscut. A drive has

been advanced 52 ft. on the course of the reef north-east. There are indications that a strong reef is near-by, from which this small reef is a branch. Several large reefs outcrop on the claim, and it is hoped that the low level now being driven will intersect one or more of them. I examined the mine on one occasion during the year, and found it in good order.

New Day Dawn and Norfolk Mines.—This company have spent a considerable amount of capital in the development of their mine, without locating payable ore. In April they were granted protection. Mining had not been resumed at the close of the year.

Dixon's Consolidated Mine.—This mine has been protected for the greater part of the year. In October work of a prospecting nature commenced. A lode outcropping on the surface has been located underground, and found to be about 18 in. wide.

New Sylvia Mine.—This mine has proved to be the most productive in the Thames district, and throughout the year regular monthly returns were forthcoming. 10,459 tons of ore was treated, for a return of £15,043 12s. 11d., an increase of £7,097 12s. 11d. above the previous year's return. Developments have been carried out at all levels. At Nos. 1, 2, and 3 (200 ft.) levels a new reef has been proved, of satisfactory value. At No. 4 (350 ft.) Battery level, stoping has been carried up to No. 3 level on the main New Sylvia reef. No. 5 (450 ft.) low level, crosscut has been extended to 1,986 ft. A short distance only remains to intersect the main New Sylvia reef. I examined the mine several times during the year, and found the work carried on with great care.

Monowai Mine.—Mining operations have been carried on during the year at Nos. 2, 3, and 4 (300 ft.) levels. Towards the close of the year a promising reef formation was located on the surface. A crosscut from No. 2 level was driven for 140 ft., when the reef, 11 ft. wide, was intersected. Stoping was carried out between Nos. 3 and 4 levels. The level main drive has been extended northward for 120 ft., nothing of importance being found. For the year 3,007 tons of ore was treated at the company's mill, for a return of £1,815 5s. 3d., while concentrates shipped and treated in England yielded £3,922 5s. 9d., the total return being £5,737 11s. The mine and milling plant were examined by me during the year, and found to be in good order.

Portia Special Quartz Claim.—The owners worked the block of ground on the Portia reef from he level into the main slide, blocking out the ground to the surface. A fair amount of surface prospecting was also done. During the year 217 tons of general ore was treated, for a return of £667 6s. 6d.

Nonpareil Mine.—Work, with satisfactory results, has been carried on continuously throughout the year. Mining has been confined to quartz droppers from the foot-wall of the Liverpool Boy's reef. Being an old mine, the means of ventilation through the old rises are blocked, and to produce efficient ventilation is somewhat difficult. By the employment of a small ventilating-fan, work which proved remunerative was possible, 28 tons of ore being treated, for a return of £1,384 6s. 9d. I examined the mine during the year, and found it safe.

Ballarat Claim.—On my visit for inspection I was unable to enter the mine owing to the gate on the drive being locked, and judging by external conditions very little work, if any, has been done during the year. However, the owner makes a return showing that he has treated one load and 80 lb. of stone from the mine, for a return of £116 10s.

Gladstone Claim.—This is an old claim recently taken up, and is situated in the Karaka Creek, in the vicinity of the New Magnet and Halcyon Mines. Two men have been employed on the claim, and 1 ton 56 lb. of ore was mined and treated, giving 140 oz. 1 dwt. of gold, for a return of £367 12s. 3d., which may be considered as very satisfactory.

Karaka Mines (Limited).—The principal work for the year has consisted in erecting a fine steam-winding and pumping plant, with air-compressor, all housed in substantial buildings. A little prospecting-work has been done from the main adit level, where a small reef has been driven on, and at various places a little free gold has been seen in the quartz. I examined the main adit-level workings and found them to be in good order.

Occidental Mine.—This mine has been working continuously throughout the year, and the results are satisfactory. At the low level (No. 5), 70 ft. below No. 4 (the adit) level, the Occidental No. 2 reef has been driven on for some length, and a block of ore stoped out for a length of 100 ft. by 30 ft. high, from which 400 tons of general ore and 840 lb. of picked ore was treated, for a return of £4,108 15s. 7d., exceeding £10 per ton. The run of gold appears to be pitching below the floor of the deepest level. I examined the mine several times during the year, and found it in fair order.

Champion Mine.—Work at this mine has been principally of a prospecting nature. 300 tons treated gave a return of £100. I examined the mine early in the year, and found it in good order.

Golden Belt Mine.—Mining has been carried on continuously for the year at the low (adit) level, where a rise has been put up to a height of over 160 ft. on the Ajax reef, and an intermediate level has been driven to prove the extent and value of the reef. Unfortunately, the value is very low. During the year no ore was treated. I examined the mine, and found it in fair order.

Tairua Golden Hills.—After repairs to the mill, treatment of ore was resumed early in the year. Subsequently operations were suspended, owing to the quartz being unprofitable. During my inspection I found that the work was being carried on with care, the roads and the working-places being in fair order. 2,806 tons of ore was treated, for a return of £3,494.

Tairua Mines.—A considerable amount of prospecting was done over the unexplored part of the property, but nothing of any value was discovered. I examined the mine during the year, and found it in good order.

Daisy Claim.—This is a small claim, the area being only 4 acres. Work is carried on from a short adit level water-free. The owner secured a satisfactory return, treating eleven loads of general ore and 66 lb. of specimen-stone, for a return of £256 2s. 9d.

Thames Foreshore Dredging-works.—The dredge was worked for about the first six months of the year, when 3,056 tons was treated, for a return of £298 19s. 6d. During the remainder of the year the works have been idle. I visited the works on several occasions during the year, and found them in fair order.

Accidents and Fatalities.

May Queen Mine (1,000 ft. level).—On the 11th January, 1912, two men—James Williams and Thomas Guy—were suffocated owing to an inrush of CO_2 gas. Both men died. On the 13th April, 1912, William McKee had his back and leg broken by a fall of rock. This accident did not prove fatal.

Deep Levels (Waiotahi section).—On the 28th May, 1912, by a fall of rock from the back of the drive, two miners—Andrew Jamieson, contractor, and Robert Aubrey, wages-man—were seriously injured, each having a leg broken between the ankle and the knee. Jamieson has been unable to work since, and Aubrey has had the foot amputated.

Golden Hills Mine.—On the 8th January, 1912, H. O. Massey was seriously injured internally by a pipe in the B. and M. slime-tank.

WEST COAST DISTRICT.

MR. T. O. BISHOP, A.O.S.M., INSPECTOR OF MINES, REEFTON.

QUARTZ-MINING.

Marlborough.

Dominion Consolidated Development Company.—The development of this company's property in the Wakamarina Valley has proceeded satisfactorily during the year along the lines mentioned in the last report. A 25-stamp mill has been erected and equipped with jigs and Wilfley concentrators for dealing with scheelite, the whole plant being driven by water-power. The ore is transported from mine to mill by means of a self-acting incline tramway. In the mine the developments have been satisfactory, the reef opening up well as the levels are extended, and maintaining fair average value in gold and scheelite. The plant has been running for the last four months of the year, 3,500 tons having been treated, for a value of £1,839, or about 10s. 6d. per ton, from gold, and £3,259, being 18s. 7½d. per ton, from scheelite; total value per ton, £1 9s. 1½d. Owing to the very favourable situation of the mine for cheap working, this return should leave a satisfactory profit, and this company should soon be on the list of dividend-payers.

Jubilee Mine, Top Valley (Owners, the Wairau Valley Gold-mining Company).—The attempt to find the reef at a lower level in this mine has been carried on in a desultory fashion during part of the year, two men having been employed in driving a crosscut. The result of the year's work is absolutely nil.

Morayshire Scheelite Claim, Top Valley.—A reef 3 ft. wide, and carrying scheelite, was found in this claim, and at first appeared likely to prove valuable. A winze was sunk 30 ft., from which 2 tons of hand-picked scheelite was obtained. A drive was then started at a lower level, but here the reef has split up in leaders, and for the whole distance driven (180 ft.) is of no value. Prospects do not now appear to be favourable.

Nelson.

Golden Blocks Mine.—Development in this mine during the year has been confined to driving a level north and south from the bottom of the 90 ft. incline shaft, and very little has been added to the life of the mine. The battery has been kept running mainly on ore from the upper levels, but this supply is getting very small, and if the mine is to continue active more energetic development-work is needed. There does not appear to be any reason why the mine should not be opened out on a bigger scale, and have a long life in front of it. 1,229 tons was treated during the year, and yielded £6,761, an average of of £5 10s. per ton.

Mount Arthur Prospecting Syndicate.—Mr. Clouston rediscovered some small lenses of quartz on the Gordon Pyramid, and, as some of them carried a little free gold, some development-work was undertaken to prove their extent. A tunnel 400 ft. in length was driven underneath the line of outcrops, but failed to locate anything of any value, and work has been abandoned.

Lyell.

New Alpine Mine.—For the first six months of the year stoping operations were carried on from the small block of stone mentioned in last report as being discovered above No. 7 level in the foot-wall of the main reef. It was found that very little stone remained in this block, and that the value was less than had been expected. Work was abandoned in July, and since then this once well-known and productive mine has been entirely idle. It is stated that large bocks of ore remain underfoot in the lowest levels, and it is still possible that the property will be further tested by deep sinking.

Victory Mine.—Some little development-work was attempted in this old property by a Christchurch syndicate, and various outcrops of reefs in the New Creek Valley were also tested, but without any favourable results. The old Victory No. 2 level was cleaned out, and a winze sunk from it for 40 ft. on a small reef. Some fairly good assays were obtained, but, the reef being very small and the country very hard, it was not a payable proposition, and work was suspended at the beginning of the winter.

Westport.

Swastika Mines (formerly Red Queen Mine, Mokihinui).—This property is being further tested under a new name. On the steep hillside south of the Mokihinui River there are several small leaders in hard greywacke country which have been worked intermittently for many years, and have proved just about good enough to keep a working-party of men. About 100 ft. lower down the hill, and probably connected with these leaders, there is an outcrop of quartz about 20 ft. wide and 30 ft. deep, hard, glassy, bluish-looking quartz. A drive is being put in along the top of this mass, and some old drives on the leaders are being extended. Some small parcels of stone have been put through the battery. A sample of quartz carefully taken by me right across the face of the drive on the big reef on the 10th March, 1913, and representing a width of 5 ft., assayed 1 dwt. 7·4 gr. (value, 5s. 2½d.) gold per ton. The annual return furnished by the secretary to the syndicate, however, stated that the value of the small crushings taken from the leaders was about £2 5s. per ton. If the large outcrop was traced down the hill and opened out at two levels—say, 100 ft. and 200 ft. below the present drive on the cap—its value or otherwise could be easily and cheaply proved. The leaders do not appear likely to be of value, excepting, as in the past, to a party of working miners or tributers.

No other quartz-mining has been carried on in the Westport district during the year.

Capleston.

Just-in-Time Mine.—Driving north and south on the reef-track and crosscutting east and west therefrom at the 400 ft. level have been carried on during the whole year, with no result. A reef found outcropping on the surface near the north boundary of the claim was also sunk on, but proved unpayable. At present the north drive at the 400 ft. level is being extended.

Welcome and Fiery Cross Mines.—Although the Government offered a subsidy of £10,000 for deep sinking on this property, the owners (Messrs. W. J. Morris and others) failed to raise their proportion of the cost, and work was not started. A cancellation suit against them in the Warden's Court was successful.

Victoria Range Syndicate.—This party has let a contract for a low-level crosscut 2,000 ft. long to intersect several lines of reef on Victoria Range, and they hope to find the solid portion of the reef which was so much crushed and broken in the Kirwan's Reward Mine. There is a reasonable chance of success, and the drive is in solid and favourable country.

Reefton District.

New Big River Mine.—Stoping above the No. 10 level (1,575 ft.) has been carried on for the whole year, and the ore mined has been of high value, and very profitable. The only development of importance has been the sinking of a winze for 50 ft. below No. 10 level, and this has been in rich ore for the whole distance. On the surface a large new boiler, air-compressor, and winding-engine are in course of erection, and a new adit level is being driven to connect the mine with the timber and coal supply in Deep Creek. On completion of the new plant the main shaft will be deepened, and a new level opened up in the mine. Dividends for the year amounted to £15,600, or 13s. per share.

St. George Gold-mining Company.—The development of this property has proceeded continuously throughout the year, seven men being employed. Some small boulders of quartz have been struck in driving along the reef-track, but nothing of any value. The company has acquired an option over the adjoining Big River South property, and the drive will be continued north into this ground.

Cumberland Group of Mines, Merrijigs (Consolidated Goldfields Company, owners).—The Cumberland, Industry, and New Scotia Mines have been acquired by the above company, and six men have been employed in cleaning out some of the old tunnels during the year. The Cumberland yielded a small quantity of rich stone some years ago, and no doubt an attempt will be made by the present owners to find a continuation of the block.

Progress Mines.—This mine, together with the Blackwater and Wealth of Nations, was idle for eight months, owing to a labour dispute. Development in the mine was practically confined to the search for ore-bodies south of the main fault, which cuts off the reefs at No. 11 (1,420 ft.) level, and up to the present has not been successful in adding anything to the ore-reserves. An important discovery has been made of a conglomerate deposit situated between the mine and the battery, and though very little work has been done upon it, what has been accomplished shows it to contain a large amount of gold, and it can be mined and landed at the battery very cheaply indeed. This mine certainly contains possibilities for the future. There is a lot of low-grade ore in sight, and, taken with the deposit just mentioned, much of this may yet be worked at a profit. And taking into consideration the fact that no change of country has been met with, and that the huge ore-body of No. 11 level has been interrupted by a simple fault, there is a very fair hope that it will be picked up again by means of the work now in progress. The company also has considerable accumulation of valuable concentrates and slimes on hand.

Bonanza Claim (W. J. Morris and party).—An old tunnel on this property was cleaned out and retimbered for a length of 200 ft. There is a small stringer of quartz showing in places in the tunnel, but the face is blank, and there is no encouragement to continue driving at this point. No work has been done since the end of July.

New Discovery (W. O. Bierwirth, owner).—No further development-work has been done in this claim. A small crushing of 9 tons was taken from the leader, and yielded gold to the value of £64. Work is stopped at present.

Keep-it-Dark Mine.—Early in the year the reef was struck in No. 8 level, and for the year's work has yielded 10,180 tons of ore. Development, consisting of driving at Nos. 7 and 8 levels and sinking

below No. 8, has been in progress continuously, and the winze below No. 8 has been in a strong ore-body of payable value for the whole distance sunk—viz., 64 ft. Prospects for the next level appear to be good.

Wealth-of-Nations Mine.—The main shaft at this property was sunk for another level (the 12th, at 1,990 ft.) during the year, but no further development at this level has been started. The ore-reserves have not been added to by any new discoveries, and the year's operations have absorbed 10,936 tons from the stopes above No. 10 level.

Golden Fleece Mine (Consolidated Goldfields).—No work has been done during the year.

Bolitho Bros.' Cement Claim, Lankey's Creek.—This party has been steadily at work during the year, mining and treating conglomerate. There is nothing new to report upon in connection with their work. The mine continues a good working-man's property.

Murray Creek Gold-mines.—Development-work has been in active progress during the year. The surface plant has been completed, the main shaft sunk for two levels, and driving for the reef is now being pushed on. If the Phœnix, Victoria, and Inglewood reefs are struck as good as they were in the upper levels this will be a good mine, and there is no apparent reason why they should not live to a considerable depth.

Anderson's Reef.—Willis and party are still driving the crosscut from Black's Point Road. They expect to strike Anderson's reef in about 500 ft. farther, having now driven 630 ft.

New Ulster Mine.—A little prospecting has been done during the year, with no result.

Russel and Dillon.—A small syndicate has taken up these old workings, and two men have been employed in driving on the reef-track to the north of former workings. Nothing of value has been discovered so far.

Blackwater District.

Blackwater Mines.—This mine was idle for eight months, owing to a labour dispute, and consequently there is very little to report for the year. Development is well ahead of the battery requirements, and the main shaft is down far enough for two more levels—No. 5, at 765 ft., and No. 6, at 915 ft.—neither of which has yet been started. The reef is small, being an average of about 1 ft. 11 in. stoping-width, but makes up somewhat by length, being practically a continuous ore-body for 2,000 ft. The present appearances are very favourable.

Millerton Mine.—The Millerton Syndicate, Messrs. Danks and Morgan, having carried on prospecting operations on their claim in Snowy Creek for the greater part of the year, have now sold out to the Millerton Gold-mining Company (Limited). The reef discovered on the property runs from a few inches up to 4 ft. in width, and has been driven on for 280 ft. For the first 30 ft. from the mouth of the drive the reef is 2 ft. wide, and of payable value. From 30 ft. to 252 ft. the reef is of low grade and somewhat crushed, and does not carry much quartz. For the last 28 ft. it improves again, and gradually widens to 3 ft. of solid quartz, having an assay value of 2 oz. gold per ton. It will thus be seen that there are two shoots of gold in the 280 ft. of reef driven on, the first 30 ft. in length, and the second 28 ft. and still continuing. As the present tunnel is the lowest water-free level that can be obtained, and does not give more than 100 ft. of backs, sinking will be necessary very early in the mine's history; in fact, whether it can ever become a profitable mine depends entirely on the result of sinking. Up to the present time only one winze has been put down, and that was started on the shoot of gold at the tunnel-mouth, and was stopped at 30 ft.

Blackwater South (Absalom and party).—Prospecting has been continued on the No. 2 line of reef during the year, but without giving any favourable result. The reef-track continues ill-defined, and has never carried more than a few boulders of quartz.

Empire and Snowy Creek Leases.—The Blackwater Mines Company did some driving on these claims, following in each case small and broken reefs. Work has been suspended for the present.

Rise and Shine Syndicate (Donald McDonald and party).—In this property the reef still continues small and broken, and nothing of a payable character has been disclosed during the year.

Saraty Syndicate.—This party holds several prospecting-areas north and south of the Blackwater Creek, and they have discovered several separate and distinct quartz reefs on the surface, but none which contain more than 2 dwt. of gold per ton.

The Eldorado Syndicate and D. A. McVicar and party have ceased work on their prospecting-areas, the reefs driven on proving small and unpayable.

Paparoa Ranges.

Some surface prospecting has been carried on during the year, but without any important results. The Crœsus, Minerva, and Garden Gully Mines have been idle for the whole period.

QUARTZ REEFS CONTAINING MINERALS OTHER THAN GOLD.

Wangapeka District.

In the Wangapeka Valley there are numerous outcrops of quartz reefs which contain small quantities of galena, and some prospecting-work has been done on these during the past three years by Christchurch and Nelson syndicates. Up to the present none of the finds have contained a sufficient proportion of ore to be worth developing as silver-lead mines, but at the same time there are indications that rich pockets of ore may be found, and prospecting is warranted.

Mount Owen District.

Rising Sun Mineral Company.—This company, with a nominal capital of £120,000 and a working capital of £10,000, has been in existence during the past two years. The sum of £3,000 has been called

up by the directors, and work which might be valued at £300 has been done on the property. The outcrop which the company proposes to develop is a mass of quartz occurring between the calcareous slates and the crystalline limestone on Mount Owen. In places it contains little bunches of galena, and small clean samples of this mineral may be obtained, but the bulk of the quartz does not contain more than one or two units in lead, and certainly is of absolutely no value as a mining proposition. Speaking from a geological point of view, the locality is highly interesting, and, like the Wangapeka district, may be worth further prospecting.

Mount Radiant.

Preparations are being made to test some of the copper-bearing quartz reefs in this district. The occurrence of the deposits has been fully dealt with in the Geological Survey Bulletin on the Karamea Subdivision, and up to the present the prospecting operations have not disclosed any further information.

Parapara Iron Leases.

On the Cadman iron lease, of 920 acres, nine men have been employed during the year in driving prospecting-tunnels and in stripping the iron-ore deposit by hydraulic sluicing. The four drives put in have a total length of 1,878 ft. These drives were sampled by the writer for analysis at the Dominion Laboratory, and the average result from all samples taken gave 45·02 per cent. of metallic iron, 0·13 per cent. phosphorus, and 0·075 per cent. sulphur.

On the Onakaka lease, of 860 acres, the only work done for the year was to break out and ship a small lot of 2 tons of ore for a smelter trial.

Scheelite.

This mineral, as above mentioned, is found along with gold in the Dominion Consolidated Company's mine at Deep Creek, Marlborough. 33 tons 7 cwt. of concentrates was shipped for the year, the value being £3,259 sterling.

ALLUVIAL-GOLD MINING.

The following hydraulic-sluicing and dredging companies have carried on active mining during the year:—

Marlborough.

Brothers Claim (Larkin and party).—Work has been intermittently carried on during the year, with very poor results. The water-supply is quite inadequate for the height the elevator is required to raise the wash, and unless the quantity can be increased in some way this proposition is doomed to failure.

Wakamarina - Darkies' Terrace Hydraulic-sluicing Company (Limited).—This company has taken over the property of Messrs. Nelson and Mayo at Deep Creek. An improved water-supply of about twelve heads of water has been brought in through three miles of race, and at the nozzle is under a head of 200 ft. Unfortunately, the tail-race tunnel is driven too high, and to enable the bottom to be cleaned up the last few feet of the wash has to be elevated. The result of the operations so far should give a margin of profit over working-expenses.

New King Solomon Mines, Mahakipawa.—A syndicate has acquired rights over the Cullensville Flat, and the old shafts are to be unwatered for the purpose of further prospecting. Three men have been employed during the year, but pumping has not yet been commenced.

Collingwood District.

Parapara Hydraulic-sluicing and Mining Company (Limited).—Eleven men have been employed during the year. The wash was followed down in one paddock to a depth of 110 ft., and the hydraulic elevator was raising wash this height in one lift, which proved to be about the limit of its capacity with the available pressure of 350 ft. A fresh paddock is now being opened up. In spite of most careful and economical working, this claim barely manages to pay the running-expenses.

Aorere Hydraulic-sluicing Company, Slate River.—This company has persevered to make a profit out of sluicing very low-grade material. Five men were employed during the greater part of 1912, but as it became necessary to open up a fresh sluicing face, and the year's operations had resulted in a loss, work was suspended in December.

Maruia District.

Walker's Maruia Sluicing Company (Limited).—This claim has been worked on tribute by Dwan Bros.

Thompson Maruia Sluicing Company.—A water-race nine miles and a quarter long, and capable of carrying thirty sluice heads of water, is in course of construction. The ground to be worked is of a light drift character, and has every appearance of being low grade.

Rappahannoc Amalgamated.—This claim was idle during most of the year. It is a driving proposition, and shows very good prospects, but has been very badly handled. A party of experienced practical miners would probably make it a very payable little mine.

Matakitaki District.

The *Horse Terrace Claim*, formerly the property of a Nelson company, which under the company's management proved a rank failure, is now giving handsome returns to the present owners. Four men have been constantly employed for the year.

Hunter's Claim, Horse Terrace.—This claim has been worked on tribute by Chinamen.

Mammoth Claim.—On this claim, the property of a Nelson company, a little prospecting has been done, but no actual sluicing for the year.

Buller River.

One or two small parties are still making a living by working small terraces along the Buller Valley, but no work of any importance is now going on.

Fairdown.

Carthage Gold-mines (Limited).—This company claims to be making a profit out of hydraulic elevating a black-sand lead on the flat between the railway and the sea at Fairdown. No dividends, however, have yet been declared.

Addison's Flat.

Shamrock Claim, Westland Gold-mining Syndicate.—Eight men have been employed during the year in development. Actual mining should commence early in the new year.

Milliken and party (Cement-crushing and sluicing).—Four working shareholders are the holders of this property, and continue profitable operations.

McCann and party, Carmody and party, and *McKnight and party* have been sluicing as usual throughout the year, fourteen men being employed at the three claims.

Grey Valley.

Several small parties of two men each continue to make good wages in the creeks which flow into the Grey River, but very little work of any magnitude is going on.

Donnellan Bros., at Gow's Creek, are working the creek-bed by sluicing and elevating, and the claim gives profitable employment for three men.

The *Gow's Creek Sluicing Company* has at present six men employed in opening up in the said creek above Donnellan Bros. Actual sluicing has not yet started.

The *Healey's Gully Company* has had six men employed in sluicing, with very poor results.

Aynsley Bros., sluicing at Goat Terrace, near Blackball, have found profitable employment for three men for the year.

DREDGING.

Hessey, Cameron, Tacon (Limited) continue dredging at Boatman's Creek, in the Reefton district. Twelve men are employed. The plant is kept in good order and repair, and has paid very fair interest on the capital involved.

The *Hessey-Cameron No. 7 Dredge*, Frying Pan Creek, has been running for the year, and has employed eleven men. It is kept in good repair, and regulations are complied with.

The *Slab Hut Creek Dredge* has worked only a portion of the year, and has given disappointing returns. It is too small for the ground to be worked, and is in very bad repair.

The *Worksop Gold-dredging Company*, Antonio's Flat, has had a most successful year's work, having paid £8,400 in dividends. Eleven men are employed, the machine is kept in first-class condition, and the regulations are complied with.

The *Blackwater River Gold-dredging Company* has had a fairly successful year's work, having paid in dividends £947 10s., bringing the total up to £12,791 5s.

The *Red Jack's Gold-dredging Company* is now erecting the old Nelson Creek dredge on a claim at Red Jack's. Dredging will commence early in the new year.

The *General French Claim, Eureka Gold-dredging Company*, have placed the old Moonlight dredge on a claim farther down Moonlight Creek. For the short period the dredge has been at work the returns are said to be satisfactory.

The *New Trafalgar Dredging Company*, having gone into liquidation, has been taken over by a small syndicate on tribute.

The *Pactolus Dredge*, Nelson Creek, has had a steady run for the year, and has paid in dividends £2,500, making the total £65,000. The machine is kept in good order, and the regulations are complied with.

No Town Creek Dredge.—The claim was worked out early in the year, and the company wound up after having paid £34,800 in dividends.

Buller River.

The last two dredges on the Buller River—viz, the Smeaton Syndicate's machine and the Old Diggings—both having proved unprofitable, ceased work early in the year.

GENERAL REMARKS.

Quartz-mining.

The only new developments of importance during the year have been the successful opening of the gold-scheelite mine of the Dominion Consolidated Company at Wakamarina, and the favourable-looking reef prospected by Messrs. Danks and Morgan in the Blackwater district. A fairly large amount of prospecting-work has been in progress throughout the district, but nothing of importance has so far been discovered.

The Reefton district has suffered very much on account of the labour dispute, which kept the three largest mines idle for eight months, and, although the mines resumed work during November, it will take some time to bring them up to standard condition again.

A most encouraging sign for the future is that at the greatest depths yet attained in any of the mines there is as large a proportion of free gold as there was in the upper levels; and there has been no change of country in depth.

With one or two exceptions, mine-managers throughout the field have shown a willingness to comply with the Mining Regulations, but there is still much room for improvement in the ventilation of the deep mines, in all of which only the bare standard quantity of air required by law is maintained. There is not a mechanical ventilator in use in the whole Reefton district, and in this respect the managers are displaying a lamentable ignorance of the best modern mining practice.

The contract system of stoping is now being given a trial, and while some of the old mine-managers are of opinion that it will not be successful in the very heavy ground, the experiment will be watched with interest.

A large number of minor accidents have been reported, but few serious ones, and none fatal.

Payments under the Gold-miners' Relief Fund have amounted for minor accidents to £141 8s. 5d.; and for total incapacity owing to miners' disease, £350, while two widows whose husbands died of this disease received the sum of £50 each, with £12 and £20 funeral expenses respectively. Authorities on the subject of this complaint are all agreed that the chief causes thereof are the inhalation of dust-particles and the continued breathing of humid and vitiated air. Since the general introduction of machine drills, the use of water-sprays while drilling is in progress is a step towards the removal of the first cause, but there is still room for improvement in this respect by extending the use of water so that no material shall be handled in a dry state however it may have been broken, and that there shall be no dust allowed to accumulate in travelling-ways. No attempt to provide miners with an ample supply of cool fresh air has yet been made, and, as mentioned above, even the deepest mines (from 1,200 ft. to 2,000 ft.) are still solely dependent on the out-of-date, unreliable, and generally unsatisfactory method of natural ventilation, poor at the best, and varying with every variation of the weather. The gold-mining industry has paid the sum of £482 on account of miners' disease during the year, and it is certain that it has lost more than this in the low standard of work attained by men who are not physically fit. Yet, while other fields in the Dominion and every other mining country have adopted modern and efficient methods of ventilation, the Reefton district lags behind, and the results are seen in the prevalence of miners' disease, a low standard of work, and a widespread feeling of dissatisfaction on the part of employees.

Alluvial Mining.

Alluvial mining is slowly becoming a past industry, the more accessible and easily worked deposits having become exhausted. There are still, however, considerable possibilities in some of the immense low-grade deposits on the West Coast. These will undoubtedly be worked on a large scale some day, as there is in nearly every case ample water-supply available. The expenditure of a large amount of capital will be required, but the deposits are so large and the gold-contents apparently so regular that there is every reason to believe that a profitable industry will result.

ACCIDENTS.

Fatal.

18th March—At Smeaton Syndicate's dredge, George Roberts, engineer, was caught in the elevator-shaft, and killed.

Serious.

15th July—At the Keep-it-Dark Mine, James Ulrich, miner, had small bone of ankle broken by a fall of stone.

12th January—At the Progress Mine, James Wicken, miner, had ribs broken and received bruises by a fall of stone.

Mr. A. H. Richards, Inspector of Mines, Hokitika.

PETROLEUM.

The *Kotuku Oilfields (Limited)*, during the year, installed a large drill, which, after three months' trial, was transported elsewhere, as it was found to be too heavy for local requirements. Boring operations have not been resumed upon this property, which is situated near Lake Brunner.

QUARTZ-MINING.

Poerua District.

Poerua Gold-mining Company.—The operations of this company were confined to the development of their mine, consisting of crosscutting, driving, rising, and sinking on the lode. I found during my inspection that the timbering and ventilation of the mine were satisfactory. There is now being installed a treatment plant consisting of a ten-stamp mill, two Fraser grinding-pans, and one berdan, together with a cyanide plant. The whole of this machinery will be driven by water-power.

Wilberforce District.

Owing to the inclemency of the weather work during the early part of the year was rendered impossible, as these claims are situated towards the summit of the Southern Alps, near Browning's Pass. No mining operations have been carried out subsequently.

South Westland.

Alluvial mining is almost abandoned on the South Westland beaches. Only a few aged men and Maoris occasionally work the beach sands when circumstances permit.

Five-mile Beach Claim, near Okarito.—It is at last proposed to rework the Five-mile Beach leads, which in the early days of mining on the West Coast proved very remunerative. The present owners of this claim propose to erect a suction dredge, equipped with centrifugal pumps by Thompson, of Castlemaine, which should render available ground hitherto unattainable by the primitive and earlier methods of mining.

Ross.

Mont d'Or Gold-mining Company.—This company produced gold to the value of £4,665, and declared dividends amounting to £2,400. For many years this mine has been a constant dividend producer.

Ross Goldfields (Reconstructed) (Limited).—On this company resuming operations after its reconstruction the water-race and power plant were thoroughly overhauled. Pumping by electrically driven turbo-centrifugal pumps then commenced, and the mine was unwatered, and the workings found in good order. Unfortunately, however, there have since been three stoppages of operations caused by failure of the electrical current, two of which were due to fusing in the transmission-line, and the other to a breakaway on the water-race above the power-house. There is now being installed a Diesel engine for the purpose of duplicating the power plant, which will obviate stoppage of pumping and winding operations in the mine in future in the event of a breakdown of the electrical power. Drives at the No. 6 level are at present being carried in the direction of the old Cassius mine-workings, and from these drives horizontal boreholes are being drilled in advance, to guard against inundation of water which may be lodged in such old workings. Watertight doors have also been installed for use in case of emergency. This necessary work is being carried out under strict supervision, as no accurate plans exist of much of the old workings on Ross Flat, in which water may be impounded.

Lake Mahinapua Gold-mining Company.—The operations of this company have been much restricted owing to inadequate water for their elevating plant. This company are working, by hydraulic sluicing and elevating, the Aylmer lead, which was formerly in places found by the early miners to be fairly rich. It is now proposed to thoroughly prospect this lead over an extensive area, and, if successful, to work the same by centrifugal sand-pumps.

Rimu and Back Creek.

About thirty claims employ from two to six men each, who are at present obtaining fairly successful returns by hydraulic sluicing. The absence of a continuous supply of water is much felt in this locality.

Kanieri Forks.

Two small parties of miners and a few old men are employed sluicing and prospecting in this once well-known mining field.

Kanieri.

Seven parties of miners are engaged upon this field. The majority, however, have only met with moderate success during 1912. During the year a Government Keystone drill was employed at testing one of the claims, the results of which were satisfactory.

Hokitika.

D. Lincoln and party have been operating the old Montezuma ground, after installation of a Kershaw steam-driven centrifugal pump of limited capacity for elevating the material. As a result of experiments made with this type of pump on the black sands of this district, a considerable area elsewhere has been taken up for the purpose of working by this, for the West Coast, somewhat novel method of mining, which is successfully employed in Victoria and elsewhere.

The *Blue Spur and Hau Hau Claim* still continues to be profitably worked on a small scale.

The *Humphries Gully Claim*, owned by the Consolidated Goldfields (Limited), has been let on tribute. The material raised is of low grade. It is hoped, however, by further development to obtain better results.

Stafford and Goldsborough.

About twelve parties of miners, by the aid of water from the Government races, are enabled to work with considerable profit upon new ground in this hitherto productive mining field.

Callaghan's.

Four sluicing parties have been profitably engaged during the year, with the assistance of water from the Government water-races.

Red Jack's.

Three parties of miners have here been employed profitably during the year.

Dillman's and Larrikins.

At Dillman's and Larrikins three parties of miners have been engaged, only one of which, however, has obtained adequately remunerative results.

Cape Terrace.

Four parties have been operating, with moderate results owing to shortage of water. In this locality there appears to be a considerable quantity of unworked ground of somewhat low grade, but with a copious water-supply this ground would be payable.

Westbrook.

Since the Government Kumara Water-race has been extended to this field there has been a considerable revival in mining. Six parties of miners are engaged at sluicing or upon the development of their claims.

Barrytown.

The *Barrytown Flat Elevating Claim* continues to find profitable employment for thirteen men. A new plant has been installed.

GOLD-MINERS' RELIEF FUND.

During the year nine applications were dealt with under the Gold-miners' Relief Fund, and certificates issued totalling £20 on account of minor accidents.

ACCIDENTS.

I have pleasure in stating that there have been no serious or fatal accidents in my inspection district during the past year.

SOUTHERN DISTRICT.

MR. THOMAS THOMSON, INSPECTOR OF MINES, DUNEDIN.

QUARTZ-MINES.

Barewood Gold-mining Company (Limited), Barewood.—This mine continues idle. The property is held under option, and it is problematical if it will materialize into any useful work. No mining-work has been done during the year.

A. C. Buckland and Ewart.—The property being prospected by this party is located some three miles from the Barewood Railway-station, and is 100 acres in extent. A good amount of surface trenching has been done along the line of reef, and what is termed a good surface-showing of scheelite disclosed. The reef varies from 4 ft. to 1 ft. in width. A low level is being put in, which will give 100 ft. of backs, and determine the permanency or otherwise of the lode. The proposition is under option to a syndicate.

Mount Highlay Gold and Scheelite Mining Company, Hyde.—Work was resumed at this mine towards the end of the year, after having been stopped for over twelve months. The owners gave an option to a Christchurch syndicate, and six men were immediately started to work. Two prospecting-levels are being put in, but are not yet sufficiently advanced to cut the lode.

Highlay Tungsten-mine, Mount Highlay (the Gold and Scheelite Proprietary Company (Limited), owners).—Operations are now confined to Gilmour's reef. A tram-line has been constructed 25 chains in length to convey the stone to the battery. The reef is 5 ft. in width, and lying very flat. The country in the immediate vicinity has the appearance of being much faulted.

Macrae's.

Maritana Mining Company (gold and scheelite).—A large amount of development-work was carried out by the company. No. 3 level was put in and opened up 100 ft. block below No. 2, and the three levels are connected at intervals, securing good ventilation. The stopes will require careful timbering. The ten-stamp battery was completed, and has commenced crushing. Eleven men are employed at the mine and mill. 1,290 tons of quartz was treated, yielding 23 oz. 12 dwt. 1 gr. of gold and 2 tons 6 cwt. scheelite concentrates, of a total value of £245 16s. 6d.

Golden Point Quartz-mine (the Gold and Scheelite Proprietary Company, Limited).—Development has continued on the three separate reefs, the main battery supply coming from No. 1, No. 3, and Home levels. The Round Hill section is being opened up at the south end of the claim. Two levels are in progress to test the reef outcropping in this part of the property. Difficulty is still being experienced in the recovery of the scheelite. Preparations are being made to install a roasting-furnace and a magnetic separator. It is considered by roasting to render the pyrites in the concentrates magnetic and then remove them from the scheelite by magnetic separation. The scheelite concentrates can then be raised to a sufficiently high percentage (WO_3) to command a reasonable price. The pyritic contents are also valuable in gold, and can be shipped for treatment. The quantity of ore produced for the year was 11,779 tons, and returned 1,129oz. 2 dwt. gold and 10 tons 5 cwt. scheelite, a total value of £5,317 6s. 7d. Twenty men are employed in the mine.

Golden Ridge Mining Company (previously known as the Goldfinch).—This property was acquired by the Golden Ridge Company during the year. The previous owners (White and party) mined and treated for the year up till the time of the sale 368 tons, for a return of 91 oz. 18 dwt., valued at £312 12s. 9d. This ore was mainly obtained from very shallow workings. The new owners have commenced driving a level to cut the reef-system at some depth, giving a supply of backs, 150 ft. having been driven. A cyanide plant is to be added to the reduction-works.

Golden Bar Quartz-mine.—Work has been fairly actively carried on at this mine. The old five-stamp battery on the ground before the claim was taken up by this company has been all remodelled, and an oil-engine installed for driving purposes. The ore is being obtained from opencast workings on the outcrop of the reef. Six men are employed, and 536 tons of ore has been treated, yielding 36 oz. 13 dwt. gold and 1 ton 14 cwt. scheelite, total value £302 5s. 5d.

Deep Dell Mining Company.—This company's property adjoins the Maritana Mining Company's claim. A large outcrop of a flat reef is to be seen, and a little prospecting-work has been done. The

ore is considered of a payable grade, and a site is being cut for the erection of a five-stamp mill. A level is being driven to intersect the lode and open up communication with the mine and battery.

Keep-it-Dark Mining Syndicate.—Prospecting is conducted on this property, adjoining the Golden Point lease. A winze 30 ft. in depth was sunk and a reef 3 ft. wide was cut, showing high scheelite value.

Griffin's Claim.—Sinking winze. Claim about a mile from Macrae's Township. Two men employed. 14 tons carted to Golden Point for treatment returned 2 tons 10 cwt. scheelite concentrates, realizing £210 10s.

Forbes Mining Syndicate, Stoneburn.—An area of 171 acres 1 rood 3 perches is held by this company at Stoneburn, seven miles from Dunback. Extensive prospecting has been carried out. 2,000 ft. of driving has been done on various lodes, which vary in width from 3 ft. to 6 ft. at slight inclination. The prospecting and developing results are thought by the owners to warrant the erection of a ten-stamp mill. Steps are being taken to form a company to carry out the work. Five tons and a half of hand-picked scheelite, valued at £440, was obtained during development. The value is gold and scheelite. Six men have been employed on an average throughout the year.

Nenthorn.

Wealth-of-Nations (Stanley and party).—This claim is located on the east side of Deighton Creek, Nenthorn. A drive has been commenced, and is expected to cut a reef in 200 ft. of driving. The prospects are considered good.

Waipori.

The various reefs in this district were not worked during the year.

Bald Hill Flat.

Advance Mine, Obelisk Range.—The face of the range where the mine is located is very much broken, and considerable movement has taken place, rendering the permanent location of the reef in solid country very difficult to determine. Prospecting has been vigorously carried on, and a large cut sluiced out in the face of the hill, and an outcrop of crushed quartz disclosed. This is now being driven on, and the dirt saved for treatment. The drive is extended 46 ft., and, although the country still appears a slip, it is hoped the present discovery will give some indication as to the position of the lode in the solid. Two men employed.

Bannockburn.

Carrick Gold-mining Company.—Development has been conducted on the two reefs existing on the property. A low-level tunnel has been commenced some 200 ft. below the present workings, and is driven 65 ft., requiring about 200 ft. to cut the Royal Standard reef. The battery has been run intermittently when ore was available for treatment, the main supply being drawn from two stopes—one in the Royal Standard and one in the White Horse reef. The average widths of the reefs is 2 ft. 6 in. Only a small tonnage of oxidized ore has been treated. Twenty-three men are employed.

Star-of-the-East Gold-mining Company.—This property, situated near the top of the Carrick Range, was worked many years ago. The present owners have opened up one of the old surface levels, and commenced to develop the outcrop of the reef. A battery of ten stamps (steam-driven) has been repaired, and the quartz coming from the opencut workings is being treated. The reef is soft and mullocky, containing broken fragments of quartz, and is upwards of 3 ft. wide. Four men employed.

Evans and Ledingham's Quartz-mine.—In the drive on the reef from the outcrop to the south a slide was met with, completely cutting out the reef. During the winter months a prospecting-drive was put in to pick up the reef on the other side of the slide, and although it was continued for a considerable distance it failed to locate the lode. 125 tons was treated, for a return of 78 oz. 6 dwt., valued at £374 1s.

Cromwell.

Cromwell Gold-mines Development Company.—Work in the low-level tunnel being driven on this property was discontinued early in the year, the face being in 650 ft., out of a total distance of over 2,000 ft. required to drain the old workings of the Bendigo Mine. The property was sold by auction, and was bought in by the owners.

Alto Mining Syndicate.—This syndicate has taken up an area of 19 acres included in the original Alto mining property at Bendigo. Operations are being conducted on a parallel leader adjacent to the Alto reef. A shaft has been sunk, at the bottom of which the reef is showing 1 ft. in width, and carrying good prospects in gold. The battery originally belonging to a defunct company has been purchased by the syndicate, and an aerial tramway is in course of erection to convey the ore to the mill.

Macetown.

New Zealand Consolidated Mines (Limited).—Mining was again commenced on this company's property towards the end of the year. A rise is being put up from the new low level to what was the old company's low level. The distance through is 210 ft.; 193 ft. is completed. Ventilation is provided by a small fan. A winze has also been sunk 28 ft. below the new low level, and preparations are being made to commence an underhand stope. Work has also been commenced at the All Nations section of the property, and an aerial tramway completed. Fourteen men are employed.

Shotover.

An area has been taken up on the Shotover Consolidated line of reef by Paulin and Trip. Some payable stone in small quantity was obtained.

Glenorchy.

Glenorchy Scheelite-mining Company (Limited).—Glenorchy lode: No. 3 level has been extended 220 ft. (total length, 807 ft.), and the presence of scheelite-bearing ore there settles the doubt as to whether scheelite lived much below the outcrop. Stopes from No. 3 and No. 7 levels produced most of the ore sent to the mill. Twelve men employed. Treatment plant: 514 tons of scheelite-ore was treated, for a return of 80 tons 8 cwt. concentrate (70 per cent. WO_3), estimated value, £7,500. Junction lode: Only a few tons of ore was removed for treatment. During the later part of the year the adjoining property (Bonnie Jean) was acquired, and since then five men have been employed upon development. The treatment plant was also put in order, and would start treating ore in January, 1913.

Six parties are carrying on work on the ranges on both sides of the Buckleburn Creek, at an altitude of up to 5,000 ft. The belt of scheelite-bearing country is very extensive in this district, and the returns obtained are good for the amount of work accomplished and the shortness of the season during which operations can be carried on. The work so far has only been at shallow depths.

A total of forty men find employment in the scheelite industry in the Glenorchy district, and it is capable of great expansion.

Southland.

Morning Star Gold-mining Company, Preservation Inlet.—The No. 4 or low-level tunnel, 115 ft. below any of the previous workings, was extended along the southerly strike for some distance. Driving was discontinued in a large body of ore up to 20 ft. in width. A trial crushing was taken out and treated, the result being very disappointing, 50 tons yielding 3 oz. of gold, valued at £11 11s. 8d. Six men were employed.

The other mines in the district were not worked during the year.

HYDRAULIC SLUICING AND ELEVATING.

This branch of mining was conducted under more favourable conditions than those obtaining the previous year. Rain has fallen more generally throughout the Southern District. The industry has not expanded in any noticeable degree, but the existing plants have had a more continuous run, the enforced idleness due to lack of water-supply not being of such long duration as was the experience in several previous years. The very low grade of some of the material treated profitably is a marked feature. One hundred and sixty elevating and sluicing plants were worked, providing employment for 670 men. A brief report of the more extensive mines follows.

Tuapeka.

Blue Spur and Gabriel's Gully Consolidated Gold Company (Limited), Blue Spur.—All the mining rights held by this company were sold by auction last October to satisfy the mortgagees' claims, and the lot was purchased by the Gabriel Gully Sluicing Company for the sum of £3,600. The property originally cost the company £115,000, and consisted of valuable water rights, miles of races, several dams, and thousands of feet of pipes. It is to be worked in conjunction with the purchaser's adjoining property.

Golden Rise Sluicing Company, Wetherstones.—Operations are being conducted in the terrace known as Ballarat Hill, where an overburden to the extent of 70 ft. has to be contended with. The ground has all previously been driven out by the early miners, but apparently sufficient gold remains to enable the company to carry on profitably. The water-supply comes from a dam at Malone's Flat. Five heads are required to work the plant, and the available static head is 300 ft.

Golden Crescent Sluicing Company, Wetherstones.—This company is now working the cement deposit at the site of the old Wetherstones cement battery. The bulk of the cement is very friable, owing to having settled down over the old workings where the ground was taken out by the Battery Company. In the solid portions of the face it is very firm, and the fact that the company are enabled to bring the water to act at a high pressure alone makes the treatment possible without the use of explosives. The water-supply is brought in across the Waipori River at an altitude of 700 ft. above the claim. The elevator has a lift of 75 ft. vertical, and works well with a jet $1\frac{7}{8}$ in. in diameter.

Gabriel Gully Sluicing Company, Blue Spur.—Work for some years has been carried on in the gully below the Blue Spur property. The face averages 20 ft. in height, and the material is hydraulic-elevated 30 ft. by water, having a static head of 350 ft. This company have purchased the Blue Spur property, and contemplates alterations in the method of working to allow of the two claims being operated conjointly.

Waipori.

Bakery Flat Gold-mining Company.—Work has been commenced below the last paddock—only partially cleaned up—at the lower end of the claim. The pipe-mains had to be removed to command this portion of the claim. The anticipated depth of the ground is 100 ft. Two separate lifts, one below the other, are to be employed, and the estimated water-consumption when in full work is eighteen heads.

Lammerlaw Flat Hydraulic Mining Company.—This company works to the false bottom, an average depth of 20 ft., being unable to reach the main bottom with the power available. Automatic nozzle-operators are in use. Gold-production decreased by £552 from the previous year. Five other plants are at work in the district, the faces varying from 12 ft. to 100 ft. in height.

Waitahuna.

Norwegian Hydraulic Sluicing and Elevating Company, Waitahuna.—This party fortunately possess a good water-supply, and have commenced operations in the cement depo it, which rests on a schist bottom dipping at an inclination of 23° east from the horizontal. Previous prospecting has proved that a considerable depth will have to be sunk before the gutter is reached. Elevating is proceeding from a depth of 50 ft. under a water-head of 300 ft. The cement is broken up by blasting previous to being sluiced into the elevator. Light for night work is supplied by a modern electric-light installation, water-driven.

Sailors Gully Sluicing Company, Waitahuna.—Operations are conducted in the cement formation, dipping in this claim at an angle of 30° east from the horizontal. The face is 60 ft., and elevating is necessary from a depth of 30 ft. The working of this cement proving payable gives to mining a permanency in this district not previously anticipated.

Three other plants are worked in the district.

Island Block.

Island Block Dredging and Sluicing Company.—After opening out a large paddock 50 ft. in depth work was suspended, due chiefly to the defective state of the pressure pipe-line. It was necessary to lift 68 ft. to provide a clearance for tailing, and with a large percentage of pressure lost on the main line the work was slow and difficult. The plant was removed to the opposite side of the river to try a paddock there.

A considerable area yet remains to be worked in the Island Block Claim, but more efficient plant is necessary to work it successfully.

Roxburgh.

Amalgamated Gold-mining Company.—An area of 3½ acres, of an average depth of 40 ft., has been treated for the year, with thirty-five heads of water at a head of 450 ft. The bottom worked to is coal and clay. Twelve men employed.

Ladysmith Gold-mining Company.—About 5 acres, of an average depth of 65 ft., was dealt with. The ground is very rough in places. Eight men employed.

Commissioners Flat.—The ground is rougher here than in any of the other claims in the district. Being a low-pressure proposition, work has often to be suspended owing to the level of the Molyneaux being higher than the bottom worked to, and no water available at suitable pressure for pumping.

Teviot Molyneaux Gold-mining Company.—Active construction-works have been commenced on this property. Water is being brought in from the Teviot River to operate at White's and Anderson's Flats. The undertaking, though extensive, presents no engineering difficulties. When completed the plant will be both extensive and modern.

Galloway.

Little Valley Sluicing Company.—Race-work was completed and water brought on to the claim at the end of the year. Sluicing operations were commenced, but it is understood the prospects were not too encouraging.

Cromwell.

Roaring Meg.—Ballingall and Paton are making preparations to work ground located at the junction of the Plank Creek and Roaring Meg. Plant has been purchased from the Quartz Reef Point Company now defunct, and is in course of transit to the mine. Three miles of race has been constructed, and 300 ft. of pressure is available. The anticipated depth of the ground is 35 ft.

Luggate.

The New Luggate Hydraulic-sluicing Company went into liquidation, and the property was purchased by the Galtee More Mining Syndicate. Six men are employed, and the average depth of the ground is 35 ft.

Arrow River.

Arrow Falls Sluicing Company.—The new owners have continued operations on the same lines as the old company. Work is going on in the bed of the Arrow River.

Baird Mining Syndicate.—Prospecting operations are proceeding on that stretch of country extending from Arrow to Crown Terrace. The water belonging to the defunct New Arrow Gold-mining Company was purchased by the syndicate, and commands the ground.

Arrowtown.

Shamrock Sluicing Company.—The material sluiced is very low grade. The result of the year's work was 170 oz. 5 dwt., valued at £662 5s. With a larger volume of water and greater pressure the claim would be highly payable. Face, 100 ft.

Macetown.

Macetown Sluicing Company.—Face, 60 ft.; pressure, 150 ft.

Shotover.

Forty men find employment mining in the bed and terraces of the river, and produced last year 1,600 oz. of gold.

Deep Creek Gold-mining Syndicate.—The company's plant has been moved to work a river-beach. The removal necessitated race-continuation and the erection of 2,000 ft. siphon.

Hazel Terrace (Ward Bros.).—This party have opened an alluvial terrace at the branches (Upper Shotover). Hydraulic mining equipment, consisting of 1,100 ft. of 9 in. pipes and accessories, has been taken on to the claim. A mile and a quarter of race is constructed. The ground has been previously worked to a false bottom.

Three other large claims are worked at Skipper's.

Cardrona.

Criffel Lead Sluicing Company.—A tail-race at a much lower level is being taken up. This will occupy about two months' time, when the wall will be reached. Should the back reef hang up, a better yield is expected this season. Water is plentiful.

Matakanui.

Undaunted Gold-mining Company (Limited).—The lower portion of the claim—that is, the shallow ground on the false bottom—is exhausted, and sinking is now proceeding at the foothills.

Tinkers Gold-mining Company (Limited).—Paddocking on the back reef is continued, and owing to tendency of the reef to slide into the paddock the work is slow and expensive. The year's work resulted in a profit being shown.

St. Bathan's.

Scandinavian Water-race Company (Limited).—Stripping of overburden has been extensively carried on, and a very large paddock has been opened out; the work in the lower levels is consequently safer. A second lift was sunk below the main 120 ft. level to a depth of 33 ft., and a small paddock taken out on the Kildare main lead, yielding fair results. Electric light has been installed.

United Mining and Elevating Water-race Company (Limited).—The season has been mostly devoted to the deepening of the channel to work a portion of the claim without elevating, and work in the deep levels temporarily suspended.

Golden Terrace Gold-mining Company.—This company was organized during the year to test a deposit located near St. Bathan's. The claim was previously worked. A narrow run of gold was followed until it ran out, and the present company intend testing the deposit in other directions.

Livingstone.

Five men are mining on these diggings, and gold to the value of £798 5s. 4d. was obtained.

Maerewhenua.

Twelve parties, totalling thirty-five men, are employed on this field. The faces range in height from 20 ft. to 100 ft. Plenty of fall is available, and the work is mainly sluicing. Gold-saving is difficult, and requires long tail-boxes. Gold to the amount of 2,204 oz. 15 dwt., valued at £8,062 12s., was obtained.

Naseby.

The forty men engaged mining in this district have experienced a fair average season from a water point of view. No new developments have taken place, and there is little to comment on, the conditions being little altered.

Hamilton's.

Hamilton's Sluicing Company.—Operations have been mainly directed to the removal of the tremendous overburden slowly sliding down the back reef. The race has been widened, and now delivers upwards of twenty heads on the claim. Electric-lighting plant has been installed.

Patearoa.

Three claims are worked here, the depth of ground varying from 30 ft. to 70 ft.

Nevis.

Nine hydraulic mining plants are at work in this valley, and employ forty men. Sluicing and elevating combined is the method adopted to treat the ground. The depth of ground on the river flat is from 10 ft. to 30 ft., and the terrace-faces worked reach to the height of 200 ft. The wash is, on the whole, tight and good standing ground. Gold to the amount of 1,576 oz. 18 dwt., valued at £4,803 19s. 10d., was returned from the district.

Waikaia.

Muddy Terrace Gold-mining Company (Limited).—Sluicing was more continuously maintained than during the previous year. An additional mining-area of 87 acres was purchased by the company. The Boundary Creek water has been brought in, and the Steeple Creek race-construction is being pushed on, and nearing completion. All the main points of the works have been connected by telephone, and the race-section men can communicate with each other. Thirty men are employed.

Argyle Sluicing Company.—This property changed hands during the year, and work was continued as before.

Winding Creek Claim (Round Hill Mining Company, owners).—A large paddock was stripped to the free outflow. A downthrow fault in the alluvial beds, having a displacement of more than 100 ft., was encountered near the creek-boundary of the paddock. Sinking on the downthrow side

was carried out to a depth of 100 ft., and then a borehole put down in the bottom to a further depth of 30 ft. failed to find the bottom. The depth from the free-outflow level is usually 40 ft.

Gow's Creek.—Paddocking in the creek-bed. No startling developments.

Nokomai.

Nokomai Hydraulic-sluicing Company (Limited).—Work was conducted in the usual manner in the three claims. Forty-eight men were employed. The ground maintains a very uniform depth of 60 ft.

Chasland's.

Wallace Beach Gold-mining Company.—This company has acquired mining rights over an area on Wallace Beach. A race 350 chains in length is in course of construction to bring water on; 23 chains is fluming and 11 chains tunnelling. The country is heavily wooded. Thirty-six men employed.

Long Beach Gold-mining Company.—Operations on Long Beach are being conducted. The depth of the ground is 15 ft. The gold is difficult to save, owing to its fineness and the heavy sands associated with it. Eight men employed.

DREDGING.

Seventy-two dredges were worked in Otago and Southland during the whole or a part of the year. Three dredges ceased operations, leaving sixty-nine dredges in active commission at the end of the year.

A dredge was placed on the Mataura River three miles above Gore, but only operated a very short period, and closed down.

Lane and party's machine on the Kyeburn has been dismantled, and is being rebuilt on the Hogburn, below Naseby.

A syndicate (Nees and Scott) are building a dredge on the Kyeburn. The ground where the dredge is to be worked was to some extent privately bored, and prospects were considered good enough to warrant the erection of a dredge.

All the machinery of the Rise and Shine No. 1 has been erected on the new pontoons recently built, and dredging recommenced. The old pontoons are to be docked, renewed, and new machinery placed on them, thus replacing the Rise and Shine No. 2, which foundered two years ago.

Adam's Flat, in the Glenore district, has been tested, and arrangements are in progress to place a dredge on the ground. Water for treatment purposes is one of the difficulties to be met.

The Government Keystone drilling plant has been largely employed by the dredging companies to test their auriferous placers.

Under the permit held by the Golden Bed Dredging Company, Ettrick, forty-two holes were bored to an average depth of 63 ft., and aggregating 2,642 ft. of boring. The shallowest hole was 40 ft. deep, and the deepest was 125 ft.

Under the permit held by the Koputai Gold-mining Company, Waikaia, seventy-six holes were bored, aggregating 1,851 ft. The maximum depth was 88 ft., the minimum was 10 ft., and the average was 24·4 ft.

The New Golden Run dredge was fitted with a steam plant, having previously been a water-power dredge. Operations are now being conducted in the deep ground at the upper end of Island Block Flat, where the boring prospects were so encouraging. The ground is up to 90 ft. deep, and the method to be employed to work it is by taking it in lifts. The first lift will be taken to the reach of the machine, and then the paddock will be hydraulically pumped out, allowing the dredge to sink within reach of the remaining lift. An elevator capable of stacking the tailings 110 ft. high has been fitted.

The industry has been free from any serious accidents, and the regulations are, on the whole, complied with.

MINERALS OTHER THAN GOLD.

Scheelite.

The production of scheelite for the year amounts to 105 tons, valued at £9,822 15s. 8d.

In the Glenorchy and Macrae's districts the industry is fairly active.

Copper.

Some mining was done on the lode occurring in the Wet Jacket Arm, Dusky Sound. A drive 180 ft. was driven at an elevation of 1,000 ft. above sea-level, and cut the large pyritic lode to be seen outcropping on the surface. Where the lode was cut by the drive it was discovered that the whole of the copper-contents had leached out, leaving the lode material quite barren. The question now is, to what depth has the leaching taken place? A low level is to be put in to test this.

Limestone.

From the Milburn Lime and Cement Company's works at Milburn and Dunback 43,630 tons was produced.

Marl.

The quantity produced during the year was 7,687 tons.

Phosphate.

The Ewing Phosphate Company treated 10,000 tons during the year.

ACCIDENTS.

There were no serious accidents reported during the year in quartz, alluvial, or dredge mining in this district.

ANNEXURE B.

REPORTS OF WARDENS.

Mr. Warden FRAZER, Whangarei, to the UNDER-SECRETARY, Mines Department, Wellington.

SIR,— The Warden's Office, Whangarei, 27th March, 1913.

I have the honour to present my annual report on the Puhipuhi Mining District for the year ended 31st December, 1912.

A good deal of steady work was done during the period under review. Although the number of fresh applications to the Court was smaller than in 1911, the results obtained by the holders of mining privileges were very satisfactory, as is evidenced by the large increases in goldfields and territorial revenue. The figures for the year are as under, those for 1911 being enclosed in parentheses: Miners rights issued, 16 (29); water-race licenses granted, 2 (nil); coal lease granted, 1 (nil); ordinary prospecting licenses granted, 11 (19); special claims granted, nil (3); certificates of protection granted, 3 (nil); goldfields revenue, £128 7s. (£71 8s.); territorial revenue, £323 10s. 8d. (£140).

Active prospecting was carried on during the year by Messrs. C. T. Mitchell, Gilmer and party, Chapman and party, Smith and party, and Simpson and party. A number of reefs were partly proved, and in two cases companies were being formed in order to raise the necessary capital to provide machinery for working the reefs.

Prospecting was also carried on at Whangarei Heads, and a large reef carrying fair gold was reported to have been discovered on the west side of Kauri Mountain.

Coal-mining has shown considerable activity during the year. The Hikurangi Coal Company (Limited) and the Northern Coal Company (Limited) worked good time, and there are indications that the output of coal is likely to increase largely in the near future. The mine at Kiripaka remained closed after the miners' strike, and only a small number of men were employed there during the year.

The results of the year's work in the district may be regarded as affording ground for satisfaction, though there has been nothing of a striking nature, and nothing to give rise to excessive speculation.

I have, &c.,

F. V. FRAZER, Warden.

Mr. Warden EVANS, Nelson, to the UNDER-SECRETARY, Mines Department, Wellington.

SIR,— Warden's Office, Nelson, 19th April, 1913.

I have the honour to report on the mining industry in the part of the Karamea Mining District presided over by me, as under:—

NELSON.

The only mining grants made in the Nelson Court are those in the Wangapeka district. Several new prospecting licenses have been granted in this district, and some of those previously granted have been renewed. None of the holders have converted their prospecting licenses into claims, but prospecting is being carried on in connection with the licenses in force. I have received reports from the holders of the prospecting licenses as required by the Mining Act, but nothing has been reported that would warrant me in calling on the holders to convert their prospecting licenses into claims.

MOTUEKA AND TAKAKA.

There is practically no mining being carried on in these parts of the district.

COLLINGWOOD.

Mining matters in this part of the district remain about the same as they were last year.

The Parapara Iron Company's rights are under protection, and no work is being done thereon.

The Golden Blocks Company is still carrying on mining operations as in past years.

Practically no new grants have been made during the year for gold-mining, but a number of prospecting licenses for coal have been granted in and around Puponga.

I have, &c.,

J. S. EVANS, Warden.

Mr. Warden HASELDEN, Naseby, to the UNDER-SECRETARY, Mines Department, Wellington.

SIR,— Warden's Office, Naseby, 17th April, 1913.

There is very little material out of which to construct an annual report on the goldfields of which I am Warden.

On the whole, the district has maintained its average of success. The question of water rights for irrigation is assuming more importance, and also the question of alienating lands for settlement which may hereafter prove to be auriferous.

With regard to the returns which are usually sent with the annual report, I may observe that all the Mining Registrars can do is to send a return of the number of miners' rights issued, and this will not agree with the census returns of the number of persons employed in gold-mining.

The prices of provisions in the different mining centres are very little higher than in the cities. I have been struck at the uniformity which exists in retail prices in various towns, although the actual freight is much higher in some than in others.

I respectfully suggest that Wardens should be relieved of the task of making annual reports.

I have, &c.,

W. R. HASELDEN, Warden.

Mr. Warden BURGESS, Thames, to the UNDER-SECRETARY OF MINES, Wellington.

SIR,— The Warden's Office, Thames, 1st May, 1913.

I have the honour to present my report on the Hauraki Goldfield, under my charge, for the year ended 31st December, 1912.

I regret that I have to record not only a great depreciation on the total value of gold won from the district, but also a serious decline in the extent of mining operations carried on generally in the district. The whole of the goldfield was already suffering from the effect upon mining investors and the public generally of the reduced returns from Waihi Mine, when the unfortunate strike of miners at Waihi took place. This so affected public feeling as regarded the prospects of the mining industry that very many of the less prominent companies carrying on operations by means of calls on their capital found it impossible to obtain any further contributions from shareholders, and they were compelled to discontinue operations, and seek protection from the Warden's Court. The return of gold for the whole district shows a decrease in value of £379,908; but it is some satisfaction to record that the mines in the Ohinemuri County (as distinct from the Waihi Mines, which are situated in the Waihi Borough) have increased the yield of gold by a value of £54,753 9s. 1d., while both the Thames and Coromandel districts also show an increase in the value of gold obtained. The former district yielded £14,914 12s. 3d. worth of gold in excess of that produced the previous year, and the latter £426 8s. 7d. The Talisman Claim is responsible for most of the increase in the Ohinemuri County, and at Thames the increase has been contributed by the Sylvia, Watchman, Monowai, and Occidental Claims; and at Coromandel, by the Hauraki and some small claims at Coromandel; and the Waitaia, Mountain King, and Handsworth Claims at Kuaotunu.

The Thames Deep Level scheme has not so far resulted in any addition to the yield of the gold of the district; but it is affording means of working ground which, judging from the amount of gold formerly yielded by the upper workings, may reasonably be expected in the future to contribute to the gold produced in the district.

In the Waihi and Grand Junction, and in other mines at Waihi, work was necessarily suspended during the long-continued strike, and the output from the mines for the year greatly reduced in consequence.

Since the resumption of operations work has been steadily carried on by both the Waihi and Grand Junction Companies, though with a reduced number of men. Up to the end of the year no gold has been won, the operations being chiefly confined to the unwatering of the mine necessitated by the flooding of the lower levels by the cessation of pumping. The Waihi Company was engaged, among other work, up to the time of the strike in sinking main shafts from 1,150 ft. level for the purpose of ascertaining whether the impoverished ore makes in value at a greater depth. In the Grand Junction Mine the company was compelled to suspend operations at a time when the ores worked in No. 6 level showed an improvement in value, particularly in the Empire reef. The consequences of the strike were very severely felt by tradesmen and storekeepers in the town, and it had a seriously depreciating effect on all land and house property. Since work was resumed in the mines there is evidence of returning prosperity, but it will take the town and district a long time to regain their lost position. The work in the construction by the Waihi Company of the line for the conveyance of electrical power from the Hora Hora Falls, in the Waikato River, was continued during the strike, and it is expected that the plant will be in working-order about June. This should add to the company's output of bullion, for the application of electricity to their works will enable ores of low grade to be profitably treated.

The other mines at Waihi—the Waihi Consolidated, the Waihi Extended, and the Standard, which closed down during the strike—have not yet resumed operations.

There is a large area of land at Waihi which offers a field for investment still unoccupied. It is not possible to raise locally the large amount of capital necessary to test this ground, and, although efforts have been made in London and elsewhere to obtain capital for the purpose, no success has been met with. The decline in the value of the ores in the Waihi Mine, and the uncertainty created by the strike, has operated strongly against the investment of foreign capital at Waihi, and, in consequence, only the Waihi and Junction Mines are now in operation.

At Karangahake the principal mine at work is the Talisman. Operations in this mine still continue to yield extremely satisfactory results, and the deepest works show improvements both in the average width and value of the lodes. The total yield of gold for 1912 amounted in value to £245,733, an increase of £23,675 over that of the previous year.

In the Crown Mine work is being carried on in blocks already opened up, and two fresh blocks of ore on the Maria reef have been opened up, but no developments at deeper levels have been undertaken. Gold to the value of £40,895 was obtained.

There are several other mines at work at Karangahake, but so far they have not reached the stage of gold-production. The Waihi-Paeroa Gold-extraction Company, which is possessed of a very extensive and well-equipped reduction-works on the Ohinemuri River, have been steadily at work, and during the year have treated 94,100 tons of tailings, taken from the bed of the river, for a return of £33,811 6s. 5d., and have already paid the shareholders a dividend of 1s. a share.

At Maratoto (Hikutaia) there are only two companies now at work—viz., the Silverstream Company and the Tellurides Company. The former company is known to have promising lodes in their property, but there has been no yield of gold or bullion from the mine for some time, as the company have been engaged in putting in a low-level tunnel for the better development of the claim. The Tellurides Company have been energetically at work on their property, but its development has not so far progressed as to enable them to produce payable ore in any quantity.

At Waitekauri the Golden Cross and Maoriland Claims have both been continuously at work, and have added something to the gold returns of the district. Several other claims are at work, but operations have not yet proved remunerative.

At Thames, besides the work that has been done at the Deep Level main crosscut and the subsidiary drives therefrom into the adjoining claims, extensive operations have been carried on in the May Queen Claim, but so far the anticipations of shareholders have not been realized as they certainly deserved to be. Work has been carried on in driving at the 1,000 ft. level a crosscut, with the view of intersecting the continuation of the reefs worked in the old Bright Smile Claim. Work has also been in progress in stoping and rising on the Exchange reef.

The Saxon Company have enlarged and repaired their shaft down to the 446 ft. level, and have since been deepening their shaft to conneet with the Deep Level crosscut. They have also driven from the shaft to intersect reefs worked in the higher levels.

The Waiotahi Company have kept steadily at work in their claim. An attempt was made to sink the shaft to 1,000 ft. level, but they were compelled to discontinue the work owing to the influx of water. Prospecting-work has been carried out chiefly at No. 7 level (572 ft.).

The Victoria, Moanataiari, and Kuranui-Caledonian Mines are under protection, awaiting the further progress of the low-level main crosscut.

Work has been continuously carried on in the Deep Level tunnel, but the progress made has been disappointing, owing to the unfavourable nature of the rock. Operations have been interrupted by a large flow of water. A borehole was put in with the diamond drill, and the water was reduced. The drive has apparently penetrated the Moanataiari Main Slide. A distance of 2,362 ft. has been driven, leaving 386 ft. yet to drive. Several small quartz lodes were cut, but of poor value.

At the southern portion of the Thames district the Occidental Mine has had a successful year. The reefs are not large, but are in places exceptionally rich. The last crushing for the year gave a return of gold to the value of £950 from 40 tons of ore. During the year 400 tons of ore was crushed, and yielded slightly over £10 per ton. The run of gold appears to be going deeper.

The Tararu end of the Thames district gives promise of success in the near future. The Waitangi, Watchman, and Sylvia Claims have been continuously and vigorously worked.

The Waitangi proprietors have been engaged during the past year in putting in a low-level tunnel from near sea-level at Tararu to intercept at a depth the gold-bearing lodes found in the upper workings. The tunnel has been driven a distance of 3,765 ft., partly through the Bonanza Claim; but the company, not having met with the success anticipated, have resumed operations in the upper levels, where gold-bearing ore is known to exist. The Watchman Company have been steadily prosecuting the development of their mine, and have proved the existence of large payable reefs, and there seems little doubt that this claim will prove a profitable undertaking. A trial crushing of 855 tons of ore gave a return at the rate of £2 1s. 5d. per ton. The Sylvia Company have kept their battery steadily employed with ore from the mine, and recent developments point to increased returns during the coming year. The total yield of gold last year amounted in value to £15,043 12s. 11d., more than double that of the year previous.

The only mine at work in the Waiomo district is the Monowai Company's claim. A large number of men have been continuously employed, and much work has been done in and about the claim. The company possesses a milling plant which is well equipped. The ore is unfortunately of a refractory nature. Of the total value of gold obtained—£5,737 11s.—from the ore treated, £3,922 5s. 9d. was realized on the concentrates sent to England for treatment.

There is very little activity in mining at Tairua. The Golden Hills Claim, from which great things were expected, has proved a great disappointment, and has ceased operations. Of the Neavesville portion of the district, the Champion and the Golden Belt Mines are still at work. In the Champion work of a prospecting nature has been carried on, and ore has been tested from several reefs in the claim, but no substantial result has been obtained.

The Golden Belt Company have maintained operations all through the year. The work has been mostly prospecting. The ore obtained is of low grade, and none has been sent to the mill.

At Coromandel there is very little to record with regard to the success of the industry. The old Hauraki Company has been carrying on systematic development, but so far the returns have been small. Work of a developmental character is also being carried on in the Hauraki Reefs Company's claim; and operations are still in progress in several other mines in the district, but development has been much retarded owing to the general depression in mining affairs and the consequent difficulty in raising funds to defray the working-expenses. Mining at Kuaotunu has been fairly successful in the few claims at work. The developments in the new Waitaia Mine have been most encouraging, and the Mountain King and Handsworth Claims have been in receipt of payable returns.

Besides the claims I have mentioned, there are a number of smaller claims in existence in various parts of the Hauraki Mining District in which more or less work is being carried on, mostly of a prospecting nature; but they have contributed only in a small degree to the gold-product of the district.

Taking a general review of mining in the whole of the Hauraki District, I feel reluctantly compelled to say that present appearances do not promise any great activity in the industry during the coming year, particularly with regard to claims held by small mining companies. These companies are working with a limited capital, and their claims have not been yielding any—or, if any, very small—returns to the shareholders. They are necessarily being prospected and developed by calls being made on the capital of the companies. There are some ventures of greater magnitude, such as some of the claims already mentioned, whose shareholders have kept up their contributions in spite of the general depression, and there is every reason to believe that in some, at any rate, of these the perseverance and enterprise of their owners will be substantially rewarded. Though, as I have said, the condition of mining in this district is at present somewhat discouraging, I do not think that this indicates any approach to the permanent decadence of the goldfield. A combination of untoward circumstances has had a disheartening and depressing effect on investors and speculators, and very little outside assistance is being obtained toward the prospecting of the new ground or the developing of existing properties.

A new discovery of importance, or the satisfactory demonstration that large bodies of payable ore exist in the deeper levels of the Waihi mines, or in any of the claims benefited by the low-level crosscut at the Thames, would, I am sure, revive interest in the district, and lead to further investment of much needed capital in our mines. Notwithstanding the dullness of mining enterprise to which I have alluded, some prospecting of new ground is being carried on in the Thames and Coromandel districts, but no discovery of any importance has been reported. Several parties have been persistently prospecting in the vicinity of the Mahakirau Creek, between Coromandel and Mercury Bay. Loose specimens of auriferous quartz—some of them very rich—have for years been found in the beds of the creeks and small streams, but no reef or lode from which this quartz might have come has been found, although most anxiously sought for. It is the general impression that some day some fortunate prospector will discover to his great advantage the original source of these auriferous stones.

On the whole, the little prospecting that has been done throughout the goldfield is of a desultory and unsystematic kind.

In my opinion, the employment of a casual man or two for this work will not lead to any beneficial discovery; if it does it will be the merest chance. Prospecting to have any hope of success must be undertaken in an organized and systematic manner by men having a natural inclination for the work, and prepared to act under the control and direction of an experienced man of knowledge and intelligence, who would see that the efforts of the paid men are not frittered away in useless and haphazard work, as has been too often the case in the past. Work of this kind prosecuted under the immediate control of local bodies or the General Government is more likely to prove successful than the fitful and often badly directed efforts of private persons, who most frequently find that they have been paying wages for nothing more than a very small amount of useless work. During the last year or two considerable areas on the goldfield have been taken up for grazing purposes under the Hauraki Pastora Lease Regulations, and in one respect this may prove an assistance to the prospector, for these areas still remain open and accessible to the miner. The clearing of the dense forest which yet clothes much of the mountain-ranges will facilitate the work of exploration and prospecting, and it is to be hoped that advantage will be taken of the opportunity offered.

The somewhat critical period through which the Hauraki Goldfield is passing makes the administration of the Mining Act more than usually difficult, for if a strict compliance with the labour conditions is insisted on, and further protection refused to companies who find themselves in straitened circumstances owing to their inability to collect calls, although nominally possessed of capital, there is no doubt that claims held by them must be abandoned, and their shareholders would permanently withdraw from all connections with the goldfields. On the other hand, some restriction must necessarily be placed on the extent to which owners of mining claims are permitted to retain property indefinitely, without expending on them the labour required by the terms under which they hold their titles while they are waiting to benefit by the enterprise and industry of those who have courage to continue.

The various applications for mining privileges ordinarily coming before the Warden's Court have materially decreased during the last twelve months, but owing to the causes mentioned more than the usual number of applications for protection of claims and other mining privileges have been dealt with; and because it has not been deemed politic to too strictly enforce the labour conditions of their holdings, most of the applications have been granted, and as a consequence more than the usual number of claims have suspended operations. I trust, however, that at the end of the present year I shall be able to report that only a few of our mines are not carrying on successful operations.

I have, &c.,
FRED. J. BURGESS, Warden.

Mr. Warden WILSON, Westport, to the UNDER-SECRETARY OF MINES, Wellington.

SIR,— The Warden's Office, Westport, 30th April, 1913.

I have the honour to report upon those portions of the Westland and Karamea Mining Districts within my district for the year ended 31st December, 1912.

WESTPORT.

There has been a considerable increase in the number of prospecting licenses granted in Westport during the past year as compared with the number taken out in 1911, but there has been a noticeable falling-off in the number of claims (special, extended, and ordinary) taken up during the same period. This is indicative of the state of the industry here. The *bona fide* mining is very quiet, but a fair amount of prospecting is in progress.

The Carthage Company has reported some very payable returns from the working of its property at Fairdown by hydraulic sluicing and with a suction elevator. Great difficulty has, however, been experienced owing to the very heavy buried timber encountered, and the cost of the work has been somewhat increased in consequence.

At Addison's good wages have been earned by one or two parties, and the working of claims held by Roberts and Lee is considered to be full of promise. Carmody and party and Millikin's party continue to get payable returns.

On the North Beach the beachcombers have been fairly active. The land is eroding very rapidly by the action of the sea, and it is anticipated that several payable leads are likely to be exposed. There has been an increase in the number of extended beach claims granted during the past year,

CHARLESTON.

An important development in this district took place last year, by the Messrs. Powell undertaking a comprehensive system for working the auriferous sand-dunes at Rahui by hydraulic sluicing and a suction elevator. The interests of the small holders, who have in time past retarded a systematic development, are now being consolidated. I understand the returns received so far are quite satisfactory. The sand, though low grade in value, is, I believe, uniform in quality. This is the only development of any importance in the locality.

SEDDONVILLE.

Mining has been very quiet. The Swastika Company has been working at the old Red Queen property, but the prospects of it proving a payable proposition are not known.

KARAMEA.

Some eight miles of beach claims were applied for between Wanganui and Kongahu, but the applicants apparently found little prospects of profitable working, and all the applications were withdrawn. Several prospecting licenses have been issued for areas along the bed of the river. The Mount Radiant Special Claims are still held, and I understand capital is being raised in the North Island for their proper development.

MURCHISON.

The industry in this district has been languishing somewhat. A few parties are working at the Rappahannock and Upper Matakitaki. Prospecting licenses were issued early in the year, but the result of operations has not transpired. Several prospecting rights have been granted along the course of the Glenroy River. There is nothing of importance to report from the Mount Owen district. Prospecting rights on the slopes of the mountain have been renewed, but again it is not known with what success the prospectors are meeting.

LYELL.

The mining business here did not warrant the continuance of the Court sittings, and the office was closed down early this year. During 1912 practically the only business transacted was the acceptance of surrenders of rights and the granting of a few prospecting licenses. Prospecting is still being continued by the Alpine Syndicate, and the vicinity of the old Victory Claim is being further tested.

In the early days there were some very rich finds in the Lyell, and the opinion seems to be generally held that the Lyell district will still well repay energetic prospecting.

I have, &c.,
WYVERN WILSON, Warden.

Mr. Warden HEWITT, Hokitika, to the UNDER-SECRETARY OF MINES, Wellington.

SIR,— The Warden's Office, Hokitika, 16th May, 1913.

I have the honour to present my report on the mining industry in the Westland District for the year ended the 31st December, 1912.

HOKITIKA.

The number of claims in which operations have been carried on remains about the same as at the date of my last annual report, and the value of the gold won shows a slight decrease on the figures for last year.

A new field has been discovered at Lang's Terrace, where the property of Messrs. Glass and party has been partially opened up, and very promising results obtained. The work done up to the present is more in the nature of prospecting, and this is not confined entirely to the property of Glass and party, but extends to other areas in the locality held under prospecting license. The cost of bringing in an adequate water-supply to work this terrace is causing delay in mining the properties held, and appears to be beyond the available means of the persons interested in the several properties. However, it is anticipated that this difficulty will be overcome in course of time, as water commanding the ground can be obtained in sufficient quantity to enable the working of an extensive area.

It is worthy of note that during the year under review no less than 3,060 acres 1 rood 26 perches of land in the Hokitika district have been taken up under ordinary prospecting licenses. I have had evidence before me from time to time as to the prospecting of a large portion of this ground by means of the Keystone drill, and by shaft-sinking and other recognized methods of prospecting, and of the expenditure of much labour and capital in proving the ground. But here again the prospector, after proving the auriferous quality of his ground, is met with the difficulty, which so far has proved insurmountable, of raising the capital necessary to bring in a water-supply to work his ground. The existence of sources of supply of water commanding the whole of the large area referred to has been proved, and several feasible schemes propounded for bringing the water in, but so far it has been found impossible to obtain the large capital necessary to carry out the work of construction of water-races necessary.

A good deal of attention has been directed to the sea-beaches north and south of the Town of Hokitika. While on the south the operations have been confined to prospecting, on the north Messrs. Lincoln and party and the Montezuma (Limited) have carried on mining operations, a Kershaw pump being used for lifting and distributing the wash (chiefly sand) over the tables. Since the company referred to took over their property the result of their operations has been sufficiently encouraging to induce the management to obtain a second and larger pump, the results of the operations of which

will, when erected, be watched with interest by the mining community, as there is little doubt that the whole of the beaches along the sea-coast of this district carry sufficient gold to admit of profitable working when means are devised for saving the whole of the fine gold carried by the beaches.

Kumara.

The gold won in the Kumara district from the several alluvial claims being worked shows a decrease on the figures of the preceding year. This, however, must not be taken as an indication that the field is worked out, but is accounted for by reason of the fact that the operations of a number of the parties operating in the Westbrook district have been impeded, and in some cases stopped, on account of the tailings from their workings interfering with the old Westbrook–Greenstone Road. The construction of the deviation of the road is proceeding, and when completed the returns for the district should reach the figures of recent years.

The Taipo and Kelly's Range district has attracted some attention during the year, prospecting for quartz reefs having been carried on. These operations have led to the discovery by Messrs. Hopkins and party of a reef which it is estimated can be worked profitably. In all an area of 900 acres has been taken up under ordinary prospecting license in the locality. The New Zealand Greenstone (Limited) is now holding under mineral-prospecting warrants and ordinary prospecting licenses an area of 5,400 acres, over which prospecting operations have been proceeded with. A contract has been let by the company for the construction of three-quarters of a mile of road from the company's aerial-tramway terminus to the main Christchurch Road, over which the stone from the quarries will pass *en route* to the coast for shipment.

Stafford.

Mining has proceeded steadily in the Stafford, Goldsborough, and Callaghan's districts, the miners in all cases obtaining good returns for their labour.

Ross.

I have little change to report in respect to the condition of the industry in this district. Some 1,538 acres of land have been taken up under ordinary prospecting license, chiefly on the sea-beach.

The Ross Goldfields (Reconstructed) commenced putting their mine in order, and made arrangements for the installation of a 235 h.p. oil-engine as a stand-by plant to insure against the flooding of the mine in the event of breakage in the power-line or failure of the electrical-power plant.

Okarito.

A number of prospecting parties have been engaged on the Okarito North beach, as an outcome of which practically the whole of the beach has been taken up under licenses for special claims, the object of the licensees being to work the ground by means of Kershaw pumps immediately the funds to provide the necessary plants can be raised. The beaches from the Saltwater to Gillespie's have been prospected and a number of claims taken up, while a large area still remains under ordinary prospecting license. Mining has proceeded steadily at Okarito River and Omeroa, and a number of miners have found profitable employment in washing the black sand along Bruce Bay, Hunt's Beach, and elsewhere.

Generally speaking, though no material advancement has been made by the industry during the year to which this report relates, the fact that so much labour and capital has been expended in prospecting-work, and that in so many cases the prospector has surrendered his prospecting license for a better title—that is to say, a "special-claim license," involving the payment of a substantial ground-rent—tends at least to show that the prospector has faith in his properties, but lacks the capital to develop same, the only possible method of working profitably involving an initial outlay beyond his means. As time goes on the capitalist may be persuaded that capital may be profitably invested in the development and working of a number of properties in the district.

Reefton.

Chiefly owing to labour troubles, mining on the Reefton field has received a decided setback during the past year. From the month of May to the month of November the principal mines in the district, those under the management of the Consolidated Goldfields of New Zealand, have been practically closed down, and the returns from these mines for the year have been very small in comparison with those of former years. In the month of December the mines were reopened, but with only a very limited number of workmen.

The Keep-it-Dark Mine has continued work throughout the year, employing between fifty and sixty men, but no dividends have been paid from this mine for a number of years.

The most successful mine in the district is the New Big River Gold-mining Company's property, situate at Big River, about twenty miles from the Town of Reefton. This mine has been successfully worked for a number of years, and last year the returns were very good, regular monthly dividends being declared throughout the year.

No new discoveries have been reported in this district for some time; but some of the old mines which have been lying idle for years have been reopened, and the prospects so far have been very encouraging, especially so in regard to the Inglewood Mine, now owned and worked by the Murray Creek Gold-mining Company (Limited), and the old Scotia, Drake, and Cumberland Mines, which are now being developed by the Consolidated Goldfields of New Zealand.

In the Blackwater and Snowy Creek districts vigorous prospecting is still being carried on, and the property owned by the Millerton Syndicate, which contains a valuable reef, has been successfully floated into a limited-liability company. A very large number of prospecting licenses have been granted in this locality.

The Just-in-Time Gold-mining Company at Capleston and the St. George Gold-mining Company at Big River have done a considerable amount of prospecting-work throughout the year, but so far without striking a permanent reef.

Perotti Bros. are still diligently sinking their shaft at Golden Point, and should soon be down the required depth, when they intend to crosscut in order to pick up the rich reef which was worked on the surface many years ago.

Other small parties working in the field or prospecting on their properties are Bolitho Bros., at Lankey's Creek, Pettigrew and party and the Luck-at-Last Syndicate, operating at Victoria Range, and Bierwirth and party at the New Discovery Mine, south of Golden Point.

The dredges working are the same as last year—viz., Hessey and Cameron's dredge at Capleston, Frying-pan dredge at Cronadun, Slab-hut Creek dredge at Tawhai, Worksop dredge at Antonio's Creek, and the Blackwater Creek dredge at Blackwater. Of these, the Worksop dredge has been particularly successful, and the gold-returns for the year have constituted almost a record.

Nothing new in the shape of alluvial mining has eventuated, and very little of this class of work is now carried on in this district, the total number of alluvial miners being not more than thirty, and about the same number of Chinese still earn a precarious living in some of the back gullies.

In the Warden's Court 173 applications were received and dealt with during the year, by far the larger number being for prospecting licenses. This shows a decrease of fifty-three on the previous year's total.

The sum of £1,331 17s. 10d. was collected in revenue during the year, a decrease of £93 9s. 8d. on the amount collected in 1911.

Provided the requisite number of men can be obtained to properly man the mines, the present should show a very marked improvement on last year, as many of the mines in the district are looking well and give every promise of successful development in the near future.

Ahaura.

Alluvial Mining.

The following is a brief summary of this class of mining in the different localities:—

Moonlight District.—The population is now very small, as the old hands are gradually dying off, and no new arrivals to take their place. Active prospecting for quartz has been carried on for some years by Mitchell and party, and recently this party let a contract for 300 ft. of a low-level tunnel, which is now being driven. The party are very confident of success; should this be the case big developments will naturally follow.

Blackball.—There is nothing new in this locality. A quartz lode was discovered at the head of Ford's Creek, but, although containing both silver and gold, the result of assay was very poor.

Half-ounce, Duffers, and Granville.—The population here is gradually dying out. No new finds have taken place during the year.

Nelson Creek.—The population keeps up well in this locality, and the claims in some instances have given excellent returns. The Gow's Creek Company completed their tunnel some months ago, and the manager, Mr. Morel, is now almost ready to commence active operations on the company's claim, which should give good returns and prove a good investment for the shareholders.

No Town.—This place is slowly dying out, and the population becoming very small. With water obtainable on the high levels the place would soon revive, as there is a vast extent of auriferous country that would find highly remunerative work.

Ahaura, Orwell Creek, and Riverview.—The outlook for this part of the district is encouraging at present. During the year a company was formed in Sydney, known as "The Lake Hochstetter Goldfields (Limited)," with a capital of £45,000, consisting of 180,000 shares at 5s. each. This company has now commenced the construction of a water-race of eighty heads from Lake Hochstetter to Sullivan's, a distance of six miles and a half.

Dredging.

The Moonlight Company's dredge has commenced operations at Moonlight, and I believe the results so far have been satisfactory. The Pactolus and New Trafalgar dredges have been continuously working at Nelson Creek. The greater portion of the claims have now been worked. The results for the year have been satisfactory. The Red Jack's Dredging Company took up a special dredging claim of 20 acres in Red Jack's Creek during the year, and are now busily engaged erecting an up-to-date plant, and expect to commence active operations very shortly.

The amount of revenue collected during the year was £2,667 17s. The number of mining applications received was 246, being an increase of 68 over the previous year.

I have, &c.,
J. George L. Hewitt, Warden.

Mr. Warden Cruickshank, Invercargill, to the Under-Secretary, Mines Department, Wellington.

Sir,— Warden's Office, Invercargill, 9th May, 1913.

I have the honour to present my annual report for the year ended 31st March, 1913, for the undermentioned different mining centres situated in the mining district of Southland:—

Round Hill.

Round Hill Mining Company (Limited).—During the year a new paddock was opened up for the No. 1 elevator, and about 5 acres of ground worked. The company found it impossible to work the richest part of the ground, owing to the Ourawera Sludge-channel being on that portion. Application

was made to divert this channel, and though the application was granted by the Warden the decision was reversed in the Supreme Court. This held matters up for some months, but, as the Court of Appeal has now upheld the Warden's judgment, the prospects for the coming year are good, for the rich ground will be accessible. The value of the gold won from the No. 1 paddock during the year was £1,163 3s. During the year a new paddock was opened up by the No. 2 elevator. The amount of ground worked by this elevator during the year was 3½ acres, and the value of gold won £4,095 17s. 3d. The total value of gold won by the company during the year was thus £5,259 0s. 3d. The company completed during the year a new dam 2½ acres in area, and of an average depth of about 10 ft., at a cost of £750. This reservoir will be of great assistance in the summer time. The average number of men employed, including the mine-manager, was twenty-seven.

Ourawera Gold-mining Company (Limited).—Eight men were employed during the past year, and the amount of gold won was 426 oz. 5 dwt., valued at £1,717 15s. 5d.

PRESERVATION.

The Tarawera Company has done nothing further, and is only holding its claim in the hope of selling the plant and buildings to another company. The Timaru shareholders in the Lady Gladys Mine recently inspected the property. It is their intention to give the reef a thorough test, and the work of development will be carried on as soon as possible.

The Tarawera Company has gone into liquidation, and a Melbourne company has taken the property over. They intend working it in conjunction with a copper claim at the Wet Jacket Arm as soon as financial arrangements are made.

WYNDHAM.

The Long Beach Gold-mining Company's Claim near Chaslands was worked for some months with indifferent success. Fair returns were obtained at first, but subsequently gradually diminishing. The claim was under option to another syndicate for two months, during which a heavy sea rose and broke up and washed away the tables, whereupon the syndicate threw up their option. The claim is now being again worked, to test a special gold-saving machine by the Long Beach Gold-mining Company.

STEWART ISLAND.

There has been some prospecting in the Pegasus district by Messrs. Statham and Thomson, and extensive water rights have been granted to them.

OREPUKI.

A number of individual miners are still at work in the district, but there have been no operations on a large scale. During the coming year twenty men will be employed constructing a race about six miles long to work a claim pegged out by an Orepuki syndicate. It has long been recognized that the ground was good, but the difficulty of getting water to it was always considered insuperable.

I have, &c.,
G. CRUICKSHANK, Warden.

Mr. Warden BARTHOLOMEW to the UNDER-SECRETARY, Mines Department, Wellington.

SIR,— Warden's Office, Dunedin, 29th April, 1913.

I have the honour to present my report for the year ended the 31st December, 1912, on the portion of the Otago Mining District under my charge.

Nothing of note has occurred in this district during the year. The hydraulic-sluicing claims had an exceptionally favourable year, owing to the wet weather that prevailed throughout the twelve months. As a result, the mining industry appears to have maintained its position better than its wont in recent years. No new areas are being opened up, and in all the present mining operations in this district it is the well-known auriferous localities of the early days that are still being worked to deeper levels and with improved methods. In the Roxburgh subdistrict the gradual withdrawal of local attention and effort from mining to the profitable industry of fruitgrowing still continues.

In the Warden's Court at Lawrence the following business was transacted: Miners' rights issued, 124; applications received, 70; general registrations, 79. Revenue to the amount of £479 11s. 4d. was collected during the year, as against £556 19s. 5d. for the year 1911.

The details of Warden's Court business in the office at Roxburgh are as follows: Miners' rights issued, 84; applications received, 49; and general registrations, 103. The revenue from this Court was collected and accounted for in the Clyde district.

I have, &c.,
J. R. BARTHOLOMEW, Warden.

Mr. Warden YOUNG, Queenstown, to the UNDER-SECRETARY, Mines Department, Wellington.

SIR,— Warden's Office, Queenstown, 12th April, 1913.

I have the honour to present my report for the year ended 31st December, 1912, on that portion of the Otago Mining District under my charge.

QUEENSTOWN–ARROWTOWN.

In the Warden's Court eighty-three applications were dealt with; many of these were for privileges to be used in connection with existing claims.

Lively interest continues to be taken in the search for scheelite on the mountain-ranges at the head of Lake Wakatipu. In connection with this industry seventeen prospecting licenses and four mineral licenses were granted. The field of operations has been considerably extended, but as most of the outcrops discovered are above the snow-level the work of prospecting and development is limited to the summer months, and is further retarded by the precipitous nature of the country. A large amount of scheelite was produced, and the producers and prospectors are very optimistic as to the future of this field.

There is a prospect of Glenorchy again becoming a reefing centre. A Melbourne syndicate has taken up a special quartz claim, two prospecting licenses, and other privileges in the Richardson Range on the left bank of the Rees River. It is the intention of the syndicate to extensively carry on prospecting and development operations in connection with the old Invincible Mine, from which about twenty-five years ago a large amount of gold was taken.

Several claims were taken up in and about the Shotover and Arrow Rivers by working miners, but generally the condition of these fields is the same as it was last year.

Two dredges are still being worked in the Cardrona Valley, and several parties continue to carry on sluicing operations. No new ground was taken up.

WAIKAIA–GORE.

Six dredges are at work in the Waikaia Valley, three in the Charlton Creek, and thirteen in the Waikaka Valley. Two ceased work during the year. A new claim was taken up in the Mataura River, near Gore; a dredge was built upon it and commenced operations.

Forty-four applications were dealt with at Waikaia, but most of them related to existing privileges. Sluicing operations were actively carried on on the several fields, but there were no new ventures worthy of note.

I have, &c.,
H. A. YOUNG, Warden.

ANNEXURE C.

EXTRACTS FOM THE REPORTS OF GOVERNMENT WATER-RACE MANAGERS.

WAIMEA–KUMARA WATER-RACE.—Mr. JAMES ROCHFORD, Manager.

Waimea Race.

THE cash received for sales of water from this race for the year ended the 31st March, 1913, was £747 5s. 6d., and the expenditure for the same period on management, gauging, maintenance, and repairs amounted to £590 14s. 1d., showing a credit balance of £156 11s. 5d. on the transactions for the year.

The average number of miners supplied with water was 32·08, a decrease of 0·08 on the previous year; and the approximate quantity of gold obtained by them was 1,603 oz., having a value of £6,251 14s.

The sales of water amounted to £766 1s. 7d., a decrease of £63 1s. 4d. on the previous year. The reduced sales does not indicate a falling-off in the demand for water in the Goldsborough or Stafford districts, but was entirely due to the fact that the whole of the water had to be turned off for at least one day every week for the last nine months of the year, to carry out the repairs to the race.

The cash received was £90 10s. less, and the expenditure on gauging, maintenance, and repairs was £8 6s. 7d. less, than during the preceding year. The approximate quantity of gold obtained by the miners was 99 oz. less than during the previous year, representing a decrease in value of £386 2s.

Morgan and party (late Waimea Hydraulic Sluicing Company) used water regularly during the year, but I regret to state that the results were far from satisfactory.

Linklater and party worked both their claims during the year, with satisfactory results, and purchased water to the value of £223 17s. 4d. This party has purchased water to the value of £994 0s. 2d. since the siphon to Lower German Gully was completed some four years and a half ago.

At Tunnel Terrace five parties have been supplied with water from the race during the year, and there is no indication whatever of a falling-off in the demand for water in this locality.

In March, 1912, a sum of £2,020 was granted by the Department to repair the Waimea Water-race, from the outer end of the Waimea siphon to the terminus of branch B, a distance of over seven miles. The repairs were started in July, and since that time six miles of the race from the siphon downwards has been repaired. The flumings are well done, and are capable, as they now stand, of carrying forty-five heads of water; but I made provision for materially increasing their carrying-capacity (should occasion arise) by leaving the studs of boxing long enough to take an extra 10 in. plank on the sides.

The 70 chains of race widened between the Tunnel Terrace Extension and Goldsborough has now a carrying-capacity about equal to that of the new flumings.

When the repairs are completed to Tunnel Terrace it will have the effect of increasing the present supply at that point by about four heads. This extra water represents the leakage that has been running to waste for years past through the old flumings, and, apart from the many other advantages gained, should itself pay the whole cost of the repairs in less than seven years.

Mr. D. McConnon was appointed by the Department to carry out the repairs, and the excellent work done by him and his staff bears ample testimony to the wisdom of the selection. The manner in which he manipulated ropes, blocks, and other tackle to convey heavy stringers, trestle-legs, and sawn timber over almost inaccessible places, greatly reduced the cost of the work, which will be done under the estimate; and, in addition to this, the old flumings were demolished and the new ones re-erected with a minimum loss of water.

The following is a summary showing the revenue and expenditure of the Waimea Water-race for the year ended 31st March, 1913: Sales of water, £766 1s. 7d.; cash received, £747 5s. 6d.; expenditure, £590 14s. 1d.; approximate quantity of gold obtained, £6,251 14s.; average number of miners employed, 32·08.

Branch Race to Callaghan's and Middle Branch Flat.

The cash received for sales of water from this race during the year ended the 31st March, 1913, was £448 18s. 9d., and the expenditure on management, gauging, maintenance, and repairs amounted to £454 13s. 1d., showing a debit balance of £5 14s. 4d. on the year's transactions.

The average number of miners supplied with water was 13·58, a decrease of 2·08 as compared with the previous year; and the approximate quantity of gold obtained by them was 1,177 oz., having a value of £4,590 6s.

The total sales of water amounted to £434 4s. 2d., an increase of 2s. 6d. on the previous year.

The approximate quantity of gold obtained by the miners was 14 oz. less than during the preceding year, representing a decrease in value of £54 12s.

The expenditure was £30 18s. 1d. less than during the previous year; and the races, tunnels, and flumings are now in good order.

Carmine and party worked their claim in Middle Branch, near Goldsborough, throughout the year, with satisfactory results, and purchased water to the value of £152 11s. 8d.

Although the deviation of the Hokitika–Kumara Road was completed in May, there was practically no sluicing done into the Waimea Main Tail-race until the last two months of the year, when Hanrahan and party and Manzoni and party started to work their respective portions of the old road.

At Callaghan's Flat Havill and party worked steadily during the year, and, although the quantity of water purchased was small, the results attained were most satisfactory. This would be a very valuable mining property if it could be worked with ordinary facilities, but the hard nature of the ground, coupled with the limited pressure from the Callaghan's Race, reduces the quantity of wash treated to much below the average of other sluicing claims in the district.

S. Honey and party (late Cook and Honey) sluiced a fairly large area of ground during the year, and purchased water to the value of £152. This party also opened out another claim in December last, and the returns so far from both properties have been most encouraging. Manzoni and party completed their 1,000 ft. of tunnel tail-race in November, and sluiced during the whole of December.

Authorized free water to the value of £20 2s. 6d. was supplied from this race to parties opening up new claims, and the usual quantity of flush-water was allowed to parties sluicing into the Waimea Main Tail-race free of charge.

The following is a summary showing the revenue and expenditure of the Callaghan's Race for the year ended 31st March, 1913: Sales of water, £434 4s. 2d.; cash received, £448 18s. 9d.; expenditure, £454 13s. 1d; approximate quantity of gold obtained, £4,590 6s.; average number of miners employed, 13·58.

Kumara Race.

The cash received for sales of water from this race for the year ended the 31st March, 1913, was £122 13s. 2d., and the expenditure on management, gauging, maintenance, and repairs amounted to £401 12s. 4d., showing a debit balance of £278 19s. 2d. for the year.

The average number of miners supplied with water was 6·41, a decrease of 1·75 on the previous year; and the approximate quantity of gold obtained by them was 515 oz., of a value of £2,008 10s.

The total sales of water for the year amounted to £179 7s. 6d., an increase of £25 10s. 3d. on the preceding year; and the cash received for sales of water shows an increase of £29 7s. 9d.

The expenditure was £32 5s. 8d. less than during the previous year; and the head-race tunnel, the main and branch races, and the siphons are now in good repair.

The break in the No. 3 channel, which occurred on the 28th October, 1911, was not repaired until the middle of September, 1912. Owing to the cost of these repairs, and the very heavy expenditure involved in maintaining over 6,000 ft. of channel, the Long Tunnel Company's returns were so unsatisfactory that they decided at the end of the year to cease operations until some other party started sluicing into the No. 3 deviation. After a lapse of eighteen months Shannon and party started in December last to put their claim in working-order, and since that time they have been steadily engaged boxing and blocking their tail-race, which is about 1,200 ft. in length. This party should be ready to sluice into the No. 3 deviation by the end of June, and the Long Tunnel Company may then give their ground another trial, as the maintenance of the channel will not be so heavy proportionally for two parties as one.

McGrath and Co. started to sluice in their Upper Larrikins Claim in May, and sluiced for six months, when they were compelled to cease operations owing to the wash dipping below the level of their top tail-race. This company has had a very uphill fight for years past. The tunnel tail-race, which commands the property, is 2,970 ft. in length, and, owing to the difficult nature of the ground through which it was driven, cost nearly £3,000; and just when the company got their claim in good working-order, and had a reasonable prospect of receiving some recompense for their heavy outlay, the unexpected occurred, and it will cost them at least another £200 to bring up fall from their low-level tail-race and again open up their property.

Owing to this company's unfortunate experience, and the break in the No. 3 channel, which prevented the Long Tunnel Company from using water for five months and a half, the sales of water from the Kumara Race (although showing a slight improvement on the previous year) did not by any means come up to expectations.

Authorized free water to the value of £149 6s. 3d. was supplied from this race during the year.

The usual quantity of flushing-water was supplied to the No. 3 channel deviation, and water was also supplied to the Borough of Kumara for fire-brigade and other purposes free of charge.

The following is a summary of the revenue and expenditure of the Kumara Race for the year ended the 31st March, 1913: Sales of water, £179 7s. 6d.; cash received, £122 13s. 2d.; expenditure, £401 12s. 4d.; approximate quantity of gold obtained, £2,008 10s.; average number of men employed, 6·41.

Kumara–Taramakau Water-race.

The cash received for sales of water from this race for the year ended the 31st March, 1913, was £121 4s., and, as the water was regulated at the intake of the siphon on the south side of the Taramakau River by the Kumara gauger, there was no extra expenditure, and the race shows a profit of £121 4s. on the year's transactions.

The average number of miners supplied with water from this race was 6·27, and the approximate quantity of gold obtained by them was 589 oz., of the value of £2,297 2s.

The sales of water for the year amounted to £125 13s. 3d., but, in addition to this, authorized free water to the value of £154 7s. was supplied to parties to open up their claims.

Early in the year Penrose and party laid down a pipe-line from this race, but owing to the position of the Erin-go-Bragh Water-race, which practically locked up their area, they did no work in their claim proper during the year.

W. Evenden and party started to take water from the race in July, and worked steadily until the end of the year, purchasing water to the value of £89 8s.

C. Evenden and party were seriously hampered by the non-completion of the Westbrook Road deviation, and did very little sluicing during the year.

Bell and party and Steel and party completed a 26 in. pipe-line from the race in October, and since that time Bell and party purchased water to the value of £24 17s. 3d.

Steel and party have not yet started to open up their claim, but I understand that the two parties intend to co-operate, and drive a tunnel tail-race or channel in a position to command their respective properties.

Gilbert and party and Tomasi and party conjointly constructed a tunnel tail-race about 700 ft. in length, and laid down a 26 in. pipe-line from the race to work their adjoining properties. This preparatory work cost the parties about £600, and was completed in December, 1912, when Gilbert and party started to sluice; but after using four or five shifts of water they were promptly stopped by the Greymouth County Council, as their tailings were damaging the old Westbrook–Greenstone Road; and since that time no work has been done by either party, pending the completion of the Westbrook Road deviation. This enforced idleness, besides being a hardship to the parties concerned, materially reduced the sales of water for the year.

Notwithstanding the number of large floods that occurred during the year, there was practically no damage done to the Taramakau Siphon and Water-race, and they are now in excellent order.

The following is a summary showing the revenue and expenditure of the Kumara–Taramakau Race for the year ended the 31st March, 1913: Sales of water, £125 13s. 3d.; cash received, £121 4s.; expenditure, nil; approximate quantity of gold obtained, £2,297 2s.; average number of miners employed, 6·27.

Waimea–Kumara Water-races.

The following is a summary of the revenue and expenditure of these races for the year ended the 31st March, 1913: Sales of water, £1,505 6s. 6d.; cash received, £1,440 1s. 5d.; expenditure, £1,446 19s. 6d.; approximate quantity of gold obtained, £15,147 12s.; average number of miners employed, 58·34.

It will be seen by the above summary that the value of the sales of water from the combined races was £1,505 6s. 6d., as against £1,417 1s. 10d. for the previous year, thus showing an increase of £88 4s. 8d. In addition to the sales above stated, authorized free water to the value of £323 15s. 9d. was supplied to parties to open up new claims, as against £49 10s. for the previous year.

The total expenditure was £1,446 19s. 6d., as against £1,518 9s. 10d. for the previous year, a decrease in the cost of maintenance of £71 10s. 4d.

The cash received was £1,440 1s. 5d., as against £1,374 10s. 9d. for the previous year, showing an increase in revenue of £65 10s. 8d.

Notwithstanding certain adverse circumstances previously set forth, the sales of water from the combined races, compared with the expenditure, show a profit of £58 7s. for the year.

Wainihinihi Water-race.

There was a good supply of water from this race, and, together with the Kawhaka supply, the Waimea Siphon was kept running full for the greater part of the year.

No breaks occurred, and the race is now in good order.

MOUNT IDA WATER-RACE.—MR. R. MURRAY, Manager.

Mount Ida Race.

The total sales of water from the Mount Ida Race during the year amounted to £1,087 5s. 5d., a decrease on that of last year of £118 18s. 1d. The expenditure on maintenance and repairs for the same period was £1,385 4s. 3d., including £117 12s. repairing the damage done by the flood of the 6th March last year beyond the 40th mile, making an increase over that of last year of £173 8s. 9d.

The total cash received was £1,087 5s. 5d.

Free water for washing up was supplied to the value of £85 12s. 8d.

The total value of water supplied from this race during the year amounted to £1,172 18s. 1d., a decrease on that of last year of £139 0s. 9d.

The approximate quantity of gold obtained by parties using water from this race during the year was 1,547 oz., valued at £5,955 19s., a decrease on that of last year of £142 9s.

Alexandra Race.

The sales of water from this race during the year, collected by Mr. Buchanan, the officer in charge, amounted to £60 13s. 10d. As there has been a divided authority over this race, I do not know the amount of water supplied nor the amount collected other than the amount shown as collected by Mr. Buchanan.

The expenditure on maintenance was £449 5s.

No water was used for mining during the year, the only users being the farmers in Ida Valley.

ANNEXURE D.

REPORTS OF DIRECTORS OF SCHOOLS OF MINES.

Mr. U. B. Inglis, A.O.S.M., Director of the Coromandel School of Mines, to the Under-Secretary, Mines Department, Wellington.

Sir,— Coromandel, 17th March, 1913.

I have the honour to present my report on the work done at the Coromandel School of Mines for the year 1912.

Attendance.—The individual number of students attending the school was as follows: First term, 7; second term, 19; third term, 19; the increase in the second and third terms including a number of young ladies who attended the classes in mathematics, science subjects, and book-keeping. The total number of class subjects was thirteen, and the attendance was extremely regular.

Annual Examinations.—As there were several students for subjects such as engine-driving and book-keeping, for which there is no recognized School of Mines examination, only nine students sat for the annual examinations. These nine students, however, sat in ten subjects and gained the unusually high average of 72 per cent. of marks, being by far the highest average marks per student per subject of any of the six schools in the Dominion. Seven passes were also secured in the practical examinations. There was only one failure in a practical and one in a theoretical subject, and twelve first-class, five second-class, and three third-class certificates were gained by students. One student obtained the highest marks for the Dominion in three of his subjects. One student passed the Junior Civil Service Examination and has since gained a good position, and one passed the teachers' C examination in geology and electricity.

Assays, &c.—During the year forty assays were made for the public and for mining companies, and there are indications that there will be a large increase in the number in the coming year. A number of chemical analyses of minerals and analyses of soils were also made in the latter part of 1912.

Library, &c.—A number of valuable books were added to the school library by the Council, and various improvements made to the school building. Chemicals and assay materials were also purchased in quantity. The books belonging to the school are much used and greatly appreciated by the students and members.

In conclusion, I have to thank the members of the Council for the very hearty interest they have taken in the welfare of the school, which has resulted in putting it in its present healthy position, and has aroused the interest of the local and surrounding public.

I have, &c.,

Urquhart B. Inglis, A.O.S.M., Director.

Mr. W. H. Baker, B.Sc., Director of the Thames School of Mines, to the Under-Secretary, Mines Department, Wellington.

Sir,— Thames, 2nd April, 1913.

I have the honour to present my report on the work done at the Thames School of Mines during the year 1912.

Attendance.—In spite of the continued mining slump the school attendance remains practically the same as last year. The average attendance of individual students was eighty-two, of whom thirty-four were registered students, thirty-eight elementary science students, and twelve members of the teachers' chemistry class. The average class attendance was 107.

Examinations.—In the practical examinations in assaying and chemistry fifteen students were examined and twelve were successful in passing. In the written examinations twenty-three students presented thirty-seven papers and obtained ten first-class, nine second-class, and nine third-class certificates. W. H. J. Cropp was successful in qualifying for the School of Mines Scholarship, and will continue his studies at the Otago University. F. A. Ellis qualified for the Customs Assayers' Certificate. W. H. J. Cropp and L. Whitehead were awarded the *Australian Mining Standard's* prizes. In the elementary science class prizes were awarded to J. Lyes, F. Grigg, A. Ellis, R. McLean, E. Penno, E. Morgan, and R. Judd for attendance, and to R. Judd for the highest marks obtained in this class.

Battery and Experimental Plant.—The battery has been in good working-order throughout the year, and five parcels of ore were treated. With the concentration and fine grinding plant very valuable tests can be made, which will indicate to a mining company the most satisfactory method of treatment. In the assay plant 160 assays were made for the public, and over one hundred on the ore being treated in the battery.

Museum.—The collection in the museum continues to be enlarged by donations of mineral samples. The thanks of the school are due to Mr. Denby, Mr. Warne, and others for donations of specimens.

Library.—The lending library is largely availed of by the students, to whom the reference-books supplied by the Department are a great convenience. The library has been further increased by the donation of part of the library of the late Hon. James McGowan, for many years President of the school.

In conclusion, I wish to express my appreciation of the work done by the staff, and my thanks to the Council for the keen interest displayed in the progress of the school.

I have, &c.,

W. H. Baker, B.Sc., Director

Mr. A. H. V. Morgan, M.A., Director of the Waihi School of Mines, to the Under-Secretary, Mines Department, Wellington.

Sir,— Waihi, 14th March, 1913.

I have the honour to present my annual report upon the work done at the Waihi School of Mines during 1912.

The average attendance of students during the year was forty-seven, with an average class attendance of 103. The diminished attendance as compared with previous years was due to the industrial crisis, extending over the whole of the second and third terms, which was the cause of many students leaving the district. The falling-off is clearly shown in the following table of attendances: First term: Individual students, 62; class attendance, 138. Second term: Individual students, 42; class attendance, 98. Third term: Individual students, 37; class attendance, 73. However, now that industrial peace is assured for some time to come, we may with confidence look forward to another period of steady progress and prosperity.

Examinations.—Although on account of the decreased attendance at the end of the year a smaller number of candidates sat for examination, the results were proportionately much higher than the previous year, as is shown in the following table: 1911—Number of candidates, 39; total number of papers, 63; first-class certificates, 16; second-class certificates, 15; third-class certificates, 18; failures, 14. 1912—Number of candidates, 20; total number of papers, 42; first-class certificates, 20; second-class certificates, 13; third-class certificates, 6; failures, 3. In addition to the above seven passes were secured by candidates in the practical examinations.

I have much pleasure in stating that a Government scholarship of the annual value of £50, tenable for three years at any New Zealand University college, has been secured by one of our students, Mr. A. H. McClean, while another student, Mr. L. Grange, has passed the first section of the Scholarship Examination. Also, Messrs. J. R. Thomson and H. Langdon have qualified for bullion assayers' certificates, issued by the Department of Trade and Customs.

President's (Mr. T. Gilmour) gold medal for highest aggregate: Mr. J. M. Corbett obtained the highest aggregate in any four subjects with an average of nearly 80 per cent. He won the same distinction and the medal two years ago, and was ineligible to receive it again this year, and it therefore passes on to Mr. A. H. McClean, the next highest. Mr. Haszard's gold medal for surveying was this year passed in, no student having secured the minimum 66 per cent.

Government certificates: At the last examination for Government certificates, held in March, 1912, Mr. J. R. Thomson obtained a certificate as first-class mine-manager, while Mr. A. Walker obtained a partial pass. In the examination for battery superintendents Mr. C. Kingsford was successful. Altogether thirty-three students of this school have obtained certificates as first-class metal-mine managers, forty-two as battery superintendents, and twenty-three as assayers of bullion under the Customs Department.

In conclusion, I have much pleasure in again acknowledging the zeal and ability with which the members of the staff carried out their duties, and the co-operation and assistance of the Council, especially the secretary.

I have, &c.,
A. H. V. Morgan, M.A., Director.

Karangahake School of Mines.—Annual Meeting, 5th March, 1913.

The annual meeting of the Karangahake School of Mines was held on Wednesday, 5th March. In the absence of the patron (Mr. H. Poland, M.P.), Mr. Barrance was voted to the chair.

The report and balance-sheet were read and adopted. The report showed the attendance to be lower than usual, owing to the Waihi strike having greatly affected the attendance at the Waikino branch school.

The average number of students was twenty-seven, and the average of attendance was fifty-two.

At the annual examinations held in December fifteen students sat and obtained fourteen first-, four second-, and nine third-class certificates. Two students also passed in the practical examination. Mr. G. E. Hyde was successful in obtaining one of the New Zealand Government scholarships, and an ex-student of the school (Mr. A. H. McClean) also gained a scholarship. Mr. Hyde had an excellent average of 81 per cent. in six subjects. The Council's prizes were won by G. E. Hyde and J. McDonald, and Mr. Hurdsfield's prize was won by Mr. C. Jenkins. The students were top in no less than eight subjects, and Mr. R. Connolly deserves special mention for obtaining 100 per cent. in senior electricity.

During the year eighty-one public assays, mainly of gold, were put through. This includes a number of prospectors' samples, which, if obtained in this county, are done free.

The scholarships offered by the Council to boys of public schools were won by R. Seally and J. Short; one student also obtained his winder's certificate.

During the year several standard works have been added to the library.

The statement of accounts showed the total receipts for the year as £872 8s. 2d., and the expenditure £591 4s. 2d., leaving a credit balance of £281 4s.

The Chairman, in a few well-chosen remarks, presented the certificates and prizes.

The election of officers for the year resulted as follows: Patron, H. Poland, Esq., M.P.; president, Mr. W. T. S. Wilson; vice-presidents, Messrs. H. Hyde, T. Hogg, and H. Croucher; Councillors, Messrs. Lewin, J. Tait, E. Patten, F. Moran, R. R. Lloyd, R. L. Birks, and Jolly.

The Council desire to thank the Mines Department, Ohinemuri County Council, Waihi Borough Council, and others for assistance and donations, also Mr. J. E. Redpath for honorary services as auditor.

Mr. W. F. WORLEY, Director of the Nelson School of Mines, to the UNDER-SECRETARY, Mines Department, Wellington.

SIR,— Nelson, 28th March, 1913.

I have the honour to present my report on the Nelson School of Mines for the year ended the 31st December, 1912.

Blowpipe Analysis Class.—This class was in session from the 10th April to the 10th December. There were in it twenty-one students, six of whom had had a previous year's training. The class met thirty-four times, the total number of attendances being 377. As in previous years, the class was drilled in testing for antimony, arsenic, bismuth, lead, tin, zinc, iron, nickel, cobalt, chrome, copper, and manganese. In addition to these the two-years students tested for gold, silver, platinum, sodium, potassium, calcium, titanium, sulphur, and nitrates. Three of those who had had a two-years course sat for examination in elementary blowpipe analysis, and each qualified easily for the certificate, as the appended list will show :—

	Total Attendance for Two Years.	Percentage of Marks.
Clifford Knapp	.. 67	97
Leslie Teller	.. 62	88
Neville Green	.. 64	84

Assaying.—During the year thirty-seven assays were made for prospectors, mining companies, and the public. This number of assays, though not so large as in former years, was a considerable advance upon last year's work, and indicates still further interest in the development of our mineral resources.

Assaying Class.—One student, a young man, took a short course of lessons in assaying for gold, silver, and lead.

Popular Lectures.—During the winter three lantern lectures were delivered in the Nelson Boys' School, the subjects being (*a*) earthquakes, (*b*) volcanoes, (*c*) the mining industry of New Zealand.

Geology.—Some investigations were made along the line of the supposed "Richmond fault," mentioned in Bulletin No. 12, but at present definite conclusions have not been arrived at.

I have, &c.,
W. F. WORLEY, Director.

Mr. H. LOVELL, Director of Westport School of Mines, to the UNDER-SECRETARY, Mines Department, Wellington.

SIR,— Westport, 2nd April, 1913.

I have the honour to present my report upon the work of the Westport School and its branches at Millerton, Denniston, and Ngakawau for the year ended the 31st December, 1912.

Owing to the death of my predecessor, Mr. Hercus, the school was without an instructor for two months, and this report bears principally upon the period during which I have been in charge, dating from the 1st July. The attendance at the school has averaged thirty-eight, with an average class attendance of seventy. The students were distributed over the main school and the various branches as follows: Westport, 10; Denniston, 9; Millerton, 11; Ngakawau, 8.

At the annual examinations held in December fourteen students presented themselves and obtained four first-class, three second-class, and six third-class passes. Six students of the school sat for the examinations for deputies and underviewers, and I understand were all successful. One student presented himself for examination for first-class coal-mine manager in the examination held on the 22nd March.

During the year 140 samples were assayed, and consisted mainly of ores for gold and silver contents. The list of assays of samples, other than those for gold and silver contents, comprised coals, mine-gases, tungsten-ore, bullion assays, and base bullion.

The school labours under great disadvantages at the branches, where there is absolutely no equipment for teaching. The want of surveying-instruments is keenly felt. Furthermore, the wide district to be covered precludes the possibility of one instructor getting good results, inasmuch as only one night in the week can be given to each school, and much time is spent in travelling.

I have, &c.,
H. LOVELL, Director.

Mr. J. F. MCPADDEN, Director of the Reefton School of Mines, to the UNDER-SECRETARY, Mines Department, Wellington.

SIR,— Reefton, 31st March, 1913.

I have the honour to present my report on the work of the Reefton School of Mines for the year ended the 31st December, 1912.

Attendance.—First term, twenty-nine students; second term, twenty-seven students; third term, sixteen students; fourth term, twelve students. The poor attendance during the year was due to cessation of work at the main mines.

Waiuta School.—Attendance at this school averaged eight students for the first half-year. During July this school was closed owing to the majority of students leaving the district, and was reopened during November, the attendance being six students.

Examinations.—At the examinations for Government certificates held in March last five students sat, four for battery superintendents' certificates, and one for first-class mine-manager's certificate. The results were most satisfactory, two students gaining battery superintendents' certificates, two received partial passes for the same, and one a partial pass for mine-manager's certificate.

Assays.—During the year 425 assays were made for the public. I have to acknowledge with thanks receipt of a number of mineral specimens from various gentlemen, and I also desire to thank the Council for the lively interest taken in the school.

I have, &c.,
J. F. McPadden, A.O.S.M., Director.

Professor James Park, M.Inst. M.M., M.A., I.M.E., F.G.S., Director of the Otago University School of Mines, to the Under-Secretary, Mines Department, Wellington.

Sir,— Dunedin, 3rd April, 1913.

I have the honour to present my report on the work done at the Otago School of Mines during the year ended the 31st December, 1912.

The Mining School for the session of 1912 showed an attendance of thirty students, of whom fourteen were entered for the full associate courses and one for the surveying course, the remaining fifteen attending the classes in geology.

During the year there was a greater demand for young graduates to fill posts as mine-surveyors and mine officials than in any previous year, and it was a matter for regret that the supply was unequal to the demand. Among the more important appointments secured by old students with some years of experience behind them were the following :—

(1.) G. W. Thomson, A.O.S.M., General Manager, Pearl Lake Gold-mines (Limited), Porcupine, Ontario.
(2.) E. Fletcher Roberts, A.O.S.M., Consulting Engineer, Vincent County Council.
(3.) Cyril Gudgeon, General Manager, Gold and Scheelite Company (Limited), Macrae's Flat, Otago.
(4.) H. Lovell, Director, Westport School of Mines.
(5.) U. B. Inglis, A.O.S.M., Director, Coromandel School of Mines.
(6.) S. Napier-Bell, A.O.S.M., General Manager, Nigeria Mines (Limited), Northern Nigeria.
(7.) Herbert Black, A.O.S.M., General Manager, Sifwi Mines, Gold Coast, West Africa.
(8.) F. W. Thomas, A.O.S.M., Assistant Manager, A'Koon Mines (Limited), West Africa.
(9.) A. Barron, A.O.S.M., Assistant Manager, Nigeria Mines (Limited), Northern Nigeria.
(10.) O. Gore Adams, A.O.S.M., General Manager, Porko Tin-mines (Limited), Bolivia.
(11.) A. M. Finlayson, D.Sc., A.O.S.M., Chief Mining Geologist, Burma Oil Company, Rangoon.

Mr. John McKinlay passed the examinations of the New Zealand Board of Examiners, and obtained his diploma as a licensed surveyor.

Laboratory.—During 1912 the number of samples of ores and minerals forwarded by the public for examination and valuation by assay or analysis was 148. The samples comprised ores of copper, iron, tungsten, limestones, gold-bearing quartz, bullion, &c. The bulk of the determinations were for gold.

I have, &c.,
James Park, Director.

ANNEXURE E.

MINING STATISTICS.

Table 1.

STATEMENT SHOWING THE REVENUE OF THE GOLDFIELDS COLLECTED IN THE SEVERAL DISTRICTS OF THE DOMINION OF NEW ZEALAND FOR THE PERIOD FROM 1ST JANUARY TO 31ST DECEMBER, 1912.

District.	Miners' Rights.	Business Licenses, Machine and Residence Sites.	Water-races, Sluices, &c.	Gold-mining Leases, Rents, and Royalties.	Registration.	Fees and Fines, Wardens' Courts.	Miscellaneous.	Totals.
AUCKLAND.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Coromandel ..	24 15 0	..	..	670 8 4	8 12 0	14 4 0	59 8 9	777 8 1
Te Aroha ..	34 15 0	437 8 0	14 10 0	286 3 0	2 9 0	..	0 1 0	775 6 0
Paeroa ..	53 15 0	224 7 9	..	1,262 4 4	14 9 0	5 15 0	7 5 6	1,567 16 7
Thames ..	158 8 0	..	0 5 0	784 1 1	8 18 0	28 18 0	98 8 2	1,078 18 3
Puhipuhi ..	3 10 0	..	..	121 12 0	15 0	2 6 0	..	128 3 0
Tauranga ..	2 10 0	..	..	..	..	..	0 5 0	2 15 0
Waihi ..	74 10 0	418 9 6	..	1,219 13 9	21 11 0	18 4 0	105 3 0	1,857 11 3
Totals ..	352 3 0	1,080 5 3	14 15 0	4,344 2 6	56 14 0	69 7 0	270 11 5	6,187 18 2
NELSON.								
Wangapeka ..	10 15 0	..	..	91 0 0	1 2 0	2 3 0	10 0 0	115 0 0
Motueka ..	..	..	..	..	..	..	..	..
Collingwood and Takaka	12 0 0	2 5 0	0 5 0	266 3 10	1 9 0	..	9 4 0	291 6 10
Westport, Seddonville, and Granity	93 10 0	72 2 0	..	781 7 2	22 19 6	31 12 0	170 17 5	1,172 8 1
Charleston ..	19 10 0	..	..	17 12 3	1 8 0	..	0 10 0	39 0 3
Ahaura ..	55 0 0	7 10 0	..	1,104 10 4	4 9 0	51 1 0	1 1 0	1,223 11 4
Reefton ..	62 0 0	15 0 0	..	966 14 11	11 16 0	40 18 0	235 4 11	1,331 13 10
Lyell and Murchison	2 10 0	0 7 0	..	9 2 7	0 15 0	..	20 10 0	33 4 7
Totals ..	255 5 0	97 4 0	0 5 0	3,236 11 1	43 18 6	125 14 0	447 7 4	4,206 4 11
MARLBOROUGH.								
Havelock ..	1 10 0	..	..	20 14 3	..	6 17 0	22 17 6	51 18 9
Blenheim ..	9 0 0	..	..	108 12 9	..	0 10 0	7 3 0	125 5 9
Totals ..	10 10 0	..	..	129 7 0	..	7 7 0	30 0 6	177 4 6
WESTLAND.								
Hokitika ..	51 0 0	..	..	3,183 4 9	0 5 0	119 10 6	118 11 0	3,472 11 3
Greymouth ..	75 0 0	0 1 0	0 5 0	7,170 6 6	0 4 0	20 13 0	40 19 0	7,307 8 6
Ross	17 10 0	2 5 0	0 10 0	551 4 6	5 7 6	5 15 0	10 3 0	592 15 0
Stafford and Goldsborough	17 10 0	..	..	1,044 0 0	..	30 1 0	..	1,091 11 0
Okarito ..	7 5 0	..	0 15 0	72 19 1	0 15 0	3 4 0	..	84 18 1
Kumara ..	46 10 0	12 10 0	2 0 0	648 8 10	11 9 0	18 16 0	59 7 0	799 0 10
Totals ..	214 15 0	14 16 0	3 10 0	12,670 3 8	18 0 6	197 19 6	229 0 0	13,348 4 8
CANTERBURY.								
Ashburton ..	0 5 0	..	..	..	..	..	..	0 5 0
OTAGO AND SOUTHLAND.								
Middlemarch ..	2 0 0	0 5 0	..	20 10 0	0 2 0	..	..	22 17 0
Hindon ..	20 5 0	1 0 0	..	52 10 0	0 2 0	0 12 0	0 19 0	75 8 0
Naseby ..	32 5 0	0 6 0	..	676 11 0	..	..	29 3 0	738 5 0
Tapanui ..	..	..	..	..	..	..	..	..
Black's, Alexandra, Clyde, Roxburgh	13 0 0	27 13 0	..	881 12 10	0 16 0	53 4 6	5 7 0	981 13 4
Arrowtown ..	5 15 0	1 5 0	..	137 18 1	6 5 0	8 3 0	0 1 0	159 7 1
Cromwell ..	54 5 0	32 11 2	0 10 0	694 8 6	..	45 2 6	2 10 6	829 7 8
Queenstown ..	40 0 0	5 10 0	..	305 16 0	7 16 0	9 11 0	2 5 0	370 18 0
Lawrence ..	30 15 0	17 16 6	0 15 0	355 1 10	1 0 0	14 18 0	59 5 0	479 11 4
Orepuki ..	15 0 0	..	..	24 7 2	1 6 0	1 17 0	0 5 0	42 15 2
Riverton ..	20 15 0	..	..	189 2 5	10 17 0	22 8 6	88 4 0	331 6 11
Pembroke ..	4 10 0	..	..	..	0 5 0	..	0 9 0	5 4 0
Waikaia ..	4 0 0	..	1 10 0	109 10 3	3 8 0	5 16 0	8 6 6	132 10 9
Wyndham ..	2 15 0	..	0 15 0	22 18 4	0 5 0	0 14 0	..	27 7 4
Gore	5 0 0	..	0 5 0	169 15 9	1 6 0	1 10 0	2 6 0	180 2 9
Totals ..	250 5 0	86 6 8	3 15 0	3,640 2 2	33 8 0	163 16 6	199 1 0	4,376 14 4
Grand totals ..	1,083 3 0	1,278 11 11	22 5 0	24,020 6 5	152 1 0	564 4 0	1,176 0 3	28,296 11 7

Table 2.

STATEMENT SHOWING THE REVENUE OF THE GOLDFIELDS COLLECTED IN THE SEVERAL DISTRICTS OF THE DOMINION OF NEW ZEALAND FOR THE PERIOD FROM 1ST JANUARY TO 31ST MARCH, 1913.

District.	Miners' Rights.	Business Licenses, Machine and Residence Sites.	Water-races, Sluices, &c.	Gold-mining Leases, Rents, and Royalties.	Registration.	Fees and Fines, Wardens' Courts.	Miscellaneous.	Totals.
AUCKLAND.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Coromandel ..	8 15 0	..	..	167 4 7	1 13 0	3 11 0	5 13 0	186 16 7
Thames ..	18 10 0	..	..	388 13 5	3 15 0	6 11 0	0 17 6	418 6 11
Te Aroha ..	5 0 0	142 6 7	..	56 12 6	0 16 0	..	..	204 15 1
Paeroa	11 5 0	30 7 11	..	518 10 10	5 1 0	0 5 0	1 17 6	567 7 3
Puhipuhi ..	2 10 0	..	..	6 10 0	0 9 0	1 0 0	..	10 9 0
Tauranga ..	0 5 0	..	..	..	..	..	..	0 5 0
Waihi	13 15 0	421 4 6	..	360 16 0	2 7 0	4 6 0	68 17 8	871 6 2
Totals ..	60 0 0	593 19 0	..	1,493 7 4	14 1 0	15 13 0	77 5 8	2,259 6 0
NELSON.								
Wangapeka ..	1 5 0	..	..	5 0 0	0 1 0	0 8 0	..	6 14 0
Collingwood and Takaka	2 0 0	0 10 0	..	108 7 6	0 8 0	..	4 8 0	115 13 6
Westport, Seddonville, and Granity	22 10 0	4 5 0	..	16 16 9	4 7 6	19 5 0	13 19 0	81 3 3
Charleston ..	4 5 0	..	..	4 3 9	0 1 0	..	0 10 0	8 19 9
Ahaura	13 5 0	..	..	241 4 9	1 17 0	9 16 0	..	266 2 9
Reefton	11 0 0	4 10 0	..	444 17 0	1 14 0	5 9 0	75 16 0	543 6 0
Lyell and Murchison	0 15 0	..	..	0 7 6	0 1 0	..	1 6 0	2 9 6
Motueka ..	..	..	..	..	..	..	..	..
Totals ..	55 0 0	9 5 0	..	820 17 3	8 9 6	34 18 0	95 19 0	1,024 8 9
MARLBOROUGH.								
Havelock ..	0 15 0	..	..	6 7 6	1 0 0	0 4 0	0 2 0	8 8 6
Blenheim ..	1 0 0	..	..	26 13 3	..	..	..	27 13 3
Totals ..	1 15 0	..	..	33 0 9	1 0 0	0 4 0	0 2 0	36 1 9
WESTLAND.								
Hokitika ..	8 15 0	..	..	441 9 4	..	11 8 6	15 9 0	477 1 10
Greymouth ..	27 10 0	0 16 0	..	1,707 15 2	0 13 0	6 13 0	9 19 0	1,753 6 2
Ross	2 5 0	0 10 0	1 0 0	152 4 0	1 10 6	1 17 0	2 15 0	162 1 6
Stafford and Goldsborough	4 15 0	..	..	51 19 0	..	2 18 0	..	59 12 0
Kumara ..	11 10 0	2 10 0	1 0 0	44 12 0	2 7 0	3 9 0	8 11 0	73 19 0
Okarito	2 5 0	..	0 5 0	93 1 1	0 12 0	0 14 0	6 15 0	103 12 1
Totals ..	57 0 0	3 16 0	2 5 0	2,491 0 7	5 2 6	26 19 6	43 9 0	2,629 12 7
CANTERBURY.								
Ashburton ..	0 10 0	..	..	..	..	..	..	0 10 0
OTAGO AND SOUTHLAND.								
Hindon	6 0 0	..	..	25 15 0	..	0 2 0	0 2 0	31 19 0
Naseby	3 15 0	0 6 6	..	149 16 7	..	..	2 14 0	156 12 1
Roxburgh Alexandra Clyde .. Black's ..	3 0 0	9 7 0	..	274 10 1	0 6 0	13 12 6	0 5 0	301 0 7
Arrowtown ..	3 5 0	2 0 0	..	67 6 10	0 7 0	0 16 0	..	73 14 10
Pembroke ..	1 5 0	..	..	..	..	..	0 6 0	1 11 0
Cromwell ..	8 15 0	6 0 0	..	253 19 0	..	8 14 0	42 17 6	320 5 6
Queenstown ..	10 15 0	0 10 0	..	86 2 7	2 8 0	4 8 0	1 15 0	105 18 7
Lawrence ..	8 0 0	0 11 9	..	156 16 2	..	7 17 0	2 4 0	175 8 11
Waikaia ..	1 0 0	..	0 10 0	100 2 1	0 5 0	1 6 0	2 2 0	105 5 1
Orepuki ..	4 10 0	..	..	10 15 10	0 10 0	1 8 0	..	17 3 10
Riverton ..	6 5 0	..	..	93 15 2	0 14 0	1 10 0	2 5 0	94 9 2
Wyndham ..	0 5 0	..	..	5 2 9	0 2 0	0 4 0	..	5 13 9
Middlemarch ..	0 10 0	..	..	9 15 0	..	..	..	10 5 0
Gore	0 10 0	..	..	6 18 3	..	0 2 0	..	7 10 3
Totals ..	57 15 0	18 15 3	0 10 0	1,230 15 4	4 12 0	39 19 6	54 10 6	1,406 17 7
Grand totals ..	232 0 0	625 15 3	2 15 0	6,074 1 3	33 5 0	117 14 0	271 6 2	7,356 16 8

Table 3.

STATEMENT SHOWING THE QUANTITY OF QUARTZ CRUSHED AND GOLD OBTAINED IN THE HAURAKI MINING DISTRICT FOR THE YEAR ENDED 31ST DECEMBER, 1912.

Locality and Name of Mine.	Average Number of Men employed.	Quartz crushed.	Gold obtained.		Estimated Value.
			Amalgamation.	Cyanide.	
WAIHI BOROUGH.					
Waihi—		Tons cwt. qr. lb.	Oz. dwt.	Oz. dwt.	£ s. d.
Waihi	1,200	131,989 0 0 0	27,355 0	456,823 0	316,723 16 9
Grand Junction	250	37,242 0 0 0	85,784 0	..	74,371 1 5
Sundries from various sources	14	975 0 0 0	..	866 4	299 6 10
Totals	1,464	170,206 0 0 0	113,139 0	457,689 4	391,394 5 0
OHINEMURI COUNTY.					
Owharoa—					
Waikino-Waiomoko	3	2 0 0 0	2 0	..	2 10 0
Waitekauri—					
New Waitekauri	1	0 17 0 0	25 6	..	27 15 11
Maoriland	14	1,764 0 0 0	599 17	590 0	3,585 12 11
Golden Cross	10	1,045 0 0 0	917 14	812 17	1,990 6 5
Prospectors	2	*	20 0	..	59 8 4
	27	2,809 17 0 0	1,562 17	1,402 17	5,663 3 7
Karangahake—					
Talisman	320	42,780 0 0 0	44,472 17	244,721 7	246,568 19 11
New Zealand Crown	170	22,839 0 0 0	..	17,023 0	40,798 7 5
	490	65,619 0 0 0	44,472 17	261,744 7	287,367 7 4
Paeroa—					
Waihi-Paeroa Gold Extraction Company	67	†	..	81,367 13	33,811 6 5
Komata—					
Komata Reefs	65	5,464 0 0 0	2,130 4	12,783 13	16,635 12 0
Maratoto—					
Silver Stream	7	5 0 0 0	750 0	..	103 0 0
Totals	659	73,899 17 0 0	48,917 18	357,298 10	343,582 19 4
PIAKO COUNTY.					
Te Aroha—					
Westralia	8	300 0 0 0	..	105 0	210 0 0
Bendigo	2	246 0 0 0	..	20 10	33 11 7
Totals	10	546 0 0 0	..	125 10	243 11 7
COROMANDEL COUNTY.					
Waikoromiko—					
Four-in-Hand	4	0 0 2 5	2 16	..	8 4 3
Prospectors	2	0 0 0 4	4 0	..	11 10 0
	6	0 0 2 9	6 16	..	19 14 3
Tokatea—					
Royal Oak	6	8 2 2 20	116 10	..	320 7 6
Mount Welcome	5	4 0 0 0	108 0	..	313 4 0
Pride of Tokatea	2	18 0 0 25	10 11	..	25 5 11
	13	30 2 3 17	235 1	..	658 17 5
Kapanga—					
New Success	2	0 2 0 3	20 10	..	51 5 11
Prospectors	4	2 0 0 0	4 15	..	14 18 6
	6	2 2 0 3	25 5	..	66 4 5
Hauraki Block—					
Old Hauraki	36	318 5 1 27	1,343 10	..	3,964 9 5
Hauraki Reefs	13	123 0 3 11	319 8	..	895 13 10
Armstrong Dredging Company	4	‡	75 3	..	220 5 5
	53	441 6 1 10	1,738 1	..	5,080 8 8
Bremner's Freehold—					
Bremner's Freehold	4	7 1 1 10	43 4	..	119 6 9
L.S.D. Syndicate	2	3 0 0 0	8 15	..	26 5 0
	6	10 1 1 10	51 19	..	145 11 9

* Sluicing. † 84,178 tons (of 2,240 lb.) of tailing were treated by cyanidation after being recovered from the river-bed. They are not included in quartz crushed, having been so accounted for before deposition in the sludge-channel ‡ Washdirt.

Table 3—*continued.*

STATEMENT SHOWING THE QUANTITY OF QUARTZ CRUSHED AND GOLD OBTAINED IN THE HAURAKI MINING DISTRICT FOR THE YEAR ENDED 31ST DECEMBER, 1912—*continued.*

Locality and Name of Mine.	Average Number of Men employed.	Quartz crushed.	Gold obtained.		Estimated Value.
			Amalgamation.	Cyanide.	
COROMANDEL COUNTY—*continued.*					
Kuaotunu—		Tons cwt. qr. lb.	Oz. dwt.	Oz. dwt.	£ s. d.
Handsworth United	5	22 0 2 24	411 15	..	999 11 4
New Waitaia	12	163 0 0 0	706 9	..	2,077 16 4
Mountain King	14	257 0 0 0	..	641 3	1,931 9 4
Missouri	2	85 0 0 0	65 11	..	174 8 6
Prospectors	8	15 10 0 0	15 8	..	37 9 3
	41	542 10 2 24	1,199 3	641 3	5,220 14 9
Totals	125	1,026 3 3 17	3,256 5	641 3	11,191 11 3
THAMES COUNTY AND BOROUGH.					
Tapu—					
Portia	2	217 0 0 0	221 12	..	667 6 6
Waiomio—					
Monowai	26	3,255 0 0 0	..	3,230 14	5,735 10 10
Tararu—					
Day Dawn and Norfolk	6	*	..	5 10	10 17 3
New Sylvia	55	10,459 0 0 0	..	24,678 0	15,043 12 11
Watchman	19	855 0 0 0	648 16	..	1,772 19 10
Waitangi	14	0 1 2 2	6 8	..	18 19 2
	94	11,314 1 2 2	655 4	24,683 10	16,846 9 2
Moanataiari—					
Kuranui-Caledonian	1	12 0 0 0	3 12	..	9 12 9
Thames Foreshore	12	..	..	158 11	298 19 6
	13	12 0 0 0	3 12	158 11	308 12 3
Kuranui—					
Kuranui Mine	6	30 0 0 0	4 12	..	10 16 2
Waiotahi—					
Waiotahi	11	87 0 0 0	..	144 4	393 6 7
Ballarat	1	2 0 2 0	49 17	..	116 10 0
Nonpariel	4	28 0 0 0	511 0	..	1,384 6 9
Golden Drop	1	0 0 0 5	3 0	..	7 19 0
West Coast	2	15 0 0 0	11 0	..	27 10 0
	19	132 0 2 5	574 17	144 4	1,929 12 4
Grahamstown—					
Victoria	4	30 0 0 18	168 8	..	463 2 2
Waiokaraka—					
May Queen	20	342 0 0 0	258 14	..	709 19 8
Karaka—					
Gladstone	2	6 1 1 13	140 1	..	367 12 3
Good Hope	6	100 0 0 0	20 16	..	56 4 10
Occidental	11	450 8 0 0	1,551 8	..	4,108 15 7
	19	556 9 1 13	1,712 5	..	4,532 12 8
Hape Creek—					
Cambria	7	55 0 0 0	40 0	..	103 0 0
Daisy	2	30 0 2 10	100 0	..	256 2 9
	9	85 0 2 10	140 0	..	359 2 9
Kirikiri—					
Kirikiri	4	73 0 0 0	59 15	..	146 9 0
Neavesville—					
Champion	6	300 0 0 0	40 0	..	100 0 0
Tairua—					
Tairua Golden Hills	26	2,806 0 0 0	..	2,071 19	3,494 0 8
Totals	248	19,152 12 0 20	3,838 19	30,288 18	35,303 14 2
SUMMARY.					
Waihi Borough	1,464	170,206 0 0 0	113,139 0	457,689 4	391,394 5 0
Ohinemuri County	659	73,899 17 0 0	48,917 18	357,298 10	343,582 19 4
Piako County	10	546 0 0 0	..	125 10	243 11 7
Coromandel County	125	1,026 3 3 17	3,256 5	641 3	11,191 11 3
Thames County and Borough	248	19,152 12 0 20	3,838 19	30,288 18	35,303 14 2
Totals, 1912	†2,506	264,830 13 0 9	169,152 2	846,043 5	781,716 1 4
Totals, 1911	2,650	507,280 11 3 16	178,334 12	1,327,104 13	1,141,235 8 1
Decrease	144	244,449 18 2 7	9,182 10	334,692 19	359,519 6 9

NOTE.—Increase as follows: Ohinemuri County, £54,753 9s. 1d.; Piako County, £8 16s. 7d.; Coromandel County, £426 8s. 7d.

* Slags. † During the year 175 men were employed on unproductive works not included in this total.

Table 3—*continued.*

STATEMENT SHOWING QUANTITY OF QUARTZ CRUSHED AND GOLD OBTAINED IN THE MARLBOROUGH, KARAMEA, AND WESTLAND MINING DISTRICTS FOR THE YEAR ENDED 31ST DECEMBER, 1912.

Locality and Name of Mine.	Average Number of Men employed.	Quartz crushed.	Gold obtained.		Estimated Value.
			Amalgamation.	Cyanide.	
MARLBOROUGH.					
Wakamarina—		Tons.	Oz. dwt. gr.	Oz. dwt. gr.	£ s. d.
Dominion Consolidated ..	40	3,500	539 17 3	..	1,838 15 6
COLLINGWOOD COUNTY.					
Taitapu—					
Golden Blocks	24	1,229	1,700 9 0	..	6,761 0 0
BULLER COUNTY.					
Lyell—					
New Alpine	9	436	191 6 0	..	750 12 0
Swastika	6	11	6 9 0	..	24 11 0
Totals	15	447	197 15 0	..	775 3 0
INANGAHUA COUNTY.					
Reefton—					
Keep-it-Dark	56	10,180	2,160 1 0	1,210 9 0	12,855 16 8
Wealth-of-Nations	60	10,936	3,391 11 0	1,300 19 0	17,509 4 5
Progress	100	8,770	2,275 16 0	1,234 15 0	12,542 10 9
Lankey's Creek	4	823	198 13 17	..	799 4 0
New Discovery	3	9	16 15 0	..	64 18 1
	223	30,718	8,042 16 17	3,746 3 0	43,771 13 11
Big River—					
New Big River	57	7,666	8,362 10 0	1,009 2 0	36,656 13 7
Waiuta—					
Blackwater	100	11,538	5,731 5 0	1,112 8 0	26,604 8 10
Totals	380	49,922	22,136 11 17	5,867 13 0	107,032 16 4
SUMMARY.					
Marlborough	40	3,500	539 17 3	..	1,838 15 6
Collingwood County	24	1,229	1,700 9 0	..	6,761 0 0
Buller County	15	447	197 15 0	..	775 3 0
Inangahua County	380	49,922	22,136 11 17	5,867 13 0	107,032 16 4
Totals, 1912 ..	459*	55,098	24,574 12 20	5,867 13 0	116,407 14 10
Totals, 1911 ..	940	128,244	47,806 1 0	10,954 16 0	228,512 7 11
Decrease	481	73,146	23,231 8 4	5,087 3 0	112,104 13 1

*Eighty-seven men not included in this total were employed at non-productive mines during the year.

STATEMENT SHOWING THE QUANTITY OF QUARTZ CRUSHED AND GOLD OBTAINED IN THE OTAGO MINING DISTRICT FOR THE YEAR ENDED 31ST DECEMBER, 1912.

Locality and Name of Mine.	Average Number of Men employed.	Quartz crushed.	Gold obtained.	Estimated Value.
FIORD COUNTY.				
Preservation Inlet—		Tons.	Oz. dwt.	£ s. d.
Morning Star	7	50	3 0	11 11 8
LAKE COUNTY.				
Macetown—				
United Goldfields	11	20	42 6	126 19 1

Table 3—*continued.*

STATEMENT SHOWING THE QUANTITY OF QUARTZ CRUSHED AND GOLD OBTAINED IN THE OTAGO MINING DISTRICT FOR THE YEAR ENDED 31ST DECEMBER, 1912—*continued.*

Locality and Name of Mine.	Average Number of Men employed.	Quartz crushed.	Gold obtained.	Estimated Value.
VINCENT COUNTY.				
Carrick—				
Carrick Gold-mining Company	20	940	388 17	1,514 10 3
Star of the East	10	250	77 11	310 0 0
Good Chance	2	125	78 6	374 1 0
Bendigo—				
Alto Syndicate	4	..	..	..
Bald Hill Flat—				
Advance	2	190	210 4	809 5 0
Totals	38	1,505	754 18	3,007 16 3
MANIOTOTO COUNTY.				
Hyde—				
Ophir	2	4	3 18	14 16 11
Mount Highlay	6	..	..	..
Gold and Tungston	14	*	*	*
Totals	22	4	3 18	14 16 11
WAIHEMO COUNTY.				
Macrae's—				
Golden Point	25	11,779	1,129 2	4,302 0 4
Maritana	13	1,290	23 12	84 17 1
Golden Bar	6	536	36 13	139 5 5
Goldfinch	10	368	91 18	312 12 9
Golden Ridge	6	170	19 17	65 1 8
Totals	60	14,143	1,301 2	4,903 17 3
SUMMARY.				
Fiord County	7	50	3 0	11 11 8
Lake County	11	20	42 6	126 19 1
Vincent County	38	1,505	754 18	3,007 16 3
Maniototo County	22	4	3 18	14 16 11
Waihemo County	60	14,143	1,301 2	4,903 17 3
Totals, 1912	138†	15,722	2,105 4	8,065 1 2
Totals, 1911	172	10,467	1,449 19	5,506 13 7
Increase	..	5,255	655 5	2,558 7 7
Decrease	34	..	..	..

* Included in Golden Point return. † Seventy-five of this number were mostly employed at quartz-scheelite mining, and in all other tables are included as scheelite miners or prospectors.

STATEMENT OF VALUE OF BULLION WON FROM QUARTZ CRUSHED FOR ALL DISTRICTS FOR THE YEARS ENDED 31ST DECEMBER, 1911 AND 1912.

Mining District.	Year ended 31st December, 1911.	Year ended 31st December, 1912.
	£ s. d.	£ s. d.
Hauraki	1,141,235 0 0	781,716 1 4
Marlborough, Nelson, and West Coast	228,512 0 0	116,407 14 10
Otago and Southland	5,506 0 0	8,065 1 2
Totals	1,375,253 0 0	906,188 17 4

Table 4.

GROSS TOTALS AND VALUE OF BULLION PURCHASED BY BANKS FOR THE YEAR ENDED 31ST DECEMBER, 1912.

Bank.	Bullion purchased.	Value.
Hauraki Mining District (Northern Inspection District).		
	Oz. dwt. gr.	£ s. d.
Bank of New Zealand	147,757 8 0	252,166 7 10
Bank of New South Wales	3,143 6 10	8,419 19 3
National Bank of New Zealand	78,673 2 11	34,736 14 4
	229,573 16 21	295,323 1 5
Marlborough, Karamea, and Westland Mining Districts (West Coast Inspection District).		
Bank of New Zealand	63,840 11 18	246,549 8 2
National Bank of New Zealand	32,382 2 18	125,192 13 11
Bank of New South Wales	12,228 4 10	48,363 19 11
Union Bank of Australia	1,378 5 10	5,302 6 2
Bank of Australasia	6,085 2 20	24,303 19 2
Private buyers	143 14 22	551 12 2
	116,058 2 2	450,263 19 6
Otago Mining District (Southern Inspection District).		
Bank of New Zealand	13,571 12 22	52,661 18 1
Bank of New South Wales	1,581 5 7	6,200 14 7
National Bank of New Zealand	4,648 16 23	29,071 8 4
Union Bank of Australia	1,792 17 23	7,058 12 5
	21,594 13 3	94,992 13 5
Totals	367,226 12 2	840,579 14 4
Totals, 1911	360,788 12 15	777,021 11 1

Table 5.

RETURN OF GOLD DUTY CREDITED TO LOCAL BODIES FOR THE YEAR ENDED 31ST DECEMBER, 1912, AND THE QUARTER ENDED 31ST MARCH, 1913.

Local Body.	For the Year ended 31st December, 1912.	For the Quarter ended 31st March, 1913.
COUNTIES—	£ s. d.	£ s. d.
Coromandel	280 2 10	36 2 0
Ohinemuri	8,614 1 8	1,777 9 7
Piako	3 16 0	..
Thames	843 8 9	303 0 4
BOROUGHS—		
Thames	61 3 0	41 6 0
Waihi	8,071 16 5	2,759 18 5
Totals	17,874 8 8	4,917 16 4

Table 6.

RETURN OF THE QUANTITY AND VALUE OF GOLD ENTERED FOR DUTY* FOR EXPORTATION FROM NEW ZEALAND FROM 1ST APRIL, 1857, TO 31ST DECEMBER, 1912.

Produce of the Goldfields in		During the Quarter ended 31st December, 1912.		Entered for Exportation to the 30th September, 1912.		Total entered for Exportation from New Zealand to the 31st December, 1912.	
County or Borough.	District.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
		Oz.	£	Oz.	£	Oz.	£
County of Thames ..	Auckland	3,030	11,841				
„ Ohinemuri ..		26,823	102,281				
„ Coromandel		1,307	5,486				
„ Piako ..		..	..				
Borough of Thames ..		413	1,734				
„ Waihi ..		..	..				
Great Barrier Island ..		..	..				
		31,573	121,342	5,574,631	21,248,269	5,606,204	21,369,611
	Wellington ..	..	..	188	706	188	706
County of Marlborough	Marlborough ..	351	1,291	90,600	352,954	90,951	354,245
County of Collingwood	Nelson	327	1,308				
„ Waimea ..		..	..				
„ Takaka ..		..	..				
„ Murchison ..		12	48				
		339	1,356	1,729,401	6,856,417	1,729,740	6,857,773
County of Buller ..	West Coast	1,145	4,600				
„ Inangahua ..		8,235	32,381				
„ Grey ..		2,504	10,035				
„ Westland ..		2,562	10,341				
Borough of Kumara ..		..	..				
„ Hokitika ..		..	..				
„ Ross ..		583	2,333				
		15,029	59,690	5,743,486	22,832,703	5,758,515	22,892,393
	Canterbury ..	..	..	99	387	99	387
County of Taieri ..	Otago	151	605				
„ Tuapeka ..		1,319	5,206				
„ Vincent ..		5,164	20,628				
„ Maniototo ..		702	2,818				
„ Waihemo ..		157	616				
„ Waitaki ..		130	518				
„ Lake ..		746	2,995				
„ Wallace ..		1,123	4,490				
„ Waikouaiti ..		..	..				
„ Bruce ..		222	889				
„ Clutha ..		34	139				
„ Fiord ..		3	12				
„ Southland ..		6,608	26,667				
„ Stewart Island		..	..				
		16,359	65,683	7,304,593	29,052,499	7,320,952	29,118,182
Unknown	..	129	486	1,373	5,245	1,502	5,731
Totals ..	..	63,780	249,848	20,444,371	80,349,180	20,508,151	80,599,028

*Duty payable on gold exported, the produce of the North Island, 2s. 3d. per oz.; duty payable on gold exported, the produce of the South Island, 3d. per oz.; duty payable on gold exported, contained in jewellers' and dentists' sweepings, free. *Vide* sections 1 and 2 of the Gold Duty Act, 1908, section 16 of the Mining Amendment Act, 1910, and section 2 of the Gold Duty Amendment Act, 1912.

Table 7.

COMPARATIVE RETURN FOR THE YEARS ENDED 31ST DECEMBER, 1912 AND 31ST DECEMBER, 1911.

Produce of the Goldfields in the District of	During the Quarter ended				Totals for Year 1912.		Totals for Year 1911.	
	31st March, 1912.	30th June, 1912.	30th September, 1912.	31st December, 1912.	Quantity.	Value.	Quantity.	Value.
	Oz.	Oz.	Oz.	Oz.	Oz.	£	Oz.	£
Auckland ..	50,824	52,693	44,773	31,573	179,863	693,949	263,791	1,049,204
Marlborough ..	79	..	9	351	439	1,643	229	867
Nelson ..	699	1,727	469	339	3,234	12,911	2,149	8,586
West Coast ..	22,071	23,900	7,269	15,029	68,269	270,580	92,403	368,545
Otago ..	27,567	19,373	27,310	16,359	90,609	363,240	96,148	387,614
Unknown ..	135	213	272	129	749	2,792	506	1,966
Totals for 1912	101,375	97,906	80,102	63,780	343,163	1,345,115	..	..
Totals for 1911	117,598	105,049	125,531	107,048	..	..	455,226	1,816,782

Table 8.

RETURN OF THE QUANTITY AND VALUE OF GOLD ENTERED FOR DUTY* FOR EXPORTATION FROM NEW ZEALAND FROM 1ST APRIL, 1857, TO 31ST MARCH, 1913.

PRODUCE OF THE GOLDFIELDS IN		DURING THE QUARTER ENDED 31ST MARCH, 1913.		ENTERED FOR EXPORTATION TO THE 31ST DECEMBER, 1912.		TOTAL ENTERED FOR EXPORTATION FROM NEW ZEALAND TO THE 31ST MARCH, 1913.	
County or Borough.	District.	Qu'ntity	Value.	Quantity.	Value.	Quantity.	Value.
		Oz.	£	Oz.	£	Oz.	£
County of Thames ..	Auckland	1,467	5,159				
" Ohinemuri ..		17,775	65,962				
" Coromandel ..		361	1,509				
" Piako ..		..	..				
Borough of Thames ..		3	3				
" Waihi ..		27,599	115,826				
Great Barrier Island ..		..	..				
		47,205	188,464	5,606,204	21,369,611	5,653,409	21,558,075
	Wellington ..	..	..	188	706	188	706
County of Marlborough	Marlborough ..	267	1,026	90,951	354,245	91,218	355,271
County of Collingwood ..	Nelson	154	612				
" Murchison ..		13	52				
" Takaka ..		..	..				
		167	664	1,729,740	6,857,773	1,729,907	6,858,437
County of Buller ..	West Coast	998	3,853				
" Inangahua ..		13,040	52,259				
" Grey ..		3,870	15,477				
" Westland ..		3,010	12,084				
Borough of Kumara ..		..	..				
" Hokitiki ..		..	..				
" Ross ..		120	479				
		21,038	84,152	5,758,515	22,892,393	5,779,553	22,976,545
	Canterbury ..	..	..	99	387	99	387
County of Taieri ..	Otago	302	1,311				
" Tuapeka ..		5,040	20,101				
" Vincent ..		4,126	16,612				
" Maniototo ..		2,345	9,182				
" Waihemo ..		314	1,097				
" Waitaki ..		1,065	4,237				
" Lake ..		451	1,811				
" Wallace ..		707	2,850				
" Waikouaiti ..		..	..				
" Bruce ..		168	672				
" Clutha ..		397	1,622				
" Fiord ..		2	8				
" Southland ..		6,897	27,850				
" Stewart Island		..	..				
		21,814	87,353	7,320,952	29,118,182	7,342,766	29,205,535
Unknown	..	80	323	1,502	5,747	1,582	6,070
Totals ..	..	90,571	361,982	20,508,151	80,599,044	20,598,722	80,961,026

*Duty payable on gold exported, the produce of the North Island, 2s. 3d. per oz.; duty payable on gold exported, the produce of the South Island, 3d. per oz.; duty payable on gold exported, contained in jewellers' and dentists' sweepings, free. *Vide* sections 1 and 2 of the Gold Duty Act, 1908, section 16 of the Mining Amendment Act, 1910, and section 2 of the Gold Duty Amendment Act, 1912.

Table 9.

COMPARATIVE RETURN FOR THE QUARTERS ENDED 31ST MARCH, 1913 AND 1912.

District of	Quarter ended 31st March, 1913.		Quarter ended 31st March, 1912.	
	Quantity.	Value.	Quantity.	Value.
	Oz.	£	Oz.	£
Auckland	47,205	188,464	50,824	200,309
Wellington	..	..	..	..
Marlborough	267	1,026	79	316
Nelson	167	664	699	2,783
West Coast	21,038	84,152	22,071	87,156
Canterbury	..	..	..	..
Otago	21,814	87,353	27,567	110,869
Unknown	80	323	135	447
Totals	90,571	361,982	101,375	401,880

Table 10.

STATEMENT OF AFFAIRS OF MINING COMPANIES, AS PUBLISHED IN ACCORDANCE WITH THE COMPANIES ACT, 1908.

Name of Company.	Date of Registration.	Subscribed Capital.	Amount of Capital actually paid up.	Value of Scrip given to Shareholders on which no Cash paid.	Number of Shares allotted.	Amount paid per Share.	Arrears of Calls.	Number of Shareholders at present.	Number of Men employed.	Quantity and Value of Gold and Silver produced since Registration.		Total Expenditure since Registration.	Total Amount of Dividends paid.	Amount of Debts owing by Company.
										Quantity.	Value.			
AUCKLAND DISTRICT.														
		£	£	£		£ s. d.	£			Oz.	£	£	£	£
Alburnia Gold-mining Company (Limited) ..	2/9/10	7,800	1,887	..	155,994	3d., 2½d. 2d.	44	95	2	..	..	1,810	..	..
Bendigo Gold-mining Company (Limited) ..	26/3/08	14,396	10,453	1,424	143,958	0 1 6	344	84	1	45	273	6,402	..	1,146
Bonanza Gold-mining Company (No Liability) ..	22/10/06	10,000	3,595	..	100,000	0 0 10	..	117	3	..	..	3,608	..	3
Bremner's Freehold Gold-mining Company (Ltd.)	5/8/10	10,000	1,167	..	100,000	0 0 3	83	75	4	483	1,339	2,454	..	22
Dixon's Consolidated Gold-mining Company (Ltd.)	22/6/08	4,500	4,320	500	100,000	1/, 11d, 9d., & 10d.	65	79	2	1	4	4,152	..	15
Dominion Gold-mining Company (No Liability)	8/9/11	18,760	1,563	..	187,600	0 0 2	..	171	4	..	..	1,397	..	12
Golden Belt Gold-mining Company (Limited) ..	22/12/11	24,959	2,535	17,027	124,796	4/, 1/2, 1/4	134	124	6	..	..	2,203	..	1,764
Golden Cross Consolidated (Limited)	13/8/12	5,435	1,359	..	108,700	0 0 3	453	76	8	367	352	1,959	..	978
Good Hope Gold-mining Company (No Liability)	10/11/10	12,975	1,982	1,622	129,746	0 0 7	..	70	..	99	277	2,324	..	13
Handsworth United Gold-mining Company (Ltd.)	27/7/09	14,000	3,083	1,000	140,000	0 0 7	..	118	4	1,983	4,828	7,086	..	1
Hare-Ratjen Copper Company (Limited) ..	5/4/07	7,600	1,000	6,600	7,600	1 0 0	..	20	..	..	..	1,365	..	27
Hauraki Reefs (Limited)	28/4/10	18,750	6,743	5,083	175,000	1/2, 1/1, 9d., & 2/	468	350	14	800	2,364	8,808	..	311
Kaipara Copper-developing Company (Limited)	25/6/08	1,470	1,010	460	1,470	1 0 0	..	99	1	..	..	1,269	..	65
Kirikiri Consolidated Mines (Limited) ..	2/9/09	15,000	4,650	7,500	150,000	0 1 8½	107	21	..	..	146	4,785	..	96
Kuranui Gold-mining Company (Limited) ..	12/9/95	22,394	17,198	3,450	89,575	0 4 8	198	75	4	..	1,899	18,454	..	145
Luck-at-Last Gold-mining Company (Limited) ..	25/8/09	2,709	2,505	..	83,260	0 0 7	..	21	4	..	..	2,496	..	720
Maoriland Gold-mining Company (Limited) ..	15/6/06	10,600	6,400	..	106,000	2s. & 6d.	..	208	15	..	7,979	26,397	..	29
May Queen Gold-mining Company (Limited) ..	15/5/07	64,000	26,567	26,767	256,000	0 4 2	..	478	17	5,198	14,586	51,001	..	543
Mills Reward Gold-mining Company (Limited) ..	6/8/10	11,746	2,524	4,500	48,310	0 0 6	..	115	..	..	..	1,511	..	..
Moanataiari Gold-mining Company (Limited) ..	7/12/09	22,449	9,320	..	179,596	0 1 0½	34	194	..	..	..	9,144	..	8,093
Monowai Gold-mining Company (Limited) ..	21/9/09	25,000	13,818	..	100,000	2/11, & 2/5	866	48	30	6,716	3,925	23,516	..	1,353
Mountain King Gold-mining Company (Limited)	12/2/08	12,000	8,000	2,000	120,000	0 1 8	..	144	12	2,918	8,262	16,564	..	26
Mount Welcome Gold-mining Company (Limited)	8/7/09	5,000	1,540	458	100,000	5½d., 4½d., 2½d., & 1½d.	1,127	84	6	549	1,584	3,131	..	25
New Champion Gold-mining Company (Limited)	21/9/11	2,500	2,400	100	50	50 0 0	..	24	..	..	71	2,462	..	3
New Comstock Gold-mining Company (Limited) ..	23/11/09	28,465	1,119	3,746	113,860	3/, 2/5, 2/5½	..	72	..	..	..	1,367	..	..
New Magnet Gold-mining Company (Limited) ..	14/7/10	5,000	1,085	..	100,000	3d., 2d., 1½d.	165	35	1	35	105	1,190	..	..
New Success Gold-mining Company (Limited) ..	29/12/09	5,227	2,667	375	79,150	0 0 7	222	38	2	45	122	2,448	..	2
New Sylvia Gold-mining Company (Limited) ..	2/10/05	30,000	23,792	1,208	300,000	0 1 8	..	340	53	44,106	25,215	48,903	..	231
New Waitaia Gold-mining Company (Limited) ..	25/2/09	15,000	7,566	2,500	150,000	0 1 4	..	130	12	1,381	3,889	10,351	..	1
New Zealand Cinnabar (Limited)	2/6/10	5,000	1,500	3,500	200	25 0 0	..	29	1	..	120	2,715	..	928
North Prince of Wales Consolidated Gold-mining Company (No Liability)	23/3/12	6,250	..	1,250	50,000	0 1 6	324	45	..	..	..	1,932	..	393
Occidental Consolidated Gold-mining Company (No Liability)	3/8/09	5,397	3,583	..	107,938	5d. & 10d.	197	127	13	1,772	4,542	6,883	..	..
Old Hauraki Gold-mines (Limited)	3/8/07	21,000	11,375	..	210,000	0 1 1	..	323	33	7,752	22,790	32,713	2,625	158
Pride-of-Tokatea Gold-mining Company (Limited)	12/7/09	6,000	2,250	..	90,000	0 0 5½	..	100	..	..	425	2,913	..	25
Pride-of-Waihi Gold-mining Company (Limited) ..	15/1/01	50,000	2,917	1,250	100,000	0 0 10	..	221	..	..	..	3,346	..	61

Rising Sun Gold-mining Company (Limited) ..	11/12/08	16,500	5,798	2,229	110,000	0 1 0	..	142	8	..	..	6,100	..	50
Saxon Gold-mining Company (Limited) ..	2/12/07	35,000	9,619	13,333	200,000	1/0½ & 11d.	798	266	10	39	109	12,895	..	486
Scotia Gold-mining Company (Limited) ..	11/9/09	1,036	1,022	1,000	102,150	0 0 4	..	74	..	301	393	1,503	..	72
Seddon Gold-mining Company (Limited) ..	13/8/09	10,000	1,258	375	100,000	0 0 4	32	44	..	..	..	1,278	..	18
Silver Stream Mines (Limited)	7/7/09	43,950	6,647	35,200	43,950	13/, 6/6, 16/4, 17/	830	65	6	3,000	415	4,996	..	208
Tairua Mines (Limited)	9/3/11	17,295	4,294	8,647	172,950	6d. & 5d.	29	231	10	363	719	4,834	..	156
Tauri Tomtit (Limited)	14/12/10	3,750	3,000	250	25,000	0 3 0	..	40	4	..	..	3,314	..	..
Tellurides Proprietary (Limited)	2/11/09	26,200	10,237	1,550	262,005	0 1 4	727	204	12	..	..	11,679	..	191
Te Puke Gold Reefs (Limited)	4/5/98	12,865	12,865	..	101,478	0 2 6	..	103	..	..	..	13,072	4,545	3
Thames Foreshore Dredging Company (Limited)	16/5/08	11,000	6,200	..	22,000	10/ & 2/	..	14	1	3,580	3,903	13,081	..	9,292
Thames Gold-mining Company (Limited) ..	16/12/05	14,841	12,653	..	139,073	0 1 8½	..	160	..	60	177	12,979	..	113
Union Hauraki Gold-mines (Limited)	9/10/09	6,662	5,786	850	53,300	0 1 4	6	34	..	..	..	5,964	..	..
Victoria Gold-mining Company (No Liability) ..	8/12/06	29,523	9,517	..	147,615	0 1 3	324	253	1	1,031	2,886	12,695	..	263
Waihi Extended Gold-mining Company (Limited)	12/8/95	149,967	50,427	5,498	149,967	0 7 5½	..	404	2	..	..	51,178	..	69
Waihi-Paeroa Gold-extraction Company (Limited)	4/3/10	125,000	65,000	60,000	125,000	1 0 0	..	145	72	81,368	33,811	105,164	6,217	1,251
Waihi Reefs Consolidated (Limited)	26/10/09	172,250	7,500	164,750	172,250	1 0 0	..	250	1	..	..	13,451	..	6,042
Waihi Standard Gold-mining Company (No Liability)	20/11/11	19,891	2,083	5,000	198,305	0 0 2½	..	12	7	982	408	2,157	..	156
Waitangi Consolidated Gold-mining Company (No Liability)	23/10/08	146,833	12,383	..	169,800	1/8 & 1/3	..	257	14	..	1,388	20,328	..	..
Waitawheta Gold-prospecting Company (No Liability)	21/12/07	7,250	5,660	750	145,000	0 0 10 7/16	59	157	10	119*	..	5,763	..	424
Waiotahi Gold-mining Company (Limited) ..	28/7/71	18,000	15,000	..	240,000	0 1 3	..	655	11	..	674,486	274,706	400,800	12
Watchman Gold-mining Company (Limited) ..	4/12/11	37,500	3,750	10,625	150,000	0 1 11	..	156	21	649	1,774	5,222	..	383
Zeehan Consolidated (Limited)	23/8/10	11,300	2,679	3,700	150,000	0 0 6	146	28	..	..	..	2,672	..	10
Totals	..	1,437,995	446,785	406,077	6,988,646	..	7,782	8,044	442	165,742	825,566	904,090	414,187	36,388

NELSON DISTRICT (INCLUDING WEST COAST).

		£	£	£		£ s. d.	£			Oz.	£	£	£	£
Blackwater River Gold-dredging Company (Ltd.)	27/4/00	9,475	5,892	3,000	9,475	0 18 0	..	89	12	13,598	53,615	45,819	12,750	..
Blue Creek Gold, Silver, and Lead Development Company (Ltd.)	14/11/10	25,000	2,893	15,000	25,000	Vendors, £1	356	226	5	..	..	2,816	..	99
Dominion Consolidated Developing Company (Ltd.)	18/1/11	15,000	7,000	8,000	15,000	1 0 0	..	44	40	867	2,972	11,513	..	986
Just-in-Time Gold-mining Company (Limited) ..	6/8/10	6,425	4,354	1,000	12,850	10/ & 8/3	122	73	7	..	..	4,777	..	119
Keep-it-Dark Mines (Limited)	8/2/11	10,000	2,750	..	20,000	0 2 9	..	45	56	5,269	19,852	23,166	..	..
Mahinapua Gold-mining Company (Limited) ..	11/1/09	5,385	4,485	900	5,385	1 0 0	..	78	2	250	952	10,293	..	4,072
Mont d'Or Gold-mining and Water-race Company (Limited)	25/7/82	12,000	10,800	..	12,000	0 18 0	..	42	12	36,977	142,213	101,906	54,000	..
Mount Owen Rising Sun Mineral Company (Ltd.)	21/9/11	25,085	18,888	16,000	27,030	Various	23	190	4	..	..	2,734	..	5,221
Murray Creek Gold-mining Company (Limited) ..	30/5/11	12,000	7,661	2,000	12,000	0 16 0	339	69	21	..	..	7,905	..	950
New Big River Gold-mining Company (Limited)	19/8/07	6,000	600	..	24,000	0 0 6	..	70	57	36,441	146,122	75,569	67,200	780
New Ulster Quartz-mining Company (Limited)..	11/3/08	5,260	3,812	1,250	5,088	0 7 11	..	22	2	241	882	4,870	..	47
Pactolus Gold-dredging Company (Limited) ..	30/8/99	8,125	8,125	1,250	12,500	0 15 0	..	130	9	34,612	136,919	78,150	65,000	405
Parapara Hydraulic Sluicing and Mining Company (Limited)	18/6/92	50,600	26,210	20,000	40,600	20/, 5/, 12/	150	60	10	12,938	49,763	71,846	..	10
Poerua Gold-mining Company (Limited) ..	20/10/10	19,788	13,313	28,000	47,788	13/6 & £1	699	184	24	..	..	13,901	..	965
Ross Goldfields Reconstructed (Limited) ..	7/2/11	70,000	14,024	43,750	70,000	0 4 0	..	257	42	..	..	5,898	..	714

* Not valued: bullion not sold.

Table 10—*continued.*

STATEMENT OF AFFAIRS OF MINING COMPANIES, AS PUBLISHED IN ACCORDANCE WITH THE COMPANIES ACT, 1908—*continued.*

Name of Company.	Date of Registration.	Subscribed Capital.	Amount of Capital actually paid up.	Value of Scrip given to Shareholders on which no Cash paid.	Number of Shares allotted.	Amount paid per Share.	Arrears of Calls.	Number of Shareholders at present.	Number of Men employed.	Quantity and Value of Gold and Silver produced since Registration.		Total Expenditure since Registration.	Total Amount of Dividends paid.	Amount of Debts owing by Company.
										Quantity.	Value.			
NELSON DISTRICT (INCLUDING WEST COAST)—*continued.*														
		£	£	£		£ s. d.	£			Oz.	£	£	£	£
Stafford Gold-dredging Company (Limited) ..	17/5/05	289	289	1,734	2,023	1 0 0	..	7	7	7,028	27,324	22,654	4,046	392
St. George Gold-mining Company (Limited) ..	9/10/09	12,150	6,567	3,000	24,300	10/ & 7/3	77	64	8	..	..	6,620	..	54
Success Gold-dredging Company (Limited) ..	25/5/10	10,000	8,000	2,000	10,000	1 0 0	..	133	11	2,167	8,563	18,140	..	1,790
Swastika Gold-mines (Limited)	19/10/12	4,000	896	1,250	16,000	2/, 1/6, 1/, & 6d.	204	43	8	..	23	879	..	187
Worksop Gold-dredging Company (Limited) ..	20/3/07	4,500	4,500	1,500	6,000	1 0 0	..	87	18	13,244	51,064	30,143	24,300	224
Totals	..	311,082	151,059	149,634	397,039	..	1,970	1,913	355	163,632	640,264	539,599	227,296	17,015
OTAGO DISTRICT (INCLUDING SOUTHLAND).														
		£	£	£		£ s. d.	£			Oz.	£	£	£	£
Arrow River Mining Company (Limited) ..	28/11/11	975	975	..	975	1 0 0	..	13	5	148	572	879	..	10
Bakery Flat Sluicing Company (Limited) ..	10/9/96	2,500	2,012	..	2,500	0 18 6	..	29	..	4,423	16,769	18,348	1,062	170
Carrick Gold-mining Company (Limited) ..	22/2/10	28,070	13,555	10,000	28,070	1 0 0	..	195	25	424	1,411	16,517	..	2,227
Confidence Gold-dredging Company (Limited) ..	12/7/12	1,000	975	1,000	2,000	1 0 0	25	13	8	..	437	1,073	..	276
Crewe Gold-dredging Company (Limited) ..	7/9/02	2,000	2,000	3,000	5,000	1 0 0	..	20	14	10,670	41,079	34,083	8,625	368
Deep Stream Gold-mining Company (Limited) ..	19/11/06	2,500	500	2,000	2,500	1 0 0	..	7	4	1,531	5,888	5,853	1,437	10
Earnscleugh Gold-dredging Company (Limited)..	15/7/01	8	8	10,992	11,000	1 0 0	..	15	35	42,404	162,884	138,748	25,850	398
Electric Gold-dredging Company (Limited) ..	2/9/99	26,000	..	26,000	26,000	1 0 0	..	260	21	55,909	216,170	93,423	128,692	691
Gabriel's Gully Sluicing Company (Limited) ..	2/5/07	600	180	..	600	0 6 0	..	8	24	1,842	7,074	9,458	1,605	2,630
Golden Bed Dredging Company (Limited) ..	5/5/99	11,000	10,694	2,000	12,794	1 0 0	..	144	10	16,851	65,107	52,354	15,911	250
Golden Crescent Sluicing Company (Limited) ..	26/11/98	3,500	3,500	..	3,500	1 0 0	..	23	7	6,938	27,002	20,958	..8,750	30
Golden Treasure Dredging Company (Limited) ..	11/7/93	1,500	1,384	1,500	3,000	1 0 0	..	42	8	19,936	76,823	56,087	23,871	450
Good Chance Dredging Company (Limited) ..	24/3/09	1,250	779	..	1,250	1 0 0	..	55	8	2,559	10,017	9,761	625	385
Hamilton's Sluicing Company (Limited) ..	8/6/10	6,000	4,000	2,000	6,000	1 0 0	..	31	5	529	2,025	6,611	..	766
Hartley and Riley Beach Dredging Company (Ltd.)	14/7/97	6,500	6,300	200	6,500	1 0 0	..	309	8	32,437	125,538	47,200	84,337	90
Havelock Sluicing Company (Limited) ..	3/3/08	4,000	3,400	600	4,000	1 0 0	..	13	6	3,379	12,968	13,511	3,200	50
Island Block Gold-dredging and Sluicing Company (Limited)	26/2/00	24,030	12,030	12,000	25,000	1 0 0	..	112	8	8,092	31,540	38,692	2,403	155
Jutland Hydraulic Dredging Company (No Liability)	28/6/01	5,000	4,100	900	5,000	1 0 0	..	9	7	5,991	23,048	23,507	3,250	135
Karaunui Dredging Company (Limited) ..	12/10/09	5,115	2,765	2,350	5,115	1 0 0	..	96	9	3,040	11,026	17,143	..	1,533
Kia Ora Victoria Gold-dredging Company (Ltd.)	10/8/01	9,100	5,915	..	9,100	0 13 0	..	35	16	25,844	104,665	72,955	37,504	..
Koputai Gold-dredging Company (Limited) ..	9/1/06	3,200	3,200	300	3,500	1 0 0	..	47	7	9,048	35,535	25,080	13,810	..
Ladysmith Gold-dredging Company (Limited) ..	19/4/00	12,000	3,964	3,000	14,500	0 10 0	..	78	9	8,738	33,686	28,566	9,429	164
Lammermoor Mining Company (Limited) ..	6/7/08	4,950	4,950	1,000	5,950	1 0 0	..	29	4	365	1,429	6,193	..	350
Lower Nevis Gold-dredging Company (Limited)	29/9/06	600	600	600	1,200	1 0 0	..	7	7	3,407	13,097	12,786	1,260	166
Magnum Bonum Gold-dredging Company (Limited)	1/3/06	2,500	2,500	..	2,500	1 0 0	..	9	8	7,520	29,778	20,249	10,875	..
Manuherikia Gold-dredging Company (Limited)	1/8/99	12,000	6,000	6,000	12,000	1 0 0	..	166	9	18,609	71,331	41,457	34,181	31
Masterton Gold-dredging Company (Limited) ..	6/1/04	5,000	3,500	1,500	5,000	1 0 0	..	73	8	15,351	60,518	30,208	33,250	..
Mount Morgan Sluicing Company (Limited) ..	2/7/02	800	800	2,000	2,800	1 0 0	..	11	3	1,648	6,350	6,352	210	117
Muddy Terrace Sluicing Company (Limited) ..	4/10/06	14,400	14,400	5,550	19,950	1 0 0	..	126	30	5,838	22,941	53,215	..	12,375

Naseby Dredging and Hydraulic Sluicing Company (Limited)	16/10/97	5,000	2,287	2,000	5,000	0 15 3	..	24	4	4,381	16,871	16,738	4,125	44
New Golden Run Dredging Company (Limited)	21/11/07	7,000	7,000	..	7,000	1 0 0	..	18	10	1,345	4,971	9,760	..	1,766
Ngapara Gold-dredging Company (Limited) ..	9/9/11	..	..	2,400	3,000	0 16 0	..	10	7	1,307	5,015	4,711	525	274
Nokomai Hydraulic Sluicing Company (Limited)..	26/3/98	24,000	7,000	17,000	24,000	1 0 0	..	65	48	31,504	118,267	90,106	33,684	502
Olrig Dredging Company (Limited)	13/3/99	9,955	8,955	1,000	9,955	1 0 0	..	70	8	8,720	33,319	34,471	4,173	50
1911 Gold-dredging Company (Limited) ..	13/5/11	2,500	2,375	125	2,500	1 0 0	..	17	9	1,274	4,911	8,276	..	266
Ourawera Gold-mining Company (Limited) ..	23/5/95	3,000	3,000	..	3,000	1 0 0	..	16	8	11,669	46,526	36,979	13,615	..
Paracale Gold-dredging Company (Limited) ..	7/9/06	7,033	5,033	2,000	7,033	1 0 0	..	37	..	10,507	36,469	45,505	2,813*	50
Paterson's Freehold Gold-mining Company (Ltd.)	15/7/99	12,000	8,000	4,000	12,000	1 0 0	..	32	17	18,384	74,458	64,157	19,500	237
Phœnix Water-race Company (Limited) (Regd.)	12/10/67	1,500	1,500	..	1,000	1 10 0	..	19	1	..	..	1,245	8,604	13
Red Jack's Gold-dredging Company (Limited) ..	1/7/12	4,500	2,856	..	4,500	Various	25	47	..	..	..	1,394	..	487
Rise-and-Shine Gold-dredging Company (Limited)	24/2/00	10,000	9,746	2,000	12,000	1 0 0	254	157	11	32,238	125,331	99,604	35,100	683
Rising Sun Gold-dredging Company (Limited) ..	16/2/01	8,000	5,500	2,500	8,000	1 0 0	..	80	10	16,554	64,036	46,552	18,400	175
Round Hill Mining Company (Limited) ..	30/7/02	28,245	6,753	21,492	5,649	5 0 0	..	180	38	37,280	149,043	148,838	8,473	395
Roxburgh Amalgamated Mining and Sluicing Company (Limited)	2/3/89	29,152	13,121	15,000	29,152	0 18 6	..	169	14	28,723	107,611	88,690	32,430	90
Sailor's Bend Dredging Company (Limited) ..	1/9/99	8,000	6,500	1,500	8,000	1 0 0	..	160	8	5,345	20,627	24,599	3,587	22
Sailor's Gully (Waitahuna) Gold-mining Company (Limited)	3/6/96	2,000	2,000	1,800	2,000	1 0 0	..	9	5	3,932	14,899	10,866	4,400	58
Sandy Point Gold-dredging Company (Limited)	20/2/03	8,000	8,000	..	8,000	1 0 0	..	44	11	12,420	48,345	50,662	7,197	1,201
Scandinavian Water-race Company (Limited) ..	10/12/07	7	7	9,750	9,757	1 0 0	..	19	16	5,185	19,808	21,112	..	4,785
Skipper's Sluicing Company (Limited).. ..	20/11/11	3,450	345	3,105	3,450	1 0 0	..	30	6	177	680	1,012	..	289
Stewart Island Tin and Wolfram Lodes (Limited)	5/12/12	5,000	865	..	5,000	0 4 0	..	81	..	..	..	211	..	20
Tallaburn Hydraulic Sluicing Company (Limited)	3/12/04	1,200	1,200	..	12	100 0 0	..	9	4	1,148	4,419	5,749	1,380	199
Tinker's Gold-mining Company (Limited) ..	29/10/10	11,500	..	11,500	11,500	1 0 0	..	22	9	1,012	4,002	3,548	467	115
Undaunted Gold-mining Company (Limited) ..	1/3/98	15,000	15,000	..	1,500	10 0 0	..	35	8	11,359	44,553	28,952	14,437	187
United M. and E. Water-race Company (Regd.) ..	23/4/72	7,600	7,600	..	152	50 0 0	..	8	6	15,854	61,102	67,883	3,078	1,088
Vinegar Hill Hydraulic Sluicing Company (Ltd.)	23/9/00	6,000	6,000	..	6,000	1 0 0	..	13	5	..	12,020	11,451	1,050	593
Waikaia Gold-dredging Company (Limited) ..	20/10/03	3,500	1,750	1,750	3,500	1 0 0	..	46	9	10,702	42,304	31,041	14,700	140
Waikaka United Gold-dredging Company (Ltd.)	11/2/99	4,700	4,700	5,600	11,200	1 0 0	..	34	17	25,589	101,141	71,170	39,760	5,090
Waitahuna Hydraulic Sluicing Company (Ltd.)	10/11/04	2,000	1,400	..	2,000	0 14 0	..	8	5	3,702	14,409	12,208	3,850	185
Totals	..	425,940	253,479	199,014	433,164	..	304	3,434	607	613,782	2,391,845	1,938,757	725,485	42,831
Grand totals	..	2,175,017	851,323	754,725	7,818,849	..	10,056	13,391	1,404	943,156	3,857,675	3,382,446	1,366,968	96,234

* Liquidation dividend.

STATEMENT OF AFFAIRS OF MINING COMPANIES, AS PUBLISHED IN ACCORDANCE WITH THE COMPANIES ACT, 1908—*continued.*

Foreign Companies.

Name of Company.	Date of Registration of Office in Dominion.	Subscribed Capital.	Amount of Capital actually paid up in Dominion.	Value of Scrip given to Shareholders on which no Cash paid.	Number of Shares on Dominion Register.	Amount paid per Share, Dominion Register.	Arrears of Calls, Dominion Register.	Number of Shareholders on Dominion Register.	Number of Men employed in Dominion.	Quantity and Value of Gold and Silver produced since Registration.		Total Expenditure since Registration.	Total Amount of Dividends paid in Dominion.	Amount of Liabilities of Company in New Zealand.
										Quantity.	Value.			
		£	£	£		£ s. d.	£			Oz.	£	£	£	£
Karaka Mines (Limited)	13/9/11	16,528	..	47,514	..	..	..	..	16	..	..	6,641	..	407
Kuranui-Caledonian (Limited)	11/1/05	24,461	10,733	7,164	205,823	1/ & 2/	..	533	1	736	2,033	10,181	..	53
New Zealand Crown Mines Company (Limited)..	5/7/10	60,529	10,403	40,000	156,062	0 4 0	..	370	170	31,682	79,530	77,529	..	1,074
Totals	..	101,518	21,136	94,678	361,885	..	..	903	187	32,418	81,563	94,351	..	1,534

ANNEXURE F.

EXAMINATIONS UNDER THE MINING ACT.

QUESTIONS ASKED AT THE 1913 EXAMINATIONS FOR CERTIFICATES OF COMPETENCY AS MINE-MANAGERS OF THE FIRST AND SECOND CLASS.

SUBJECT I.—*Mining.*

1. A lode has been discovered and proved to be 10 ft. wide, underlying 15° off the perpendicular to the south-east and striking north-east; a vertical rectangular shaft is to be sunk at a point 400 ft. south-east of outcrop and at a right angle thereto, to a depth of 500 ft.; the country expected to be met with is medium hard, water expected to be from 300 to 400 gallons per minute:

   (*a.*) Draw a sketch-plan showing size of shaft in clear of timber. (i) Give size and class of timber you would use; (ii) show how you would fit it; (iii) the method of placing it in position; (iv) show the relative size of each compartment for pumping and hauling ore.

   (*b.*) Give correctly the distance to crosscut from bottom of shaft to reach the lode, the height of back on course of reef from floor of level to outcrop, the collar of shaft being 50 ft. below level of outcrop.

   (*c.*) Give the height of chambers you would open, the size of timber required, and the distance between each level. Having driven the levels, say how far apart you would sink winzes or put rises up to facilitate filling up old workings and provide ventilation.

   (*d.*) In stoping out the lode, how far apart would you place the ore passes? Describe how you would timber them. State the distance apart you would fix ladder-roads, how you would timber them, and the size most suitable for travelling in.

   (*e.*) How would you timber a level where the walls were fairly hard and sound? State how you would secure a level where the walls were soft and inclined to swell.

   (*f.*) Give the breaking-strain in tons of a rimu cap 14 in. square, length between legs 4 ft., and uniformly loaded.

   (*g.*) Ore in sight: how many tons of 2,240 lb. each are there in a block of the following dimensions: 350 ft. in length, 10 ft. wide at eastern end, and 7 ft. wide at western end; at the middle of block—*i.e.*, 175 ft. from either end—5 ft. wide by 150 ft. in height: allowing 14 cubic feet of quartz in the solid to equal a ton?

   (*h.*) How would you beat out a back stope under an old level where the lode is 20 ft. wide, all taken out from wall to wall and filled up, the level being timbered with ordinary sets—caps 14 in. diameter, 4 ft. in clear; legs 12 in. by 12 in., 7 ft. long, and spread to 5½ ft. at bottom; no sills? Draw a sketch showing cross-section, how the old timbers and level are caught up, and the place secured, the underlay of walls being 1 in 3.
2. Describe what precaution you would take in driving near an abandoned mine where an accumulation of water was known to exist.
3. Show how you would construct a dam in a drive, average width 5 ft. by 7 ft. in height, in ordinary rock, to keep water safely back to height of 300 ft. from bottom of dam. Give the total pressure in tons on the structure, (*a*) the mode of construction, (*b*) the material you would use, and your reasons for same.
4. Give the comparative strength of dynamite, gelignite, and compressed blasting-powder.
5. In face of drive you have a bench 3 ft. high by 6 ft. wide composed of hard rock without any apparent heads or seams; a hole is bored, 1½ in. diameter, to a depth of 2½ ft. at 22 in. back from face in centre of bench: give the depth of gelignite you would put in to displace the rock. What depth of compressed powder would you use to do the same work?
6. State how you would protect the wind-bore of a draw-lift pump when firing a group of holes in the bottom of a wet shaft. What explosives would you use, and how would you fire the charges?
7. Explain how it sometimes occurs that on firing a round of holes with an electric exploder some of the charges missfire.
8. Explain the difference between low-tension fuse and high-tension fuse in electric detonators.
9. Having no electric apparatus for firing explosives, state how you would fire a round of holes in the end of a drive or stope where you would have to travel, say, 200 ft. to a place of safety.

SUBJECT II.—*Mechanics.*

1. Explain the meaning of the terms—kilowatt; B.O.T. unit; British thermal unit; electrical horse-power; power factor; latent heat; elastic limit.
2. Describe two methods of controlling the speed of an electrically driven winding plant, stating their advantages and disadvantages. What additional risks of accident exist when electric winding is substituted for steam winding? How may such risks be reduced?
3. What are the conditions under which you would use each of the following pumps at a mine: (*a*) Pulsometer; (*b*) turbo or centrifugal; (*c*) three-throw; (*d*) draw-lift?
4. Describe and illustrate by sketch an overwinder or effective automatic appliance attached to winding-machinery to prevent overwinding.

5. If a plough-steel-wire rope (of diameter D = 1 in.) is made of material having a breaking-stress of 120 tons per square inch, what maximum load would you put on it (*a*) for winding, (*b*) for hauling? (Note: Assume the wire section in the rope equal to one-half of $\frac{\pi}{4}D^2$; allow 20 per cent. for tension set up in twisting the wires.)
6. What are the various causes of priming in boilers? State any possible remedies for each.
7. What are the advantages and disadvantages of using compressed air for underground work, and how does it compare with electricity? What do you consider the most economical air-pressure at the compressor?
8. What is the use of a friction-clutch? Sketch and describe any form with which you are acquainted.

SUBJECT III.—*Ventilation.*

1. In a sample of mine-air the following percentages of gases were found by analysis: O, 16·06; CO_2, 3·84; N, 77·88; CO, 0·02; CH_4, 2·20: state (*a*) the percentage of normal air and black-damp in the mixture, (*b*) the percentage composition of the black-damp, (*c*) the effect of such atmosphere upon the burning of lights and upon human life.
2. A horizontal 20 in. air-pipe 3,400 ft. long, delivers 3,500 cubic feet per minute; an aneroid barometer observed inside the pipe at both ends indicated a difference in pressure equivalent to 0·52 in. of mercury: calculate the co-efficient of friction in terms of water-gauge.
3. The speed of a fan is to be doubled: if the airways of the mine remain unchanged, what will be the effect of the increased speed—(*a*) on the water-gauge at fan drift; (*b*) on the quantity of air passed by the fan; (*c*) on the power required to drive the fan?

   Supposing that the water-gauge of a mine is increased (say, through falls), but that the speed of the fan is kept constant, will the horse-power required to drive the fan increase or decrease?
4. A mine-fan delivered 21,500 cubic feet of air per minute against a water-gauge of 0·68 in.; it is driven by Pelton water-wheel supplied with 31 cubic feet of water per minute, having an effective head of 138 ft.: assuming the efficiency of the water-wheel to be 80 per cent., what is the efficiency or useful effect of the fan?
5. The quantity of air passing through the downcast shaft of a mine is 100,000 cubic feet per minute at a temperature of 40° Fahr. The quantity in the upcast is 106,000 cubic feet per minute at a temperature of 65° Fahr. Find the amount of gas being given off in the mine.

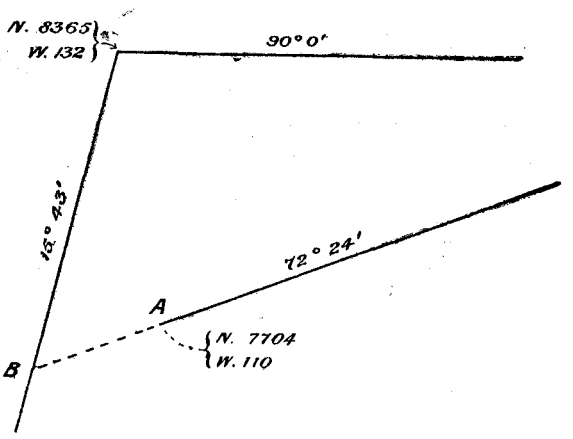
SUBJECT IV.—*Arithmetic and Law.*

1. A pound avoirdupois contains 7,000 grains. A piece of gold weighs 13 lb. 5 oz. troy: find its weight in pounds ounces and grains avoirdupois.
2. A chain is 22 yards long and contains 100 links: how many square links are there in an acre?
3. Find the value of 2 tons 17 cwt. 3 qr. 14 lb. at £5 9s. 6d. per hundredweight.
4. An engine working steadily day and night consumes a hundredweight of coal in 7½ hours: how many tons will be used in 100 days?
5. Make up a pay-sheet in proper form for a fortnight's wages in connection with a mine, a day being reckoned as eight hours: 9 men at 1s. 0½d. per hour, 46 men at 11¼d. per hour, 27 men at 10½d. per hour, 15 boys at 7¼d. per hour.
6. What are the conditions under which powder and other explosive or inflammable substances can be used in a mine?
7. State the uniform code of signals to be adopted at each mine.
8. State generally the requirements in connection with the employment of engine-drivers in a mine.
9. Names the bones of the lower extremities.
10. Describe the procedure with a man on a live wire in an unconscious condition.
11. Give a diagram of the blood-circulation, and name the principal and tourniquet points.
12. What are the symptoms of and treatment for a case of cyanide poisoning?
13. Describe some system of artificial respiration with which you are familiar.

SUBJECT V.—*Surveying.*

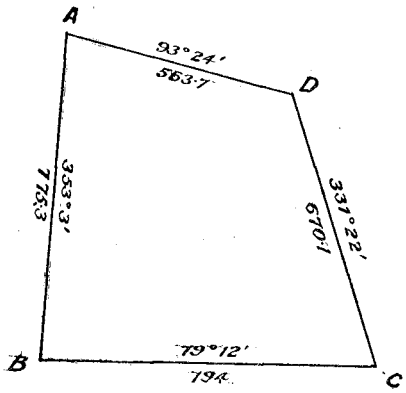
1. A drive terminates at A: how far must it be continued to reach the boundary at B?

FIG. 1.



2. The underground workings of a mine are enclosed within the figure below: compute the area contained within the figure. (Note.—The distances are given in links.)

FIG. 2.



3. The rise in the drive from A to B in Fig. 2 was found to be 30° 18', and from B to C 5° 10': compute the difference of level, in feet, between the stations A and C.
4. Explain how you would transfer true bearing to the underground traverse in the case of only one shaft, and also when there are two shafts.
5. Explain the advantages of plotting by co-ordinates, and the simple method of check which can be applied to any point.

SUBJECT VI.—*General and Applied Geology.*

1. Explain carefully how you would prospect an area of bush-clad hilly country for auriferous quartz reefs.
2. Where in New Zealand are found—Scheelite, stream tin, stibnite (antimony-sulphide), sulphur, iron-ore, petroleum?
3. Define the terms—Dip, strike, anticline, syncline, igneous rock, dyke.
4. State the principal classes of metalliferous deposits, briefly describe each, and mention one or more examples.
5. Define the terms—Normal fault, reversed fault, throw, heave. Briefly describe two or three faults known to you as occurring in mining districts. Illustrate your answers by sketches.
6. Give a rule (with diagram) for the recovery of a lode lost by faulting. Explain when the rule holds good, and when it does not.
7. Give an account of what is known as the ascension theory for the formation of ore-deposits.
8. What is an "ore-shoot"? How do you account for some portions of ore-bodies being richer in valuable contents than others?
9. Do gold-mines tend to become poorer in depth? Discuss the question as fully as you can.
10. How can the relative ages of rocks in a given district be determined (*a*) when sedimentary, (*b*) when igneous? State any instances known to you where it is important from a mining point of view to ascertain the ages of the various rocks exposed or known to exist in a mining field.
11. Describe with some degree of fullness the general geology of any quartz-mining district in New Zealand.
12. Give some account of the increase of temperature with depth in the earth's crust. How can this increase be explained?

QUESTIONS ASKED AT THE EXAMINATION OF BATTERY SUPERINTENDENTS FOR CERTIFICATES.

SUBJECT A.—*The Different Modes of reducing and pulverizing Ores.*

1. Show by neat sketch a crushing-battery of 30 heads of stamps of 11 cwt. each, with ore-breakers, ore-feeders, amalgamating-tables, quicksilver-traps, and Wiffle's concentrating-tables. Also show the battery-foundations, and the relative dimensions in figures of ore-bins, and distances that each portion of the battery requires to be placed below the rail-level where the trucks loaded with quartz come from the mine.
2. Give the quantity of water in cubic feet per minute that is required to work a crushing-battery as described in the foregoing question. Also give the maximum speed and drop of the stamp that can be worked with safety, and the quantity of ore having an average hardness that can be crushed in twenty-four hours by using a 25 mesh.
3. If ore requires to be reduced to a greater fineness after leaving the stamp battery before submitting it to KCN solutions, describe the class of machinery or appliances used to accomplish the work.
4. Give an estimate of the cost of a crushing-battery with appliances as described in question No. 1, showing the cost in full detail.

SUBJECT B.—*Amalgamation Machines.*

1. Describe the different machines used for amalgamation in the Commonwealth of Australasia, their capacity, the power required to work them, the quantity of quicksilver used in each machine, the speed that each machine requires to be worked at, and the chemicals (if any) used, giving the effect they produce.

2. In treating ore highly charged with sulphide in amalgamating-machines, describe the treatment it would have to undergo to secure a large percentage of the bullion the ore contains.
3. What is meant by concentrating-machinery? How is concentration effected? Describe the different machines and appliances used in this Dominion, their capacity, and the power required to work them.

SUBJECT C.—*The Use of Quicksilver, and Methods of using it in connection with the Extraction of Gold and Silver from Ores.*

1. How do you ascertain when quicksilver is not in a fit state for amalgamation?
2. If quicksilver contained copper, lead, and zinc, or base metals, how would you purify it so as to render it in a fit state to treat auriferous ore?
3. How is gold recovered from amalgamating-plates? State the process it undergoes before it becomes a marketable commodity. Describe fully.
4. What effect has a current of electricity on impure mercury, and how is it applied?

SUBJECT D.—*Cyanide, Chlorination, and other Chemical Processes of recovering Gold and Silver from Ores.*

1. How is the strength of KCN solutions ascertained? Describe fully.
2. What quantity of a 15-per-cent. solution would be required to make up a sump solution of 0·009 per cent. to a working solution of 0·21 per cent. KCN?
3. How many pounds of crude cyanide containing 71 per cent. KCN would it take to make up a sump solution of 0·015 per cent. to a working solution of 0·3 per cent. KCN?
4. In treating pulverized ore with solutions of KCN, how do you ascertain the best percentage of KCN solution to use, and the length of time it requires to be under treatment?
5. In treating fine slimes with a solution of KCN, describe fully the treatment so as to ensure the highest percentage of bullion being extracted.
6. If any of the workmen showed signs of hydrocyanic-acid poisoning, what steps would you take to relieve the sufferer?
7. How is the bullion recovered from KCN solutions? Describe fully the processes from the time the solutions leave the vats until the bullion is made into a marketable commodity.
8. How is gold extracted from pulverized ore by chlorination (*a*) by the Plattner process, (*b*) by the Newberry-Vautin process, (*c*) by the process adopted by the Mount Morgan Company in Queensland? How is the gold from chlorination recovered and made into a marketable commodity?
9. How are concentrates of iron, copper, and arsenical pyrites treated before being submitted to chlorination?

SUBJECT E.—*The Sampling and Testing of Ores.*

1. Describe the principles upon which automatic ore-samplers work.
2. Sketch, with dimensions, a complete assay office used for assay-work in connection with a gold-mill and cyanide plant, showing the arrangement of the different rooms, positions of furnaces, benches, &c.
3. How would you distinguish between the following minerals in an ore:—
   (*a.*) Galena and stibnite.
   (*b.*) Iron-pyrites and arsenical pyrites.
   (*c.*) Calcite and lead-carbonate?
4. Describe briefly the assay of a pure galena for lead, gold, and silver, by fire-method only.
5. State in detail how gold bullion is assayed for gold, silver, and base respectively.
6. A gold-bullion bar is found by assay to contain gold 9520 fine and silver 413 fine: what is its value per ounce for gold and silver respectively, assuming pure gold to be worth 85s. and pure silver 26d. per ounce?
7. How would you determine the presence of acid salts, likely to be cyanicides, in a sample of gold-ore tailings?

SUBJECT F.—*A Knowledge of Arithmetic and the Method of keeping Battery Accounts.*

1. How many ounces of gold are there in a sphere of 5 ft. in diameter, taking the specific gravity of gold to be 19?
2. The value of bullion from the treatment of ore was £5,678, which contained gold of 0·3265 fine, the balance being silver: show the value of the gold and silver in the bullion, taking gold at £4 3s. per ounce and silver at 2s. 5d. per ounce.
3. Give the horse-power of a turbine water-wheel to work a crushing-battery of 40 heads of stamps of 11 cwt. each, making 100 drops per minute with 6 in. drop; the wheel to be under a head of 100 ft., and to give 70 per cent. of the theoretical velocity of the water.
4. Divide 0·0021 by 12, and extract the cube root of the quotient arithmetically.

LIST OF MINE-MANAGERS, BATTERY-SUPERINTENDENTS, AND DREDGE-MASTERS WHO HAVE OBTAINED CERTIFICATES UNDER THE MINING ACTS.

First-class Mine-managers' Certificates.

Certificates of Service issued under the Mining Act, 1886, without Examination.

Adams, H. H., Waiorongomai.
*Anderson, P., Thames.
*Andrews, R., Coromandel.
Andrews, T., Thames.
Barclay, T. H., Thames.
Bennett, J., Alexandra.
*Benney, J., Coromandel.
Black, T., Waiomio.
*Bollersley, N., Boatman's.
*Bradbury, M., Reefton.
*Bray, John, Lyell.
Burch, W. H., Thames.
*Byrne, J. F., Stafford.
Cameron, A., Macetown.
*Cameron, E., Te Aroha.
Chapman, J. A., Dunedin.
*Clarke, G. S., Thames.
*Comer, R., Thames.
Conradson, M., Lyell.
*Corin, W., Thames.
*Cornes, C. A., Karangahake.
*Coutts, J., Thames.
Crawford, T. H., Thames.
*Crowley, C., Reefton.
*Cummings, W., Reefton.
Davis, J. E., Queenstown.
*Davey, C., Ross.
*Donald, J., Cromwell.
*Dryden, S., Thames.
*Dunlop, T. A., Thames.
Edwards, J., Skipper's.
Elliott, J., Macetown.
*Evans, F., Skipper's.
Evans, J. H., Skipper's.
*Fitzmaurice, R., Reefton.
Frewen, J. B., Queenstown.
Gavin, T., Te Aroha.
*Gilbert, J., Reefton.
Gilmour, T., Thames.
*Giles, G. F., West Wanganui.
Glass, W. M., Naseby.
*Goldsworthy, J., Waiorongomai.
*Greenish, J., Reefton.
*Greenville, W., Ohinemuri.
*Hall, J. P.
*Hansen, P. C., Thames.
*Harris, J., Owen's Reefs.
Harrison, R. H., Coromandel.
*Hicks, T. B., Thames.
*Hilton, G. P., Bendigo.
*Hodge, F., Coromandel.
Hollis, W., Thames.
Hunter, R., Thames.
James, F., Thames.
Jamieson, A., Coromandel.
Jenkins, M., Wakatipu.
Johnstone, H., Bluespur.
*Julian, J., Boatman's.
Kelly, J., Lyell.
Kerr, J., Thames.
*Lawn, E., Black's Point.
*Lawn, H., Boatman's.
*Lawn, J., Reefton.
*Littlejohn, W., Karangahake.
*Lowe, E. W., Thames.
*Malfroy, J. M. C., Ross.
*Martin, W. G., Thames.
*McCallum, J., Reefton.
McCullough, R., Thames.
McGruer, G. N., Karangahake.
*McIlhaney, J., Thames.
McIntosh, D., Bluespur.
*McKay, J., Ross.
*McKenney, J., Reefton.
*McKenzie, W., Thames.
*McLeod, G., Coromandel.
*McLiver, F., Thames.
*McLiver, H., Thames.
McMaster, J., Reefton.
Moore, H. W., Thames.
*Moore, J. H., Thames.
*Morgan, R., Otago.
Morrisby, A. A., Glenorchy.
*Nasmyth, T., Reefton.
Newman, W., Naseby.
*Northey, J., Thames.
*O'Sullivan, D. E., Thames.
Polton, A., Karangahake.
Porter, J., Waipori.
*Purvis, G., Ross.
Quinn, E., Te Aroha.
*Radford, T., Thames.
Ralph, J. G., Thames.
*Ranger, J., Reefton.
Rasmussen, C. L., Mokihinui.
Rasmussen, C. P., Mokihinui.
Reid, P., Coromandel.
Resta, L., Macetown.
*Roberts, E., Ross.
Rooney, F., Reefton.
Scott, T., Waiorongomai.
*Searight, A., Reefton.
*Senior, J., Thames.
Smith, J. E., Thames.
Stone, F., Karangahake.
*Steedman, J. B., Thames.
Sturm, A., Waipori.
Taylor N., Thames.
Todd, C., Heriot.
Treloer, J. S., Reefton.
Tripp, R. S., Arrowtown.
*Vivian, J. G., Thames.
*Vivian, S., Reefton.
*Waite, C. D., Thames.
*Waite, E., Thames.
Walker, J. W., Thames.
Watson, T., Reefton.
*Wearne, J. E., Endeavour Inlet.
Wearne, T., Endeavour Inlet.
*Wilcox, J., Thames.
Williams, J., Skipper's.
Wright, G., Boatman's.
Wylie, W., Ross.
Young, G., Skipper's.

Issued after Examination under the Mining Act, 1886, and Amendment Acts.

Adams, B., Thames.
Baker, W., Thames.
Black, G., Reefton.
*Caples, P. Q., Reefton.
*Carter, J., Thames.
*Casley, G., Reefton.
Cochrane, D. L., Reefton.
Colebrook, J. D., Coromandel.
Coombe, J., Reefton.
Crawford, J. J., Thames.
*Cummings, W., Reefton.
Donaldson, W., Otago.
Fleming, M., Thames.
*Gardner, W. P., Reefton.
Harris, W., Thames.
Horn, G. W., Thames.
Horne, W., Coromandel.
Hornick, M., Thames.
Hosking, G. F., Auckland.
Kruizenza, W., Reefton.
*Lawn, T., Reefton.
Logan, H. F., Wellington.
Mangan, T., Thames.
Mouat, W. G., Dunedin.
*Truscott, G., Thames.
Watkins, W. E., Reefton.
*Wilkie, J., Reefton.

Issued on Production of Certificate from a Recognized Authority outside the Dominion under the Mining Acts, 1886, 1891, 1898, 1905, and 1908.

Argall, W. H., Coromandel.
Beckwith, L. H., Wellington.
Brook, R. H. T., Reefton.
Cock, W., Waiomio.
Datson, J., Manaia.
Dodd, William, Milton.
Evans, A. W., Reefton.
Griffiths, A. P., Auckland.
Griffiths, H. P., Auckland.
Hailey, R. C., Dunedin.
Hall, E. K., Reefton.
McKenna, Thomas, Dunedin.
Molineaux, H. S., Gore.
Rich, F. A., Auckland.
Williams, W. H., Auckland.

Issued after Examination under the Mining Act, 1891.

Agnew, J. A., Thames.
Annear, William, Reefton.
Arcott, R., Waihi.
Bennett, E. P., Thames.
Boydell, H. C., Coromandel.
Bradley, R. J. H., Te Puke.
*Bray, E., Reefton.
*Bruce, Malcolm, Thames.
Carroll, J., Lyell.
Cartwright, E., Thames.
Crabb, J., Reefton.
*Dobson, J. A., Auckland.
Evans, H. A., Wellington.
*Fahey, P., Reefton.
*Flannigan, Francis, Reefton.
Gilmour, J. L., Thames.
Hodge, J. H., Thames.
*Hughes, D., Thames.
*James, T., Thames.
Keam, P. E., Thames.
Lane, J., Reefton.
Lawn, C. H., Capleston.
Linck, F. W., Thames.
*Marshall, F., Reefton.
Morrison, R., Thames.
McDermott, J., Thames.
McDermott, G., Thames.
McDermott, W., Thames.
McGregor, W. T., Thames.
McKenzie, H. J., Coromandel.
McPeake, J., Thames.
O'Keeffe, M. D., Thames.
Paul, Matthew, Thames.
Paltridge, Henry, Thames.
*Prince, F. H., Reefton.
Robertson, D. B., Stafford.
Ross, Richard, Thames.
Russell, Murray, Dunedin.
Shepherd, H. F., Thames.
Stanford, W. J., Macetown.
*Steedman, J. G., Thames.
Sutherland, Benjamin, Reefton.
Tierney, R., Thames.
Vialoux, F., Coromandel.
Warne, George, Thames.
Waters, D. B., Skipper's.
Watt, J., Thames.
White, G. H., Thames.
Whitley, A., Thames.
Williams, C., Capleston.

* Deceased since issue of certificate.

FIRST-CLASS MINE-MANAGERS' CERTIFICATES—*continued.*

Issued after Examination under the Mining Acts, 1898, 1905, and 1908.

Allen, Henry, Waihi.
Autridge, L. E., Thames.
Baker, S. G., Thames.
Barker, B., Thames.
Barrance, K. M., Karangahake.
Bell, O., Waihi.
Bennie, Boyd, Waihi.
Bishop, Thomas Otto, Skipper's, Otago.
Blenkhorn, C., Coromandel.
Bolitho, Joseph, Reefton.
Bower, J. W., Coromandel.
Broad, R., Waihi.
Buddle, Frank, Coromandel.
Bull, C. W., Waihi.
Caisley, John, Karangahake.
Carroll, A. M., Reefton.
Carroll, John, Kuaotunu.
Carter, R. P., Waihi.
Clouston, R. E., Kaitangata.
Cooper, J. H., Thames.
Cooper, Thornhill, Waihi.
Cordes, F. M., Karangahake.
Cornes, J. G., Waihi.
*Daley, John William, Waihi.
Docherty, W. H., Coromandel.
Dutton, W. F., Waihi.
Ellery, John, Reefton.
Fry, S., Waimangaroa.
Evered, N. J., Waihi.
George, M. T., Waihi.
Goldsworthy, C., Karangahake.
Goldsworthy, W., Coromandel.
Gordon, J. A., Thames.
Grayden, P., Thames.
Greening, W., Karangahake.
Gudgeon, C. W., Macraes.
Hitchcock, W. E., Barewood.
Hooker, John, Coromandel.
Irwin, Samuel, Waihi.
Jackson, G. T., Waihi.
Johnson, J. H., Coromandel.
Katz, C. A., Waihi.
Langdon, H., Waihi.
Langford, G. S., Waihi.
Lautour, H. A. de, Waihi.
Lawn, Nicholas, Reefton.
Lewis, Ralph Reginald, Waihi.
Mackie, Portland George A., Waihi.
McConachie, W., jun., Waihi.
McDonald, R. M., Table Hill.
MacDuff, R. B., Thames.
McGruer, A., Karangahake.
MacLaren, J. A. J., Coromandel.
McMahon, J. H., Reefton.
McMahon, T., Reefton.
Mitchell, William J., Barewood.
Moore, L. O., Waihi.
Morgan, William, Waihi.
Morrison, William, Waihi.
Moye, Michael, Reefton.
Oats, John, Black's Point, Reefton.
O'Sullivan, J. W., Thames.
*Rabe, John, Thames.
Rimmer, J. C., Helensville.
Rodden, John, Reefton.
Saunders, W. H., Reefton.
Sheehan, D., Karangahake.
Smith, Walter, Karangakake.
Spearing, J. R., Waihi.
Stewart, F., Waihi.
Stewart, R. A., Reefton.
Sullivan, T., Reefton.
Thomson, J. R., Waihi.
Thomson, Thomas, Waihi.
Thorne, G. M., Waihi.
Tucker, E. S., Coromandel.
Turner, G. W. E., Reefton.
Turnbull, E. V., Coromandel.
Turner, C. E., Murchison.
Ulrich, G. A. C., Waihi.
Walker, A. J., Waihi.
Watson, J. L., Thames.
Webber, J. H. A., Reefton.
Weir, Thomas, Waihi.
*Whyte, N. McG. H., Waihi.
*Williams, C., Thames.
Wilson, Allan, Thames.
Wood, P. H., Reefton.
Wotherspoon, James, Waihi.

Issued under Section 313 of the Mining Act, 1891.

*Edwards, George, Westport.
Hornibrooke, H. P., Coromandel.
Martin, James, Reefton.
Rickard, John, Thames.
Snow, Thomas, Huntly.
Thomas, James, Thames.
Trelease, J. H., Thames.
Williams, John, Kuaotunu.
White, John S., Karangahake.

Certificates of Competency granted to Holders of Provisional Warrants under Section 32 of the Mining Act Amendment Act, 1896.

Alexander, Thomas, Deep Creek.
Argall, A. E., Coromandel.
Battens, H., Coromandel.
*Begley, Thomas, Reefton.
Bennett, Charles Henry, Kuaotunu.
Bunney, Joseph, Waihi.
Campbell, Alexander, Cullensville.
Carlyon, Samuel, Coromandel.
Cornes, C. A., jun., Karangahake.
Daldy, Edward Arthur, Coromandel.
Draffin, Samuel, Waitekauri.
Farmer, C. S., Waitekauri.
*Goldsworthy, Thomas, Tokatea.
Goldsworthy, William, Karangahake.
Govan, Joseph, Thames.
Harvey, A. G., Coromandel.
*Howard, Samuel, Karangahake.
James, Robert, Thames.
Jamieson, John, Reefton.
Johns, Thomas, Waihi.
Kennerley, W. H., Thames.
*Langford, James, Coromandel.
McCombie, John, Karangahake.
MacDonald, H., Coromandel.
McEnteer, James, Tararu.
McFarlane, Charles M., Tokatea.
McLean, Benjamin J., Waitekauri.
McLean, Charles, Thames.
*McLean, James, Tararu, Thames.
Meehan, James, Westport.
Moorecraft, Walter, Coromandel.
Morgan, William, Owharoa.
Moyle, Thomas, Thames.
Patton, William, Macetown.
Pearce, Francis, Reefton.
Potter, William H., Thames.
*Rabe, Henry, Karaka.
Rillstone, Charles, Waipori.
Somervell, John, Thames.
*Stackpole, Robert, jun., Karangahake.
Thomas, Archelaus, Tapu, Thames.
Turnbull, Thomas A., Whangamata.
*Willets, Henry, Thames.
*Wilson, James R. S., Kuaotunu.

Issued to Inspectors of Mines by virtue of Office under the Mining Acts, 1886, 1891, and 1898.

Binns, G. J., Dunedin.
Cochrane, N. D., Westport.
Gordon, H. A., Wellington.
*Gow, J., Dunedin.
Green, E. R., Dunedin.
Hayes, J., Dunedin.
McLaren, J. M., Thames.
Tennent, R., Westport.
*Wilson, G., Thames.

SECOND-CLASS MINE-MANAGERS' CERTIFICATES.

Certificates of Service issued under the Mining Act, 1891.

Adams, W. J., Thames.
Agnew, J. A., Coromandel.
*Allen, Richard, Reefton.
Argall, A. E., Coromandel.
*Beard, W. T., Reefton.
*Begley, Thomas, Reefton.
Bennett, C. H., Coromandel.
Blair, Thomas, Kuaotunu.
Bolitho, James, Reefton.
Bone, William, Reefton.
*Borlase, J. H., Capleston.
*Bowler, John, Thames.
*Bray, Edwin, Reefton.
Bremner, John, Coromandel.
Brokenshire, James, Thames.
Brown, John, Macrae's.
Brownlee, Thomas James, Thames.
Bunny, Joseph, Thames.
Byrne, John, Karangahake.
*Caird, Alexander McNeil, Reefton.
*Campbell, J., Kuaotunu.
*Climo, Noah, Coromandel.
Comer, W. W., Thames.
Comer, George, Thames.
Corbett, T., Paeroa.
*Cowan, Hugh, Kuaotunu.
Crabb, Thomas, Reefton.
Daniel, P. F., Greymouth.
Dobson, John Allen, Kuaotunu.
Edwards, George, Westport.
Ellery, John, Reefton.
*Flannigan, Francis, Reefton.
Foster, Thomas, Wellington.
*Gale, C. W., Coromandel.
Gemmings, Charles, Thames.
Gill, George, Thames.
Glasgow, T. M., Thames.
Goldsworthy, Henry, Thames.
Goldsworthy, William, Mauku, Auckland.
Govan, Joseph, Thames.
Gribble, James, Norsewood.
*Griffin, Patrick, Thames.
Grimmond, Joseph, Ross.
Guthrie, John, Wellington.
*Guy, Robert, Kuaotunu.
Hardman, James Edward, Thames.
*Harris, R., Thames.
*Harvey, William, Reefton.
Hetherington, William, Thames.
*Hicks, W., Thames.
Hill, Alexander Grey, Waikakaho.
Hollis, Frederick J., Waihi.
Hore, John, Wellington.
Hornibrooke, H. P., Kuaotunu.
Jamieson, John, Reefton.
Jobe, James, Thames.
Johns, Thomas, Thames.
Johnstone, William, Collingwood.
*Kendall, Henry, Thames.
Kerr, George, Kamo.
Kirker, Thomas, Thames.
Laughlin, David, Thames.
Law, John, Thames.
*Lough, H., Thames.
Loughlin, S., Thames.
Mackay, William, Nenthorn.
Martin, David, Black's Point.
Martin, James, Reefton.
Mayn, John, Coromandel.
McCombie, John, Karangahake.
*McCormick, Charles, Coromandel.

*Deceased since issue of certificate.

SECOND-CLASS MINE-MANAGERS' CERTIFICATES—*continued.*

Certificates of Service issued under the Mining Act, 1891—continued.

*McEwen, James, Reefton.
*McLean, James, Thames.
McLean, Alexander, Coromandel.
McLean, Charles, Thames.
*McNeill, Daniel, Thames.
McNeill, George, Upper Kuaotunu.
McLoghry, Archibald, Karangahake.
*McQuillan, John, Reefton.
Meagher, John, Karangahake.
*Mills, George, Thames.
*Milne, John, Thames.
Morgan, William, Upper Thames.
*Moorecroft, Thomas, Thames.
Moyle, Thomas, Thames.
*Naysmith, James, Reefton.
Newdick, Alfred, Thames.
*Notman, Alexander, Reefton.
O'Keefe, M. W. D., Thames.
Page, John, Lyell.
*Parkiss, Joseph W., Reefton.
Peebles, Alexander, Kuaotunu.
Pettigrew, Robert, Sydney.
*Phillips, W. H., Thames.
*Pollock, John, Thames.
Potts, W. H., Thames.
Primrose, J., Kuaotunu.
*Rabe, Henry, Thames.
*Radford, Thomas, Thames.
Reid, Thomas Groat, Thames.
Rickard, John, Thames.
Richards, A. H., Kuaotunu.
*Rogers, Charles Henry, Reefton.
Rogers, William Henry, Kumara.
*Ross, J., Thames.
*Rowe, James, Thames.
Shaw, James, Karangahake.
Sligo, Alexander, Nenthorn.
Thomas, James, Thames.
Thomas, A., Thames.
Thomson, John, Dunedin.
*Tregellas, James, Reefton.
*Tregoweth, William, Thames.
*Wells, Charles Lewis, Thames.
*Willets, Henry, Thames.
Williams, James, Thames.
Williams, John, Thames.
*Wilson, James R. S., Kuaotunu.
Wilson, J. G., Thames.
Whisker, Charles, Thames.
White, John S., Karangahake.
Woodcock, James, Thames.
Worth, Robert, Waihi.

Issued after Examination under the Mining Acts, 1891 and 1898.

Benney, J., jun., Paeroa.
Bennie, Boyd, Coromandel.
*Cahill, T. M., Upper Kuaotunu.
Carroll, John, Upper Kuaotunu.
Christie, William, Waitekauri.
Draffin, S., Waitekauri.
Dunkin, T., Coromandel.
Evans, H. A., Skipper's.
*Gatland, V. Y., Coromandel.
Mathewson, A., Hyde.
McNeil, A. H., Coromandel.
White, F. H., Kuaotunu.
White, G. H., Thames.

Issued under Section 313 of the Mining Act, 1891.

Connon, William, Thames.
*Coran, Henry, Thames.
Edwards, E., Coromandel.
*Kelso, Archibald, Coromandel.
McCormick, W. J., Waitekauri.

Certificates of Competency granted to Holders of Provisional Warrants under Section 32 of the Mining Act Amendment Act, 1896.

Allen, W. J., Coromandel.
Barney, Montague T., Waitekauri.
Brownlee, Henry, Thames.
Collins, Charles, Waitekauri.
Curtis, Charles, Taylorville.
Davis, James, Coromandel.
Gardner, James, Waimangaroa.
Howe, Albion S., Waitekauri.
Johnson, Frank H., Collingwood.
Kirwan, William, Reefton.
*McDonald, John, Tairua.
McInnes, John, Puriri.
Martin, William, Tararu, Thames.
Murphy, Joseph, Coromandel.
O'Brien, John, Westport.
Prescott, Arthur J., Coromandel.
*Radford, Samuel, Waihi.
Ruffin, Richard, Manaia, Coromandel.

Certificates of Service issued under the Mining Amendment Act, 1910.

Adams, Albert Augustine, Thames.
Adams, R. W., Thames.
Barker, J. W., Coromandel.
Brabyn, John, Clarendon.
Butcher, F. J., Waitekauri.
Donaldson, George, Macrae's Flat.
Gillan, Thomas, Thames.
Grace, Pierce, Waitekauri.
Hansen, Charles Hans, Puketui.
Hayes, James, Thames.
Hill, Harrold Alexander, Thames.
Hyde, Henry John, Karangahake.
Iles, E. J., Bannockburn.
Inglis, Robert, Kuaotunu.
Kell, Arthur, Karangahake.
McKenzie, D., Georgetown.
Reid, George, Glenorchy.
Reynolds, Edmond Francis, Coromandel.
Sheehan, James, Thames.
Tallentire, John, Waiorongomai.
Williams, John Paul, Puriri.

BATTERY-SUPERINTENDENTS' CERTIFICATES.

Issued under the Mining Act 1891 Amendment Act, 1894, without undergoing Examination.

Adams, H. H., Waihi.
Aitken, R. M., Reefton.
Banks, Edwin Gripper, Waihi.
Barry, Hubert Percy, Waihi.
Goldsworthy, Henry, Kuaotunu.
Goldsworthy, John, Kuaotunu.
Greenway, H. Howard, Auckland.
*Heard, G. St. Clair, Waihi.
Hope, John S., Waitekauri.
Hutchison, William, Karangahake.
Margetts, Frederick Ernest, Kuaotunu.
McKenna, T. N., Tararu.
McLellan, William, Waitekauri.
*Mellett, Richard Sheridan, Waitekauri.
*Napier, James, Karangahake.
Noble, James R., Karangahake.
Park, James, Thames.
Shepherd, Henry Franklin, Waihi.
Sims, C. F., Tararu.
Walker, James A., Kuaotunu.
Wilson, Arthur E., Waihi.
Wilson, James Kitchener, Auckland.

Issued after Examination under the Mining Act 1891 Amendment Act, 1894.

Adams, A. A., Thames.
Allen, F. B., Thames.
Allom, H. O., Thames.
Ansley, Comyn, Paeroa.
Ansley, Walter, Thames.
Banks, J. H., Waihi.
Bowers, W., Thames.
Brown, A. E., Thames.
*Carter, Samuel, Thames.
Clarke, J. L., Thames.
Clarke, R., Waitekauri.
Clarke, W. J., Waihi.
Day, A. T., Thames.
Dixon, Clement, Waihi.
Doveton, G. D., Thames.
Fleming, G. C. S., Thames.
Fuller, J. P., Kuaotunu.
Gray, J. W., Waihi.
Hayward, F. W., Komata.
Horne, G. W., Kuaotunu.
Jackson, J. H., Paeroa.
Jones, Achison, Waihi.
Kidd, F. D., Thames.
Laurie, D. B., Karangahake.
Lee, J. W., Reefton.
Macdonald, W., Waihi.
McKenzie, H. J., Thames.
McMicken, S. D., Thames.
Morgan, P. G., Thames.
Morrin, W. S., Thames.
Noakes, H. L., Waihi.
Raithby, R. W., Reefton.
Robinson, J. R., Waitekauri.
Stafford, B. H., Waihi.
Taylor, C. H., Tararu.
Thorpe, A. H., Thames.
Vercoe, R. B., Thames.
Wingate, H. M., Maratoto.
Winslow, G., Thames.
Williams, A. G. R., Thames.

Issued after Examination under the Mining Acts, 1898, 1905, and 1908.

Adams, J. H., Coromandel.
Adams, Richard W., Tararu, Thames.
Adams, J. H., Thames.
Airey, Hubert, Karangahake.
Aitken, Alexander Hugh, Waihi.
Allen, D. V., Thames.
Allen, H. E., Wellington.
Anderson, David, Waihi.
Andrews, T. T., Waihi.
Auld, J. B., Crushington.
Baker, W. H., Thames.
Banks, C. A., Waihi.
Banks, E. J., Thames.
Barrance, K. McK., Karangahake.
Barrett, J. J., Karangahake.
Barron, William E., Waikino.
Baskett, E. G., Karangahake.
Bell, L. M., Waihi.
Bidlake, A. E., Waiomo.
Bird, A. W., Thames.
Bishop, T. O., Reefton.
Blackadder, William, Crushington.
Bradley, R. J. H., Karangahake.
Browne, E., Waitekauri.
Brown, F. M., Karangahake.
Brown, J. E., Komata.
Brown, W. E., Reefton.
Burns, William, Waiomio.
Bush, E. F., Parawai.
Bush, George Arthur, Karangahake.
Bush, H. R., Thames.
Campbell, Colin, Thames.
Carpenter, W. E., Karangahake.
Carless, Noel, Waihi.
Carter, S., Waihi.
Carroll, John, Kuaotunu.

*Deceased since issue of certificate.

BATTERY SUPERINTENDENTS' CERTIFICATES—*continued.*

Issued after Examination under the Mining Acts, 1898, 1905, and 1908—continued.

Chappell, G. A., Karangahake.
Clark, John L., Waihi.
Clarke, Thomas, Waihi.
Coote, J. M., Thames.
Corbett, G. L., Waitekauri.
Couper, J., Thames.
Cowles, R. K., Crushington.
Crawford, H., Macraes.
Crompton, H., Maratoto.
Croucher, Herbert, Waihi.
Dawson, B., Ellerslie.
Donnelly, Thomas, Waihi.
Donovan, Willie, Waikino.
Draffin, Eugene, Kuaotunu.
Eaton-Turner, Geoffrey William, Waihi.
Ellis, L. L., Waitekauri.
Empson, J. B., Karangahake.
Evans, G. C., Waihi.
Evans, J., Waihi.
Evans, W. B., Reefton.
Ewen, H. F., Auckland.
Fletcher, H. T., Katikati.
*Fraser, J. M., Reefton.
Fry, Sidney, Westport.
Fuller, John P., Kuaotunu.
Fyfe, A., Dunedin.
Gardner, E. A., Reefton.
Gibson, William, Waihi.
Gilpin, J., Waihi.
Gow, E. A., Crushington.
Grayden, J., Waitekauri.
Grayden, Peter, Thames.
Grumitt, P. H., Thames.
Gwilliam, Benjamin, Karangahake.
Halliwell, L. V., Karangahake.
Hargraves, E. P., Waihi.
Hay, Adam, Karangahake.
Harsant, C., Puketui.
Hazard, T. R. C., Waitekauri.
Hindmarsh, R., Reefton.
Hitchcock, W. E., Barewood.
Hogg, B., Karangahake.
Hogg, T. R., Karangahake.
Horn, G. W., Kuaotunu.
Gillooly, T., Roxburgh.
Gillstrom, Carl A., Berlin's.
Hutchison, R. M., Karangahake.
Johnson, Edward, Waihi.
Jones, R. D., Karangahake.
Kidd, R. B., Waitekauri.
Kingsford, A., Karangahake.
Kingsford, C., Waihi.
Langford, G. S., Waikino.
Launder, G. H., Waitekauri.
Lawless, L. J., Paeroa.
Lawn, H., Reefton.
Littlejohn, W. D., Karangahake.
Lovelock, J. E., Crushington.
Mackay, John, Crushington.
Maltman, A., Reefton.
Mann, C., Westport.
Matheson, A. M., Barewood.
Maxwell, W. L., Waihi.
McDonall, P. H., Waihi.
McEwin, J. A., Reefton.
McKinlay, John, Waihi.
McNeil, A. R., Karangahake.
McPadden, J., Coromandel.
Melrose, P., Waihi.
Montgomery, A. E., Opitonui.
Morgan, Robert James, Waihi.
Motherwell, William, Waihi.
Moyle, W. T., Upper Tairua.
Orbell, G. S., Waikouaiti.
Orr, F. S., Waiuta.
Paltridge, F., Thames.
Pond, H. C., Auckland.
Porteous, J., Crushington.
Quick, J. N., Thames.
Reid, J. E., Great Barrier.
Reynolds, E. A., Auckland.
Roberts, H. C., Waihi.
Rodden, William, Lyell.
Rosewarne, R. H., Thames.
Royse, W. G., Reefton.
Sanford, A. G., Waihi.
Shaw, D. S., Waikino.
Shaw, L. J., Waikino.
Stephens, H., Dunedin.
Sutherland, J. A., Reefton.
Thomson, G. W., Bendigo.
Thurlow, J. R., Coromandel.
Tomlinson, A., Karangahake.
Tomlinson, David Mitchell, Barewood.
Tomlinson, W. F., Dunedin.
Turnbull, E. V., Waihi.
Ulrich, G. A. C., Komata.
Ulrich, Herstall, Whangapoua.
Walker, Alfred James Dickson, Waihi.
Waters, D. B., Waihi.
Watson, A. B., Waitekauri.
Watson, A. P., Crushington.
Watson, J. R., Reefton.
Watson, J. P., Reefton.
Watson, W. A., Crushington.
White, A. S. H., Karangahake.
Williams, A. C., Waihi.
Williams, James, Reefton.
Williams, William Eustace, Waihi.
Wilson, A. P., Crushington.

DREDGEMASTERS' CERTIFICATES.

Issued without Examination under the Mining Act, 1898, and Amendment Acts, 1901 and 1902.

Allen, Charles, Alexandra.
Anderson, L. C., Alexandra.
Andrews, Ralph, Canvastown.
Baker, J. R., Alexandra.
Ballantyne, D., Miller's Flat.
Barnes, T. J., Beaumont.
Barry, Thomas, Clyde.
Bradley, Neil, Alexandra.
Bennett, George, Gore.
Bennett, James, Kumara.
Blue, G. P., Alexandra.
Brand, Peter, Waikaka.
Brennan, Philip, Palmerston S.
Bremner, A. P., Lower Shotover.
Brice, William H., Cromwell.
Bringans, D., Alexandra.
Brown, T. G., Ahaura.
Bunting, James, Murchison.
Busbridge, P., Gore.
Butler, Ewen, Roxburgh.
Butler, M. J., Kanieri.
Cameron, Samuel, Alexandra.
Clarke, Edward, Port Chalmers.
Compton, Albert, Dobson.
Cormack, W., Greymouth.
Cornish, J. T., Miller's Flat.
Coutts, Henry, Miller's Flat.
Cowan, Alexander, Stillwater.
Cowan, James, Nelson Creek.
*Crookston, W. L., Three-channel Flat.
Crowley, J. B., Edendale.
*Cumming, J. C., Beaumont.
Cunningham, George, Kanieri.
Curtis, Charles, Stillwater.
Cutten, W. H., Dunedin.
Deniston, R. A., Cromwell.
Dewar, John, Alexandra.
Donaldson, J. G. A., Greenstone.
*Edmonds, A. R., Nelson Creek.
Faithful, William, Greymouth.
Foohy, J. M., Alexandra.
Gibb, William, Croydon Siding.
Gibson, A., Island Block.
Goodger, G. W., Waenga.
Graham, J. M., Gore.
Grogan, William A., Miller's Flat.
*Hansen, William, Alexandra.
Hay, James, Dunedin.
Hedley, A., Cromwell.
Herbert, J., Beaumont.
Hewitt, James, Clyde.
Hogg, Thomas, Cromwell.
Hoskins, Thomas, Maori Point.
Hoy, Samuel, Alexandra.
Inwood, W. J., Rocklands Beach.
Johnston, E. A., Alexandra.
Johnstone, Alexander, Cromwell.
Keen, Thomas, Clyde.
Kennedy, Angus, Alexandra.
Kitto, Edward T., Miller's Flat.
Kitto, Francis, Lowburn.
Kitto, John F., Miller's Flat.
Kitto, W. H., Cromwell.
Kloogh, N. P., Lowburn Ferry.
Lawson, Edward, Dunedin.
Ledingham, J., Bannockburn.
Lee, George, Collingwood.
Lidicoat, R. H., Fern Flat.
Louden, Alexander, Clyde.
Luke, S. J., Alexandra.
Magnus, A., Roxburgh.
Magnus, Olaf, Box 130A, Christchurch.
Mailer, John, Stillwater.
Maitland, A. E., Miller's Flat.
*Maxwell, John, Dunedin.
McClure, F. C., Rongahere.
McConnell, J., Cromwell.
McCormack, D., Kanieri.
McDonald, E. A., Waitiri.
McDonald, J., Sofala.
McDonald, John, Cromwell.
McGeorge, J., Dunedin.
McGeorge, Alexander, Dunedin.
McGregor, D., Kanieri.
McGregor, G. R., Alexandra.
McIntosh, D. J., Lowburn Ferry.
*McLay, George, Cromwell.
McLean, D., Waitiri.
McMath, D. C., Ross.
McMath, Thomas, Alexandra.
*McVicar, Peter, Roxburgh.
Mills, Edward, Murchison.
Mitchell, D. A., Dunedin.
Morel, C. G., Inangahua Junction.
Morris, G. S., Cromwell.
Murray, D., Clyde.
Murray, Madget, Cromwell.
Neilson, S., Miller's Flat.
Nicholson, W. E., Alexandra.
O'Leary, D., Waiau.
Olsen, Charles, Roxburgh.
Parsons, J. D., jun., Clyde.
Percy, John, Clyde.
Perkins, A. C., Dunedin.
Pettigrew, George, Nelson Creek.
Poulter, G. W., Alexandra.
Pringle, John, Miller's Flat.
Ray, J. C., Totara Flat.
Reeder, Philip, Bald Hill Flat.
Rennie, Andrew, Roxburgh.
Ross, Alexander, Cromwell.
Ross, Robert, Alexandra.
Richmond, J., Gibbston.
Ritchie, J. S., Waitiri.
Sanders, H. P., Clyde.
Sanders, John, Cromwell.
Sanders, Thomas, Alexandra.
Schaumann, H., Alexandra.
Scott, M. G., Alexandra.
Scott, Robert, Capleston.
Shore, T. M., Queenstown.
Shore, William, Gore.
Simonsen, Charles, Alexandra.
Skilton, A. G., Old Diggings.
Sligo, N. K., Ahaura.
Smeaton, S. H., Inangahua Junction.
Smith, Alfred, Inangahua Junction.
Steel, Archibald, Kawarau Gorge.
Steel, Thomas, Dunedin.
Templeton, Ivie, Rongahere.
*Thompson, J., Alexandra.
Thompson, T., Miller's Flat.
Tough, John, Miller's Flat.
Troy, G. C., Cromwell.
Turnbull, W. D., Canvastown.
Tyson, John, Rongahere.
Von Haast, J. H., Clyde.
Wallace, John A., Miller's Flat.
Watt, John, Cromwell.
Weaver, Charles, Alexandra.
Williamson, R., Millar's Flat.
Williamson, Walter, Miller's Flat.
Wilson, S. W., Waikaka Valley.
Wood, R. M., Cromwell.
Woodhouse, W. S., Roxburgh.
Young, Andrew, jun., Roxburgh.

* Deceased since issue of certificate.

DREDGEMASTERS' CERTIFICATES—*continued.*

Issued after Examination under the Mining Acts, 1898, 1901, 1902, 1905, and 1908.

Anderson, Andrew, Alexandra South.
Anderson, Bertram, Maori Point.
Anderson, G. B., Roxburgh.
Archer, D. J., Ngakawau.
Baird, William G., Clyde.
Bardsley, John James, Cromwell.
Bishop, Hugh Arthur, Collingwood.
Blair, G., Abbotsford.
Borthwick, Robert, Alexandra.
Bourke, John, Clyde.
Brent, C. D., Cromwell.
Briggans, Thomas, Alexandra.
Briggans, William, Alexandra.
Broderick, T., Lyell.
Bruce, J. A., Kawarau Gorge.
Burley, J. P., Westport.
Burnside, Walter, Alexandra.
Burton, A. P., Miller's Flat.
Callaghan, E., Three-channel Flat.
Campbell, G. W. T., Alexandra.
Carnegy, A., Three-channel Flat.
Carr, W., Alexandra.
Carter, W. W., Sandy Point.
Chapman, Robert, Maori Point.
Clark, D., Callaghan's Creek.
Clarke, R. S. B., Alexandra S.
Coup, George, Albertown.
Cox, R. D., Alexandra.
Craig, D. A., Shag Point.
Croawell, James, Three-channel Flat.
Curno, C. B., Alexandra.
Dalton, J. R., Three-channel Flat.
Dalzell, T. L., Cromwell.
Donaldson, John, Lawrence.
Downie, Henry, Totara Flat.
Eaton, Edgar W., Alexandra.
Elder, D. D., Roxburgh.
Fache, S. C., Gore.
Faithful, Alfred, Bannockburn.
Farmer, Nathan C., Miller's Flat.
Farquharson, George, Alexandra.
Findley, David, Dunedin.
Fisher, Hurtle, Miller's Flat.
Filippi, S. de, Westport.
Forno, D., Inangahua Junction.
Fraser, W. J., Roxburgh.
French, T. E. K., Three-channel Flat.
Gibson, William H., Cromwell.
Graham, Thomas Arthur, Gore.
Gunion, R. A., Alexandra.
Gunn, W. E., Beaumont.
Guy, Donald, Cobden.
Guyton, James, Dunedin.
Hanning, C. J., Clyde.
Hansen, H. C., Three-channel Flat.
Harden, J., Stafford.
Harliwick, Matthew, Roxburgh.
Hewetson, Sydney, Nelson Creek.
Hogg, J., Nevis.
Holden, Charles, jun., Cromwell.
Holden, John, Cromwell.
Hepburn, D. O., Alexandra.
Hughes, John L., Miller's Flat.
Johnston, John, Maori Gully.
Johnston, Louis, Beaumont.
Jones, David Rowland, Island Block.
Jones, T. R., Miller's Flat.
Junker, Frank J., Berlin's.
Kane, William, Clyde.
Kean, F. F., Waikaka.
Kellett, C. H., Dunedin.
Kennedy, A., Ophir.
Kitto, Henry, Alexandra South.
Kitto, John, Clyde.
Linney, William, Island Block.
Livingstone, D., Alexandra.
Lloyd, Arthur, Inangahua Junction.
Lloyd, Hubert, Lyell.
MacDonald, C. J., Cromwell.
MacGinnis, J. A., Cromwell.
MacGinnis, M. P., Alexandra.
MacLaren, John, Alexandra.
Marklund, C. O., Lowburn Ferry.
Mathews, James Halbert, Miller's Flat.
Matthews, A. A., Three-channel Flat.
Mayne, W. C., Nelson Creek.
McDonald, C. J., Waitere.
McDonald, G., Alexandra.
McCallum, W. S., Alexandra.
McGregor, Dougald S., Alexandra.
McKenzie, John, Roxburgh.
McKinnon, John, Alexandra.
McLean, John, Roxburgh.
Melvin, J. R., Roxburgh.
Merchant, Isaiah, Clyde.
Milne, John A., Roxburgh.
Moffitt, R. W., Miller's Flat.
Mollison, William, Stillwater.
Moncrieff, Henry, Miller's Flat.
Monson, C. H., Miller's Flat.
Morel, A. E., Noble's.
Morel, L. H., Inangahua Junction.
Morgan, Harold, Roxburgh.
Morgan, John, Alexandra.
Morris, V., Cromwell.
Mouat, W. G., Greymouth.
Munro, C. T., Waitiri.
Munro, Hugh, Alexandra South.
Munro, R. F., Ross.
Murray, H. B., Cromwell.
Murray, Robert John, Canvastown.
Nelson, Edgar, Brunnerton.
Nelson, George L., Brunnerton.
Newick, Albion Edgar Charles, Bannockburn.
Nicholson, Charles S. G., Mataura.
Noble, William, Alexandra.
Olsen, Hans, Alexandra.
Omond, Thomas, Nevis.
Orkney, H. E., Cromwell.
Orr, H. T., Cromwell.
Orr, William W., Cromwell.
Parker, P. R., Roxburgh.
Paterson, J. B., Miller's Flat.
Patterson, J., Clyde.
Plumb, E. H., Maori Point.
Poppelwell, William, Alexandra.
Rait, Hume, Albertown.
Ray, J. F., Bannockburn.
Ray, Robert Marshall, Bannockburn.
Reiderer, Edward, Cromwell.
Reynolds, T., Greymouth.
Ritchie, William John, Cromwell.
Roberts, G., Three-channel Flat.
Robertson, D. J., Alexandra.
Robertson, W. R., Alexandra.
Rooney, J. B., Roxburgh.
Rumble, Charles, Ngahere.
Rumble, Joseph, Miller's Flat.
Sanders, W. J., Ahaura.
Saunders, C. E., Cromwell.
Sawle, J., Cromwell.
Sawyer, J. F., Alexandra.
Sherwood, T. W., Greymouth.
Simpson, Edward Robert, Cromwell
Sparrow, J. A., Upper Nevis.
Spooner, A. E., Alexandra.
Steele, Thomas, Alexandra.
Steele, W. H., Miller's Flat.
Taylor, Alexander, Alexandra.
Taylor, J. T., Dunedin.
Theyers, C., Alexandra.
Theyers, J. W., Alexandra.
Turner, T. F., Moonlight.
Vickerman, E. M., Cromwell.
Walker, J. J., Alexandra South.
Wasserbrenner, M., Alexandra.
Wathen, James, Miller's Flat.
Watson, E. H., Collingwood.
Weaver, P., Alexandra.
Weir, R., Gore.
Weir, T. R., Cromwell.
Weir, W., Nevis.
Wescombe, Alfred L., Island Block.
Westcott, P. A., Miller's Flat.
Williams, Frederick, Alexandra.
Wilson, George, Marsden.
Wilson, Stephen L., Inangahua Junction.
Wood, W. W., Cromwell.
Woodhouse, F., Bannockburn.
Woodhouse, G. G., Waitiri.
Wylde, G. R., Inangahua Junction.

APPENDIX B.

REPORTS RELATING TO THE INSPECTION OF COAL-MINES.

The INSPECTING ENGINEER OF MINES to the UNDER-SECRETARY OF MINES.

SIR,— Wellington, 11th April, 1913.

I have the honour to present the annual reports of inspection, together with statistical information, in regard to the coal-mines of the Dominion, for the year ended 31st December, 1912.

The reports are divided into the following sections :—

I. Output of Mineral.

II. Persons employed.

III. Accidents.

IV. General Remarks.

Annexures—

(*a.*) Inspectors' Reports, Extracts from.

(*b.*) Mine Officials' Examinations, and List of Certificate-holder .

(*c.*) Statistics of Working Collieries.

(*d.*) Technical Papers relating to Breathing-apparatus ; Qualification of British Deputies ; Safety-blocks for Inclines ; and Mine-gases.

SECTION I.—OUTPUT OF MINERAL.

The output of the several classes of coal mined in each inspection district is summarized as follows :—

Class of Coal, &c.	Output of Coal during 1912.				Total Output to the End of 1912.
	Northern District.	West Coast District.	Southern District.	Total.	
	Tons.	Tons.	Tons.	Tons.	Tons.
Bituminous and semi-bituminous coal	116,147	1,301,461	...	**1,417,608**	21,326,053
Pitch-coal	...	...	4,115	**4,115**	1,991,197
Brown coal	267,700	...	276,975	**544,675**	10,450,092
Lignite	...	...	211,217	**211,217**	1,693,472
Totals for 1912 ...	**383,847**	**1,301,461**	**492,307**	**2,177,615**	**35,460,814**
Totals for 1911 ...	397,872	1,218,693	449,508	2,066,073	33,283,199

It is satisfactory to report that the usual annual increase in output has been maintained. There has also been a considerable increase in the quantity of coal imported into the Dominion during the past year, 364,359 tons having been imported, as against 188,068 tons during 1911. The quantity of coal exported was 223,918 tons during 1911, and 229,849 tons in 1912. There has therefore been an increase of 281,902 tons in the coal consumed or stocked in New Zealand during 1912.

The following is a statement showing output of coal rom each coalfield :—

Coalfield.	Output during 1912.	Total Output to End of 1912.
	Tons.	Tons.
North Auckland	116,147	3,024,403
Waikato	263,938	3,230,768
Mokau	3,762	81,560
Nelson	29,071	224,604
Buller	826,105	11,478,628
Inangahua	11,046	215,886
Grey	435,239	6,782,216
Canterbury	16,764	657,041
Otago	294,063	7,658,649
Southland	181,480	2,107,059
Totals	**2,177,615**	**35,460,814**

The production from, and the number of persons employed at, the principal collieries of the Dominion are shown in the following table :—

Name of Colliery.	Locality.	Class of Coal.	Output for 1912.	Total Output to 31st December, 1912.	Total Number of Persons ordinarily employed.
Northern District.			Tons.	Tons.	
Hikurangi	Hikurangi...	Semi-bituminous	54,618	822,067	85
Taupiri	Huntly ...	Brown ...	258,108	2,495,263	496
Northern	Hikurangi...	Semi-bituminous	43,436	452,112	71
West Coast District.					
Coalbrookdale	Millerton ...	Bituminous	329,430	3,761,423	584
	Denniston	"	298,636	6,344,435	559
Westport-Stockton	Mangatini	"	125,031	457,160	140
	Seddonville	"	72,693	472,797	103
State Coal-mines	Point Elizabeth	"	188,835	1,602,298	336
Blackball	Blackball ...	"	202,878	1,672,824	355
Southern District.					
Kaitangata	Kaitangata	Brown ...	127,761	2,841,492	327
Nightcaps	Nightcaps...	" ...	89,874	878,449	129
Other collieries, in all districts ...	...	Various ...	386,315	13,660,494	1,143
Totals	...	...	**2,177,615**	**35,460,814**	**4,328**

SECTION II.—PERSONS EMPLOYED.

Inspection District.	Average Number of Persons employed during 1912.		
	Above Ground.	Below Ground.	Total.
Northern	234	618	852
West Coast	632	1,867	2,499
Southern	264	713	977
Totals, 1912	**1,130**	**3,198**	**4,328**
Totals, 1911	1,365	2,925	4,290

SECTION III.—ACCIDENTS.

The following is a summary of coal-mining accidents during 1912, with their causes:—

—	Fatal Accidents.		Non-fatal Accidents.	
	Number of Separate Fatal Accidents.	Number of Deaths.	Number of Separate Non-fatal Accidents.	Number of Persons injured, including those injured by Accidents which proved Fatal to their Companions.
Explosions of firedamp ...	...	...	1	1
Falls in mine	4	4	5	5
Miscellaneous—Underground...	5	5	11	11
On surface ...	...	...	1	1
Totals	**9**	**9***	**18**	**18**

* Being in the proportion of 2·08 deaths per 1,000 persons employed.

There has been a satisfactory decline in the number of fatal accidents, but still the proportion is higher than that recorded in some other countries. The management and inspection of New Zealand collieries have become during recent years much more vigilant; and the only reason I can advance for the frequency of accidents is that owing to the difficulty in getting experienced coal-miners, of whom there is a constantly increasing shortage, men are sent into the pits to work without sufficient knowledge of the measures necessary for the safety of themselves and others. A brief description of the fatal accidents at our collieries during 1912 is appended. It will be seen that, as on previous occasions, the most prolific causes of accident are falls in the mine, and tubs descending incline jigs. From the first-named cause four men were killed and five seriously injured; and from the latter three were killed and six seriously injured. A careful perusal of the evidence given at the inquests in connection with the deaths by falls indicates that most, if not all, of the accidents were due to circumstances of which the sufferer himself was in the best position to judge the risk and take precautions accordingly for his own safety. All but one of the accidents on jigs were preventable if the attendants at the jig-tops had exercised proper care. Jig and incline ropes and chains should be frequently tested and most carefully examined, and steel ropes should be kept well greased externally, and lubricated inside. Three lives have been lost at the coal and metal mines of the Dominion within the past few months by the breakage of decayed steel ropes on inclines.

During 1912 at our coal-mines one life was lost for every 355 persons employed and for every 242 000 tons of coal raised.

The following is a brief description of the fatal accidents at New Zealand collieries during 1912:—

Name of Sufferer.	Colliery.	Nature of Accident.
George Bain ..	Taupiri	Deceased, a trucker, when spragging a tub just landed at the bottom of a jig, was crushed by an empty set which descended the incline when unattached to the haulage-rope. The Coroner's jury rightly recommended that a "trailer" should be used on jigs, with which I entirely concur. This had previously been recommended in the report of the Royal Mines Commission, 1911.
J. L. Mount ..	„	A hewer; killed by a fall of coal from the side of a faulted pillar, no timber being used; the place was unduly high for necessary observation. This was a preventable accident.
D. Parry ..	Stockton	Killed by a fall of top coal and roof. The Coroner's jury, while holding no one blameworthy, recommended that in future, where coal is left upon the roof, places shall be started on sets of timber, instead of single props as in this case.
P. Finlay ..	Point Elizabeth No. 1 ..	Deceased was struck by a falling prop, knocked out by coal being pulled down by his mate, at the face. The prop was erected by these two miners.
A. Syme ..	Denniston	Killed by a fall of stone from roof. The place was apparently safely timbered.
H. M. Bell ..	Point Elizabeth No. 1 ..	The attendant at a jig-top let a full tub descend when unattached to the rope; the stop-block was not used: this tub struck deceased, a trucker, with fatal results.
W. H. Ellis ..	Paparoa	By the breaking of a jig-rope a runaway tub struck deceased, a trucker, with fatal results. As the rope had been illegally repaired before the Inspector of Mines made his official examination of the place where the accident happened, it is impossible to state if the breakage occurred under fair working-conditions. The deceased was somewhat deaf. Two men were similarly killed by an incline-rope breaking at the Talisman Gold-mine during 1913.
S. Weatherall ..	Perseverance	The head of deceased was injured by striking the roof while he was riding on a tub being hauled up a dip by winch. It is doubtful if deceased was riding by official permission; if not, he committed a breach of the regulations.
W. McAllister ..	Kaitangata	Deceased struck his head against an iron crowbar erected to support the roof. Primarily a minor accident, rendered fatal by blood-poisoning supervening.

The following statement shows the tons of coal and shale raised, persons employed, lives lost, &c., from 1878 to 1912:—

Year.	Output of Mineral.	Persons employed.			Tons of Mineral raised per each Person employed Underground.	Tons of Mineral raised per Life lost.	Persons employed per each Life lost.	Lives lost per Thousand Persons employed.	Number of Deaths.
		Above.	Below.	Total.					
Prior ...	709,931	...	...	...	...	...	...	...	...
1878 ...	162,218	147	366	513	443	4,771	15	66·27	34†
1879 ...	231,218	...	...	802	...	115,609	401	2·49	2
1880 ...	299,923	...	...	1,038	...	149,961	519	1·92	2
1881 ...	337,262	...	...	963	...	337,262	963	1·04	1
1882 ...	378,272	...	...	1,043	...	189,136	521	1·91	2
1883 ...	421,764	361	888	1,249	475	210,882	624	1·60	2
1884 ...	480,831	393	890	1,283	540	160,277	421	2·34	3
1885 ...	511,063	338	1,145	1,483	456	170,354	494	2·01	3
1886 ...	534,353	392	1,213	1,605	440	*	*	*	0
1887 ...	558,620	388	1,111	1,499	503	139,655	375	2·66	4
1888 ...	613,895	414	1,275	1,689	481	153,474	422	2·36	4
1889 ...	586,445	466	1,251	1,717	468	146,611	313	2·37	4
1890 ...	637,397	512	1,334	1,846	477	79,674	231	4·33	8
1891 ...	668,794	416	1,277	1,693	523	167,198	423	2·36	4
1892 ...	673,315	485	1,196	1,681	563	673,315	1,681	0·66	1
1893 ...	691,548	590	1,298	1,888	533	138,309	377	2·64	5
1894 ...	719,546	506	1,393	1,899	516	119,924	316	3·16	6
1895 ...	726,654	525	1,274	1,799	618	145,331	360	3·33	5
1896 ...	792,851	590	1,347	1,937	588	12,013	29	34·07	66‡
1897 ...	840,713	531	1,381	1,912	609	210,178	478	2·09	4
1898 ...	907,033	556	1,447	2,003	627	907,033	2,003	0·49	1
1899 ...	975,234	554	1,599	2,153	609	325,078	717	1·39	3
1900 ...	1,093,990	617	1,843	2,460	593	273,497	615	1·62	4
1901 ...	1,239,686	688	2,066	2,754	600	413,228	918	1·09	3
1902 ...	1,365,040	803	2,082	2,885	655	682,520	1,443	0·69	2
1903 ...	1,420,229	717	2,135	2,852	665	355,057	713	1·40	4
1904 ...	1,537,838	763	2,525	3,288	609	384,459	822	1·21	4
1905 ...	1,585,756	833	2,436	3,269	651	264,293	546	1·83	6
1906 ...	1,729,536	1,174	2,518	3,692	687	288,256	615	1·62	6
1907 ...	1,831,009	1,143	2,767	3,910	662	152,584	326	3·07	12
1908 ...	1,860,975	992	2,902	3,894	641	372,195	778	1·28	5
1909 ...	1,911,247	1,159	3,032	4,191	633	273,035	599	1·79	7
1910 ...	2,197,362	1,136	3,463	4,599	634	137,335	283	3·55	16
1911 ...	2,066,073	1,365	2,925	4,290	706	147,577	306	3·26	14
1912 ...	2,177,615	1,130	3,198	4,328	681	241,975	355	2·08	9
Totals ...	**35,475,236**	...	...	...	...	...	...	...	**266**

* No life lost. † Year of Kaitangata explosion. ‡ Year of Brunner explosion.

SECTION IV.—GENERAL REMARKS.

Mining Operations.

At the Hikurangi Colliery operations have been chiefly confined to pillar-extraction from the No. 3 section underlying the Waro limestone rocks. As the coal-areas owned by this company are fragmentary and of limited extent, boring is being resorted to for the purpose of prospecting the mine to the dip of the present workings. There has been a decrease in the annual output during 1912.

At the old mine of the Northern Coal Company, near Hikurangi, there has been a slight increase in output, but this mine is rapidly approaching exhaustion, a considerable proportion of the remaining pillars being much depreciated by thin stone bands. As a result of boring operations to the north of Hikurangi Township towards the hill, it is reported that a coal-seam averaging 10 ft. in thickness has been proved over 200 acres. The company are now engaged laying down a small colliery to work the newly proved area from a dip haulage-road now being driven from a point adjacent to the Waro limestone rocks. An upcast air-shaft, 195 ft. in depth, has been sunk to the coal-seam, at which a Waddel fan has been installed. This mine is being connected to the Government railway by a branch line of about half a mile in length. The Kiripaka Mine, also the property of this company, and formerly a considerable coal-producer, was worked out and closed during the year.

The Taupiri Coal-mines (Limited) have connected by main haulage-road their Taupiri West and Ralph's sections, and have considerably developed the Rotoiti section. A main haulage-heading is now being driven under Lake Wahi. At this company's Extended Mine considerable improvements have been effected by the alteration of the gradients of haulage-roads. For better

ventilation a double-inlet 92 in. Sirocco fan, having an estimated capacity of 215,000 cubic feet per minute against a water-gauge of 2½ in., has been installed, and for power purposes the air-compressing plant is being increased. The general equipment of this the most important colliery in the North Island is both efficient and modern. Notwithstanding labour troubles during the year, this company have again increased their annual output.

The Waipa Railway and Collieries (Limited) are still engaged upon the construction of the branch railway, about five and three-quarter miles in length, connecting their mine with the Main Trunk line near Ngaruawahia. It is reported that contracts have been let for screening plant and other necessary machinery. This company may possibly enter upon the output stage late in 1913.

The Puponga Mine, after nine years of vicissitudes, is now in liquidation, about £75,000 having been sunk upon the property. This mine was worked from a dip-haulage adit, bearing almost true north, and inclined approximately 1 in 3½ for its total length of 25 chains, from each side of which levels and bords were driven. The coal-seam proved of excellent and hard quality, but of moderate thickness, and much-parted by bands of hard stone, which limited the field of operations on both sides of the dip until the thirteenth level was reached, when the band thinned out and an excellent seam 7 ft. thick appeared in the levels from thence downwards. Unfortunately the management, in contravention of the written orders of the Inspector of Mines, extracted coal pillars from under the Wiriki Creek, with the natural result that a considerable volume of water entered the mine, and the cost of production increased to such an extent that operations were rendered unprofitable. By the construction of a water-race 25 chains in length to carry this creek the influx may to a certain extent be reduced. Notwithstanding the hitherto chequered career of this mine, by systematic drilling in the low-lying valley to the eastward of the present dip-bottom, towards the Old Man Rock, a valuable area of coal is likely to be proved. As an example of indifferent mining it may be stated that absolutely no boring has ever been done upon the property. The total output from this mine at the end of 1912 amounted to 160,101 tons.

On the Buller Coalfield, from which 11,500,000 tons of bituminous coal have now been won, the Seddonville State Colliery has increased its annual output, with profitable results. Available hard coal exists only in this mine in the Deviation and West sections, and in a small area east of the haulage-road, all of which are rapidly approaching exhaustion, after which there will only remain a limited quantity of soft coal, which, although suitable for steam-production, is saleable only at such a low price that it is doubtful if it can be mined at a profit.

At the Denniston Colliery the most important development has been the extension of headings in the Wareatea section in a north-westerly direction, where excellent coal has been proved. In the Ironbridge Mine headings have also been considerably advanced in the No. 2 seam, and in the Kruger section, and to the westward of the Deep Creek section. There has been a small decline in the annual output, which, however, has been more than counterbalanced by an increase in the same company's Millerton Colliery, a younger mine with a more extensive area of unworked coal. In the Mine Creek section of the Millerton Colliery the main crosscut has been considerably advanced, but development of the Lower section has disclosed considerable faulting. The main development to the south-west, however, has proved a large area of excellent coal. The greater proportion of the year's output from the two foregoing mines, the property of the Westport Coal Company, has been obtained from pillar-extraction.

At the Westport-Stockton Colliery there has been an improvement in output from the B, C, and D tunnels, which comprise the existing mine, and are confined within a narrow strip of coal-bearing country extending along the outside of the eastern boundary of the Westport Coal Company's Millerton lease. This strip of coal is in length about 1 mile 50 chains, and varies in width up to 20 chains. It originally contained about 120 acres of coal, varying in thickness between 5 ft. and 14 ft. A considerable proportion of this is soft. To the eastward this area is bounded for its entire length by a downthrow fault and escarpment, as shown in my plan of the Buller Coalfield published in the Mines Annual Report for 1906. Owing to the limited extent of the present mine the company have systematically prospected a considerable area towards the eastern boundary of their lease, and have developed a compact block of coal at least 600 acres in extent, of which 486 acres of workable thickness are contained within the company's lease, the remainder being an extension of the coal eastward into Crown land to a line drawn from St. Patrick's Creek to Coal Island. The bottom or workable seam in the newly proved area is isolated from that worked in the original mine by about 40 chains of sandstone country, in which coal of workable thickness does not occur. A number of boreholes have been drilled, proving a seam which, I am informed by the mine-manager, varies in thickness between 5 ft. and 19 ft. The general dip of the newly proved area is 1 in 20, bearing north-north-east; and although there may be local variations of dip owing to minor faulting, there is no evidence of severe dislocation of the rocks within the proved ground. The boreholes show that about 100 ft. of sandstone overlie the coal-seam throughout the greater part of the area, and that the seam proved is the lower of two, the upper one in this locality being too thin for economical working. The boreholes having been located systematically, a reasonable estimate based upon the journal submitted may be made of the quantity of workable coal. Assuming that the coal-seam has an average workable thickness of 12 ft. over 486 acres, then there exist 9,000,000 tons of coal *in situ*, of which at least 3,000,000 tons should be ext acted and marketable. The connection of this newly developed area with the existing haulage-system of the old mine presents no engineering difficulties. A tunnel of about 12 chains branching from the B main haulage-tunnel has already been completed, also a bridge across the Mangatini Creek, from which point about 90 chains of surface formation connect with the new mine adit. This formation also is nearly completed, after which there only remains the laying of the permanent-way and the erection of trolly-poles for electric traction to bring the new mine to the output stage, which should materially improve the financial prospects of the company.

On the Grey Coalfield the Point Elizabeth State Colliery No. 1 has about maintained its annual output. In the No. 1 section the only solid work remaining consists of a small steeply inclined area

eastward of the crosscut, and another somewhat limited area to the dip of the present No. 2 level, for the drainage of which by electrically driven pumps boreholes have been drilled from the surface. In No. 2 section, westerly rise workings, development of the bottom seam continues. This seam varies between 3 ft. 6 in. and 6 ft. in thickness. The greater proportion of the output during the year was obtained by pillar-extraction. As in the case of the State colliery at Seddonville, this colliery is rapidly approaching exhaustion.

The surface equipment and branch line of railway in connection with the Liverpool State Colliery at Seven-mile Creek, near Point Elizabeth, being completed, the output of coal will shortly commence.

After a cessation of operations at the Paparoa Colliery for about a year, towards the end of 1912 work was resumed and a small output made, bringing the total production of this mine up to 71,360 tons, mostly soft coal, since operations commenced four years ago.

The Blackball Colliery produced 202,878 tons, being an increase of 46,056 tons above the output for 1911. This mine is worked on the panel system, owing to the liability of the coal to spontaneous combustion. Development generally throughout the mine has been satisfactory, and the mine has been found to be more free from faulting than any other mine on the Grey Coalfield.

At the Kaitangata Mine development was unimportant, and a slight decline in output has occurred.

The Nightcaps Colliery improved its output, and was successful with its development. A new section of the mine is being commenced to work the lower (10 ft) seam from the outcrop situated about 90 ft. below the seam hitherto worked. A considerable proportion of the pit-head works was destroyed by fire during the year, but, fortunately, very little loss of working-time was caused thereby.

In conclusion, it may be remarked that during 1912 development of new coal-areas, with the exception of that at the Westport-Stockton Mine, has been unimportant. The most promising of the working collieries—viz., Taupiri, Blackball, Millerton, and Nightcaps—have produced record outputs; but at Denniston, Point Elizabeth, Kaitangata, and the North of Auckland collieries the output of coal has declined during 1912. The anticipated addition of the Waipa Colliery and the Liverpool State Colliery at the Seven-mile Creek, near Point Elizabeth, to the list of producing collieries during 1913 should in a great measure make up for the decline in output from the older mines.

Coal-shipping Ports.

The following is a summary of the business done and the volume of trade at the coal-shipping Ports of Westport and Greymouth during 1911 and 1912:—

	Westport.		Greymouth.	
	1911.	1912.	1911.	1912.
Receipts (ordinary)	£91,190	£101,585	£35,597	£30,394
Expenditure (ordinary)	£71,946	£122,061	£21,094	£25,939
Coal exported (tons)	770,410	797,460	379,004	382,312½
Coke exported (tons)	..	1,656	2,397	2,476⅘
Steamers visiting	1,116	1,167	739	760
Sailing-vessels visiting	9	8	18	14
Aggregate tonnage	711,881	691,614	382,427	367,023
Average depth of water on bar at high tide during the whole year	24 ft. 3 in.	23 ft. 6 in.	20 ft. 3 in.	21 ft. 5 in.
Average depth of water in river at high tide during the whole year	25 ft. 1 in.	25 ft. 6 in.	..	20 ft. 0 in.
Total rainfall, in inches	71·36	80·40	94·77	108·13

In addition to the foregoing, from the Port of Greymouth during 1912 there were shipped 1,072 tons of bricks, 1,142 bales of wool, 374 bales of flax, 51,366,993 superficial feet of timber, and 18,142 railway-sleepers. This port is destined to serve an extensive and fertile agricultural country. During 1912 there has been a slight decrease in the quantity of coal exported, due to the reduced annual output from the State colliery. With the addition of the new State colliery near Point Elizabeth to the list of outputting mines during 1913, a considerable improvement in the tonnage of coal shipped may be confidently expected.

A report has recently been obtained by the Greymouth Harbour Board from Mr. C. W. Darley, I.S.O., M.I.C.E., of New South Wales, an expert harbour engineer, upon a proposal that breakwaters be constructed off Greymouth to obtain a safer and more reliable harbour than that at present existing; but it is understood that such report was unfavourable. With the completion of the Otira railway-tunnel now being driven, an outlet will be made by which the congestion at the Port of Greymouth will be relieved by railway communication with the east coast.

At Westport the sum of £413,411 has been expended upon the construction of the two breakwaters and internal training-walls, and the results attained are better than were anticipated by the designer of the scheme, the late Sir John Coode. The Harbour Board is now engaged upon the construction of a floating basin and the extension of the western breakwater a further distance of 600 ft. For the purpose of proving whether workable seams of coal exist under the coastal plains within the boundary of the Buller Coalfields Reserve, from which the Harbour Board derives portion of its revenue, the Board have hired from the Mines Department a diamond drill, and have commenced drilling near the beach at Waimangaroa.

I have, &c.,

Frank Reed, M.I.M.M., L.S.,
Inspecting Engineer and Inspector of Mines.

ANNEXURE A.

EXTRACTS FROM REPORTS OF INSPECTORS OF MINES.

Northern Inspectorate: Mr. Boyd Bennie.

Hikurangi Coal Company (Limited).—No. 3 section (new dip): From this section the greater portion of the annual output has been produced. The work has been confined chiefly to pillar-extraction from under the limestone area, where the coal-seam averages in thickness about 11 ft. In the North-east section a new dip is being driven into a small area of coal.

No. 4 section (Crown lease): Upon this lease boring for coal is being carried out adjacent to the limestone rocks to the dip of the No. 3 section. The mine roads and working-places are in fair order, but the ventilation has been neglected. A small Waddel ventilating-fan has been installed, and on my visits of inspection of the 19th July and 23rd July last it was stopped, and the air in the mine was inadequate both in quality and quantity. For this neglect the manager was prosecuted for a breach of the Coal-mines Act, 1908, section 40 (1), and was fined and ordered to pay costs. The coal mined for the year was 54,618 tons, as against 64,657 tons for the previous year, showing a decrease of 10,039 tons. An average of eighty-five men were employed.

Northern Coal Company (Limited).—Hikurangi Northern Mine: This section is approaching exhaustion, work being almost exclusively confined to pillar-extraction. A considerable area of pillars remains intact, but owing to thin bands of stone in the seam a great number of the pillars will be left in as unprofitable. The roads, working-places, and ventilation I found satisfactory. The quantity of coal mined for the year was 43,436 tons, while the amount extracted in the previous year was 40,503 tons, an increase of 2,933 tons. The number of men employed in and about the mine was seventy-one.

The Kiripaka-Panapu section is exhausted, and the machinery is being removed. On the 14th September I visited the mine and found the main drive closed, and I was informed by the manager that a few days previously the last of the pillar coal had been extracted, and the roof allowed to fall. The percentage of coal lost was very small. The whole of the pillars were drawn without any serious accident. Most of the machinery at this mine will be used at the new section, Te Kiripaka Block, situated about two miles distant from the Panapu. For the year 12,341 tons of coal were mined and shipped. An average of thirty men were employed.

Te Kiripaka Mine is a new section now being developed. It is situated about two miles from the Panapu section.

Hikurangi Waro Mine: This is a new mine in course of development by the Northern Coal Company, and is situated about half a mile north of the Hikurangi Township, and close to the well-known limestone rocks at Waro. The company has prospected, by boring, a large area lying between the Main North Road and the Hikurangi Mountain, and it is reported that at various depths a coal-seam averaging 11 ft. in thickness was proved. About 200 acres has been prospected in this manner. The development of this colliery was commenced early in the year. The main incline shaft, dipping 1 in 3, in stone, is expected to cut into the coal at a depth of 650 ft. An upcast air-shaft has been sunk a depth of 195 ft. to the coal-seam. An air-compressor, with a blast fan, has been erected for temporary ventilation, and the main ventilating-fan (of Waddel type) is in course of erection at the upcast shaft. The mine is to be connected with the Government railway-line by about half a mile of branch line. I examined the mine-workings several times during the year, and found them in good order. A comfortable change-room is erected for the men, and adequate workshops and office accommodation are provided. There is an average of forty-nine men employed.

Ruatangata Kamo Colliery.—This small colliery, which had been closed down for a time, was reopened early in the year, but only a small quantity of coal was produced. Unfortunately, the workings had come into close proximity to the abandoned workings of the old Kamo Colliery, with the result that the mine became irretrievably flooded, and is now abandoned. For the year 110 tons of coal was mined, giving employment to nine men.

Whangarei-Kamo Colliery.—The mine-developments being extended in the main dip eastwards proved the coal to be much broken and displaced by faulting; and it now appears that the only hope of entering an area of good coal, comparatively free of faults, is to extend the main dip towards the old Kamo Colliery, where it is said a workable seam was left by the Kamo Company, who ceased operations many years ago owing to a mine-fire. The Whangarei Colliery has worked almost continuously throughout the year. For the year 5,405 tons of coal were raised. An average of twenty-one men were employed. During the year I examined the mine on several occasions, and found the roads and working-places in good order. The natural ventilation of the mine by two shafts is not satisfactory, and a fan is required.

United Colliery.—As stated in my previous report, this mine was closed for a time, but it was reopened early in the year by new owners, and with a limited number of miners the return shows an output of 5,230 tons. Several extensive surface alterations are being made. The output of coal is transported by barges down Miranda Creek to the Main Trunk Railway near Mercer. I found the mine in good order. Ventilation was fair, and it is proposed to install a ventilating-fan. An average of forty-six men have been employed.

Taupiri Coal-mines (Limited).—Ralph's Mine: The output of coal for the year at this mine was 115,235 tons, as compared with 108,741 tons during 1911, an increase of 6,512 tons. The number

of men employed averaged 178, being a decrease of sixty-five as compared with the previous year, due no doubt to the labour troubles towards the end of the year. In the Taupiri West section the main haulage-road has been connected with Ralph's main haulage-rope system. The Lake Rotoiti Crown lease has been partly developed, and twenty men have been employed hewing coal thereon. A number of bores have been put down, proving this seam in advance of the drive. The main haulage-heading is now under the Lake Wahi lease. The remaining sections of the mine are developing coal of good quality. I examined the mine-workings several times during the year, and found them in fair order, while the ventilation was very good on the whole, though at times dull in isolated places.

Extended Mine: From this section was produced 142,355 tons of coal, being a decrease of 668 tons below the output for 1911. The number of men employed was 226. During the year I examined the mine several times, and found the roads and working-places in good order, and the ventilation adequate and well distributed. To provide better ventilation for the future extension of the mine there is now in course of erection a 92-in.-diameter double-inlet Sirocco fan, capable of producing 200,000 cubic feet per minute with a 2·5 in. water-gauge, with a speed of 150 revolutions per minute, belt-driven from a Tangye engine. This installation is expected to be completed early in the year. The airways in the mine are being enlarged and improved to accommodate the increased volume of air, and where possible the travelling-roads will be in the fresh intake air. For the drainage of the mine a 5-in.-diameter borehole has been put down in the vicinity of the water-lodgment, and to the borehole-pipes a Cameron pump is now being connected. This pump is designed to work against a 600 ft. head. A supplementary air-compressing plant, for underground pumps, haulage-winches, and coal-cutting machines, has been installed at the No. 2 Extended shaft, where five air-compressors were previously in use, the latest addition being an Ingersoll Rand compressor of the AA2 class. Two new multitubular boilers have been installed, and when this plant is completed all the power required underground at both mines will be transmitted therefrom.

Pukemiro Collieries (Limited).—The property of this company is situated almost west from the Taupiri Company's mines, about eight miles from Huntly, where the Public Works Department are now constructing a combined railway and traffic bridge over the Waikato River. It is proposed to construct a branch railway to the colliery, and thereby provide facilities for opening up the country between the Waikato River and the west coast. In the meantime work at the mine has been confined to prospecting the coal-area and initial work incidental to development. A large portion of the machinery is on the ground, and the buildings for the workshops and electric power-house are completed. A township in the most convenient position has been surveyed, and post and telephone communication with Ngaruawahia effected. An average of eighteen men have been employed above ground.

Waipa Railway and Collieries (Limited).—This company's branch railway connecting their mine with the Main Trunk Railway is well advanced, but nothing has been done at the mine. Contracts have been let for the surface haulage-incline, screening plant, and various machinery. It is anticipated that the company will be in a position to market coal during 1913.

Kawakawa Colliery.—This mine is some distance from the township, and is connected therewith by a mile and a half of tram-line. An adit level is being opened up on what is known as Moodie's section. The coal-seam is about 5 ft. thick, containing a band of fireclay of about 9 in. in thickness. The coal is sold locally. I found the new drive well timbered, and safe. For the year 237 tons were mined, giving employment to three men.

The *Mangapapa Colliery* produced 3,762 tons of coal. I found the roads and working-places in good order. Ventilation by fan is satisfactory.

ACCIDENTS AND FATALITIES.

Fatal.

George Bain: Killed on the 7th March, 1912. Deceased, a trucker, was in the act of spragging a truck just landed when the empty trucks going up the incline became detached from the wire rope and descended the incline, crushing Bain, who died within an hour.

James Leigh Mount, a miner, was on the 2nd July killed by a fall of coal from the pillar-side.

Non-fatal.

William Wilson: Loss of right eye, on the 6th May, 1912.
Frank Duncan: Fracture of pelvis, on the 23rd July, 1912.
Thomas Baker: Bruise of abdomen, on the 13th August, 1912.
Samuel Carey: Bruise of hip and abdomen, on the 3rd October, 1912.
All the above accidents occurred at the mines of the Taupiri Coal-mines (Limited).

West Coast Inspectorate: Mr. James Newton.

Point Elizabeth State Colliery No. 1.—The output from this colliery amounted to 188,835 tons, being a decrease of 57 tons on the previous year's operations.

No. 1 section: An area is being developed to the eastward of the crosscut. The coal opened up is of good quality and thickness. The dip of the seam is very steep, necessitating a great deal of labour and care. The main dip heading and the bottom levels in this section have been standing for a considerable time. The remainder of the coal won from this section during the year has been by pillar-extraction. The available area is very limited, consequently only a limited number of colliers have been employed. Pillar-extraction in the third level has ceased, the coal having been brought back to a point sufficiently near to the main haulage-dip. The remainder of the coal will be left to support boreholes that are being put down from the surface for pumping purposes, to unwater a section

of the mine to the dip of the present third level. The available coal in this part of the mine will probably be rapidly exhausted. The ventilation of the mine has been excellent, the quantity of air circulating on my last visit being 57,200 cubic feet per minute. Systematic timbering of the roadways and working-places has been adopted in order to protect the roof, while the provisions of the Coal-mines Act have been strictly adhered to. Safety-lamps are exclusively used for lighting in the workings. The number of men ordinarily employed above and below ground was 112.

No. 2 section: In the top seam, which varies in thickness from 10 ft. to 13 ft., operations have been confined to pillar-extraction. A good percentage of coal has been won. This seam is rapidly becoming exhausted. The bottom seam, which varies in thickness from 3 ft. 6 in. to 6 ft., is still being developed by the longwall system in the westerly rise-workings. The coal ahead is thin and dirty. To the extreme rise the workings are still in solid coal, but the area is rapidly diminishing between two convergent faults. The whole of the workings in this seam will shortly be confined to pillar-extraction. The extended dip-workings are nearly exhausted, the strip of pillars left to protect the haulage-road being the only coal remaining. Preparations are at present being made to extract the bottom seam lying between the Nos. 1 and 2 levels.

During the year the top and bottom seams were connected by a shaft, and a new return airway was opened in the bottom seam between the dip and rise workings, greatly improving the ventilation around the working-faces. Good ventilation has been maintained during the year, a current of approximately 50,000 cubic feet circulating through the mine. The timbering of the roadways and working-places has been found satisfactory. Systematic propping of the roof, supplemented by the erection of substantial timber chocks, has been carried out, while every care has been exercised to comply with the provisions of the Coal-mines Act. The workings are fault-bound on every side. Almost the whole of the output is being won from pillar-extraction, the pillars being won from the faults homewards, consequently the area on pillars in both sections is rapidly diminishing. This necessitates a reduction in the number of colliers employed, with a corresponding decrease in the output.

Point Elizabeth (Liverpool) State Colliery.—Contrary to expectations, this colliery has not yet reached the output stage. Considerable advancement has, however, been made during the year, and the various surface arrangements are nearing completion. The haulage-tunnels have been constructed and the permanent-way laid. The middle hydraulic brake to control the load on the lower incline has been installed, while the foundation for the top brake is nearing completion. Substantial progress has been made with the storage-bins. A stone tunnel, driven through a "roll" in the main level, to connect the workings eastward of Seven-mile Creek, has been completed, and a considerable amount of driving has been done in the coal, which shows signs of faulting. The seam of coal at Garvey's Creek, near the storage-bins, has been opened up for a distance of 6 chains, and it should not take long to work up a fair output from this seam. This colliery before the end of 1913 should be dealing with a substantial output.

Paparoa Colliery.—Operations in this colliery were resumed during the latter part of the year, work having been suspended for a period of a year. The output of 6,347 tons was obtained from No. 2 seam, principally from developing levels. The coal proved, although of good quality and thickness, is very friable, and necessarily will produce an excessive percentage of small. The ventilation and general conditions of the mine are satisfactory. Safety-lamps are exclusively used in the workings. An appreciable amount of methane is given off by No. 2 seam, and every effort is made to thoroughly dilute the same to render it harmless. A Sirocco fan, producing a ventilating-current of approximately 60,000 cubic feet per minute, is installed.

Brunner Mine.—St. Kilda section: This section is situated on the north side of the Grey River, about a quarter of a mile from the old Brunner Mine workings. The output for the year amounts to 24,340 tons, a decrease of 7,126 tons from the previous year's winnings.

Top-level drive (horse-road): This level, which was formerly driven a distance of approximately 38 chains between two parallel faults, is running north-east and is nearing exhaustion. The percentage of small coal won from this level has been great, but, being of good quality, no difficulty has been experienced in finding a market, owing to its suitability for coking, and gas, and smithy purposes.

Free-drainage level: This level has been driven a distance of 30 chains. It has been found however, that the area to the rise is restricted by a fault running parallel to the level. Firedamp is met with in this level, and great care is necessary to keep the ventilating-current well up to the working-faces.

Dip section: A heading has been driven a distance of approximately 6½ chains in an easterly direction upon the dip of the seam which it is now proposed to work. The coal passed through proved to be of variable hardness, but of good quality. Bords driven to the north all struck what appeared to be a formidable, but proved to be only a local, fault, bearing north-and-south. A moderate area of good saleable coal may be available in this portion of the lease.

A quantity of excellent fireclay is being got from the rise-workings in the old Brunner Mine. The ventilation has at all times been adequate, but owing to neglect on the part of those responsible a firedamp ignition occurred, resulting in four men getting slightly burned. A prosecution followed, and convictions with severe fines were imposed.

Blackball Colliery.—The development of the mine continues satisfactory, the output for the year being 202,878 tons, an increase of 46,056 tons above the previous year's. One shift of miners was employed for the first four months, and for the remainder of the year two shifts.

No. 17 section: The C level to the west of No. 17 incline has been extended 250 yards, and the coal throughout the whole of this distance averages about 12 ft. in height, and is of excellent quality. Towards the end of the year the D level, which is 150 yards to the rise of the C level, was started, but did not go more than 60 yards before the whole of the bottom seam pinched out, and the level is now being driven in the top seam to prove this part of the field.

Dip section No. 1: At the beginning of the year two levels east and two levels west were turned off the dip headings. The two east levels were driven a distance of 300 yards from the dip heading. To cope with the output from this section an endless-rope system, electrically driven, has been installed. The quantity of water now being pumped from this section equals about 300 gallons per minute—nearly three times more than twelve months ago.

No. 2 dip: Excellent progress has been made with the driving of this dip. It is now down 150 yards from the main level, and has passed through coal of good quality. Very little water is making, only about 100 gallons per hour being pumped at the present time.

Heating has been a source of considerable anxiety and expense throughout the whole year. All fires have been in the No. 17 section, and from what can be seen of the conditions in the development places the trouble will probably continue in all parts of this section. The fault has turned out a greater undertaking than was anticipated. The disturbed ground has been penetrated for a distance of 170 yards, and the indications are not so good now as formerly. The appearance at the face seems to indicate that the fault proper has not yet been reached. Surface observations point to the existence of a large downthrow. It is anticipated that a further increase in the output of this colliery will be made during 1913. Ventilation has been well maintained, and a plentiful supply of mining-timber kept.

North Brunner Colliery.—Operations at this colliery recommenced during May, after suspension for eight months. The output was 12,839 tons, an increase of 55 tons over the previous year's production. Development in the higher sections of the colliery has proved very disappointing, faults and faulted ground being found in all directions, besides which the seam gradually became thinner and extremely soft and dirty, making it impossible to produce marketable coal at a profit. The management, after due consideration, decided to commence pillar-extraction and obtain as much saleable coal as possible. There is a considerable quantity of good fireclay occurring in patches, which may be won in conjunction with the coal. Lower down the hill a small area of coal about 11 ft. thick is being won, but the quantity available is not great. At the junction of the endless haulage-rope with the self-acting incline a drive is being put in to cut a section of coal which boring has proved to exist. Extensive alterations have been effected at the storage-bins for the treatment and sorting of the coal before it is loaded into wagons. To convey the coal from the mine to the bins there is an endless-haulage system 75 chains in length. There are also two self-acting surface inclines, in length 25 chains and 15 chains respectively. The mine haulage is connected with the above systems by self-acting inclines. Ventilation and general safety of the mine have been well maintained.

Loughlan's Mine.—Four men have been employed intermittently at this mine, producing 1,152 tons of coal, which is a decrease of 1,608 tons as compared with the previous year. The main drive at the drainage level is approximately 265 yards in from the outcrop, and shows coal of good quality, 5 ft. thick. The general safety of the mine is satisfactory.

Golden Point Mine.—The output from this mine amounted to 510 tons, a decrease of 30 tons compared with that of 1911. Ventilation is good.

Watson and Moyle's Coal-mine, Murray Creek.—Operations have almost entirely been confined to the extension of the heading in the top drive, which has reached a distance of 450 ft., approximately. The coal, however, is only fair in quality at the face, while between the seam (which at this point is only 5 ft. thick) and the main roof there is a band of rotten shale about 2 ft. thick, making it very difficult indeed to obtain the coal in a marketable condition. Ventilation and general safety conditions of the mine are satisfactory. Two men employed underground have produced an output of 1,170 tons.

Phœnix and Venus Coal-mine, Murray Creek.—An output of 1,481 tons has been won from this mine. Only two men on an average have been employed at winning coal. The seam, which is approximately 30 ft. thick, is lying at a very steep angle. The coal is of good quality, but produces a large amount of small. The drives are satisfactorily secured with props, and the ventilation is good. Work at the mine has been intermittent, owing to slackness of trade.

Lockington's Freehold, Deep Creek.—The output (235 tons) has been partly won from opencast and partly by driving into the hill from the outcrop. The coal when driven upon proved to be exceptionally dirty, large masses of stone being intermingled with the coal-seam. Very little coal has been won during the latter months of the year, owing to slackness of trade.

Burke's Creek Coal-mine.—The output from this mine for the period under review amounts to 3,063 tons, an increase of 135 tons over last year's production. Very little development has been done in the main north drive, as the seam is intersected with formidable bands of sandstone cutting in every direction across the face of the drive. A small section of good coal on the south side of Burke's Creek is being developed, and a supply of good coal is being obtained. General conditions of the mine are satisfactory.

Waitahu Coal-mine.—The output for the year was 732 tons, obtained from a new drainage drive. A high percentage of small coal is produced from this seam. Owing to faulty timbering a portion of the level has collapsed. The probability of this occurring was pointed out to the manager, and instructions given to remedy the defect, but the instructions were not carried out, and the level collapsed. Considerable expense will be necessary to restore it to good working-order. Ventilation is satisfactory.

Reefton Mine.—This mine, which was closed during 1911, was reopened at the commencement of 1912, and a new drive from the surface was driven for a considerable distance through alluvial ground before reaching the coal-seam, which proved to be of inferior quality. Driving thereon being continued, good hard coal 8 ft. thick was found. The drive has been driven 220 yards and securely timbered. 197 tons of marketable coal has been won. Should the coal continue as at present it will in all probability command a ready sale for household purposes, owing to the mine being situated near the Town of Reefton.

Archer's Freehold, Capleston.—Two seams of coal, from 10 ft. to 12 ft. thick and separated by about 60 ft. of sandstone, are being worked. The seams have a dip of approximately 1 in 3, and are connected by a cross-measure drive. A pair of levels driven at right angles to this drive have both struck a downthrow fault, and are standing. In the meantime the solid coal is being split into pillars on the outside of the fault. The output for the year amounts to 1,435 tons. Ventilation is maintained by holing to the rise levels. The general safety of the mine is satisfactory.

Coghlan's Freehold, Capleston.—The output (784 tons) has been won exclusively from No. 2 level, which is driven approximately 200 yards into the hill. The quality of the coal has proved to be patchy. Ventilation has been maintained by holing to the level above. The timber in the level is not altogether satisfactory, the sets being placed too far apart, while the laths are rather weak.

Rocklands Coal-mine, Buller Road.—Only a small output (199 tons) has been won during the year, owing to the dredge on the Buller River having ceased operations. The ventilation of the workings is adequate, and the safety conditions satisfactory. The demand for this coal will be confined for some considerable time to local household purposes, and will not be large.

Whitecliffs Coal-mine, Buller Road.—The drive to the west and on the rise of the old workings has been opened, and the coal has proved to be moderately hard and of good quality. The demand for the coal has, however, been very slack. An output of 116 tons has been won. General safety conditions are satisfactory.

Seddonville State Colliery.—The output for the year 1912 amounted to 72,693 tons, an increase of 12,648 tons over the previous year, due to the increased demand for small or soft coal. The Big Dip and Cave sections, containing about 20 acres of coal, have been exhausted, and the haulage machinery and ventilating-appliances removed. The coal in the Big Dip section was very soft, and in parts intermingled with mud and sandstone. All available marketable coal was won, and the section isolated by stoppings to prevent the fumes caused by heating of the unwon interior coal from entering the Cave section. From a small area known as the Deviation section, lying to the west of the haulage-road and separated from the Big Dip area by a fault running north-east and south-west, coal of fair quality is being won from the pillars, but the output from this portion will not long continue. A small quantity has also been won from an area lying to the east of the haulage-road. To the north of the Big Dip and on the west side of the haulage-road an area known as the West section is still in solid workings. The coal therein is patchy. The ventilation and general safety conditions have been well maintained. A plentiful supply of mining-timber is kept and used.

Denniston Colliery.—The output during 1912 from this colliery amounted to 298,636 tons, being a decline of 24,732 tons from that of the previous year. The development of both sections of this mine has been kept well in advance of requirements, and has proved a large area of virgin country.

Coalbrookdale Mine: The development of the Dip area No. 8 continues to show excellent results, and the coal won maintains its excellent quality. The heading driven north-east and east is opening up well. Preparations are being made to install endless-rope haulage. A pair of 8 in. by 9 in. Tangye engines have been erected, which will be driven by compressed air. The length of haulage is about 50 chains.

Wareatea section: Headings have been pushed on in a north-westerly direction, with winning-places opening out on either side. Endless-rope haulage, approximately 40 chains in length, has been installed. This conveys the coal to the Cascade Mine haulage-system. The quality of the coal is excellent. A considerable portion of the area opened up is overlaid with a very tender roof, and great caution is exercised to successfully support the same. The present Hayes fan used for ventilating purposes will soon be replaced by a double-inlet Sirocco fan, capable of producing 200,000 cubic feet per minute.

Ironbridge Colliery: Development of the No. 2 seam has been expeditiously advanced during the year, with the result that a large area of excellent hard coal has been opened out. Pillar-extraction has produced a satisfactory output.

Kruger's section: This section continues to open up coal of excellent quality.

Deep Creek section: This section is developing westward, the output being obtained both by solid work and pillar-extraction. The winning-headings running west continue to open out in hard coal of considerable thickness.

Ventilation: A great deal of improvement has been effected during the year in regard to the method of leading the air round the various sections. The general safety of the mine has been well maintained.

Millerton Colliery.—Operations at this colliery have resulted in a substantial increase in the output. The quantity of coal won for the year was 329,430 tons, an increase of 29,788 tons over that for 1911.

Mine Creek section: Development has been considerably advanced during the year. The main crosscut heading running south-west is at present driven a distance of about 61 chains from the Mine Creek lay-by, and levels running east and west off the heading are opening up a large area of excellent hard coal of good quality. On the extreme east of this section two sections of pillars are being extracted.

Mangatini section: Pillar-extraction in the dip portion situated to the north of the main west heading has been in operation during the whole of the present year. The coal is of good quality, and very thick. It is impossible to obtain anything like the whole of this coal owing to its thickness, which in places must reach 40 ft. The method adopted is to drive a place through the pillar approximately 10 ft. high. This opening is supported with props, and when holed the stumps of coal are then "robbed," the overhead coal is blown down, and as much as can be safely filled from the opening is won. This is continued, working homewards, and generally a fair proportion of the coal is won.

Lower section: During the period under review development has been pushed in a south-westerly direction with varying success. In this portion of the mine faulting has been frequently met with, and the coal in places is very dirty. The whole of the output from this section has during the year

been won from solid workings. The prospects of this colliery are very bright. Already a very large area of excellent coal has been opened out, and the main developing-headings going south-west continue to prove that a large area of virgin coal still remains.

Ventilation is maintained by a Schiel fan, producing approximately 95,000 cubic feet per minute. The Mine Creek section is ventilated by a 70 in. Sirocco fan. In the Mangatini section a 30 in. Sirocco fan of 15,000 cubic feet capacity is installed. In the Lower section a Hayes fan is used. The ventilation of the workings has invariably been found excellent, and the general safety of the mine has been satisfactory.

To deal with the output from this colliery approximately four miles of endless-rope-haulage system is used, while to convey the coal to the principal system self-acting wheel banks combined with horse-haulage, jigging, and hand-trucking are employed.

Westport-Stockton Coal Company's Mine.—Operations at this colliery have produced an increase of 37,764 tons over the previous year's output, the production for 1912 being 125,000 tons. As during the previous year, by far the greater amount has been won from the B and C tunnels, only a small proportion having been obtained from the D tunnel.

C Tunnel, Lower West section: For the last nine months of the year pillar-extraction has been in operation, and a very fair proportion of the coal has been won. On the east side the whole of the block of coal has been cut into pillars, and extraction of the same has been proceeding for some time. A considerable quantity of solid coal is still being worked at the top west end of the tunnel. The coal in C tunnel has proved to be of medium hardness and fair quality.

B Tunnel: The workings skirting the boundary of the lease are still in good hard coal, but all places will ere long have reached the outcrop, when it will be necessary to commence on the pillars. A drive to connect the eastern portion of the coal lease was started from B lay-by during the year. This drive will have a gradient of 1 in 15, and will be approximately 27 chains in length. The surface tram-line is being formed to connect the eastern section of the lease with the present mine.

D Tunnel: The Lower East section is still in solid workings, and has still a considerable area to thus open up. In the Top East the coal is being won by pillar-extraction, which, however, will not last long, owing to faulty ground.

Throughout the colliery the underground haulage is mostly done by horses. Generally the mine has been found to be well ventilated by three fans, two of which are capable of producing 80,000 cubic feet per minute, while the other has a capacity of 20,000 cubic feet. A plentiful supply of mining-timber is used, while the provisions of the Coal-mines Act are observed. The outlook for the future is promising, and should the eastern area prove to be as valuable as the boring has indicated, there is every reason to believe that this property will for a considerable number of years continue to win an increased output.

Puponga Colliery.—The annual output amounted to 24,405 tons, the greater proportion of which has been won from solid workings. Very little development was done during the year, owing to inflow of water in excess of the pumping-capacity, but this has now been overcome by the installation of a new boiler. Preparations are being made to install a new pump. Pillar-extraction has entirely ceased, the pillars having been won out sufficiently near the dip heading. As a result the output has fallen off considerably. The development of Nos. 14, 14½, and 14¾ levels has shown the coal to have improved considerably, and at present it has the appearance of continuity. No prospecting by boring has been done ahead of the present working. Coal-cutting machines driven by compressed air are used in the winning-headings, and are giving good results. The pumping is done in stages, compressed air being utilized for the lower and steam for the top stage. "Monobel" explosive is used to break the coal. The ventilation of the mine is excellent, and conditions of general safety are satisfactory.

Marble Creek Coal-mine, Mount Burnett.—It was expected that by the end of the year this mine would have reached the output stage, but development of the various inside works has proceeded so slowly that it is impossible to say when the mine will become productive. To convey the coal to the coast at Tamatea, an incline with varying grade, three-quarters of a mile in length, is partly completed, from which it is proposed to construct three miles and three-quarters of surface tramway to the proposed jetty. It is intended to haul the coal along the surface line by a small locomotive. No work has been done underground for some considerable time. The seam, which varies from 2 ft. 6 in. to about 4 ft., dips at an angle of 45°.

North Cape Coal-mine (Taupata Estates).—The annual output was 4,666 tons, an increase of 2,966 tons above that of the previous year. The main level has been driven 18 chains, and has been standing for some months, owing to the coal having thinned to about 2 ft. 6 in. The area of coal to the rise is not great. It will be necessary to drive to the dip to prove the coal in that direction. The ventilation and general safety of the mine are excellent. Regulations are enforced.

ACCIDENTS.

The following details are supplied regarding fatal and serious accidents which have occurred in the coal-mines of this district during the year:—

List of Fatal Accidents.

Denniston (Iron Bridge Colliery).—(11/1/12): A. Syme, miner, killed by a fall of stone from the roof.

Westport-Stockton Colliery.—(2/5/12): D. Parry, killed by a fall of stone and coal from roof.

Point Elizabeth State Mine No. 1.—(9/7/12): Phillip Finlay, miner, killed by being struck by a prop; the prop was knocked out by a fall of coal at the face. M. H. Bell, trucker, killed by a runaway truck.

Paparoa Mine.—(11/11/12): W. H. Ellis, trucker, killed by a runaway truck.

List of Serious Non-fatal Accidents.

Denniston.—(25/3/12): W. Jackson, trucker, broken leg; caused by a runaway truck down the jig. (6/7/12): Henry Knight, miner, internal injuries; caused by a fall of coal in Wiseman's place. (17/10/12): J. Derbyshire, trucker, serious spinal injuries; caused by a fall of coal at the working-face.

Brunner.—(19/2/12): John Allen, miner, broken leg; caused by a runaway truck down wheel bank.

Millerton.—(2/2/12): William McDonald, trucker, broken leg; caused by a runaway truck down jig bank.

Seddonville.—(19/3/12): L. McGrane, miner, broken leg; caused by a fall of coal at the face.

Puponga.—(16/5/12): Henry Crook, miner, fractured skull; caused by a fall of coal at the face.

Blackball Mine.—(9/5/12): R. Clayton, trucker, fractured skull; caused by a runaway truck. (13/12/12): John Leitch, miner, injury to eyes; caused by blasting at the coal-face.

Two of the fatal accidents were caused by falls from the roof; one by being struck on the head by a falling prop, the prop being dislodged by a fall of coal from the face of the lift in pillar-workings; two were caused by runaway trucks down jigs—one by the breaking of the rope, and one by sending the truck away without attachment to the rope.

Regarding the non-fatal serious accidents, four of these were the result of runaway trucks down jigs, four by falls of coal at the working-face, and one by blasting operations at the face. No serious or fatal accident occurred above ground.

Referring to accidents in coal-mines, I am strongly of the opinion that a great number of these could and would be prevented if a little more care was taken. By far the greater number are what might be termed avoidable, and are directly the result of either ignorance or carelessness, or cases where the workmen themselves take a certain risk, knowing full well that there is the possibility present of results that may lead to accident. This, in my opinion, is the most fruitful source of mine accidents, and I am confident that they cannot be effectively dealt with by legislation. What is needed is a keener appreciation of the dangers that are present in every department of underground work in a coal-mine, in order that no undue risk will be taken. This is necessary on the part of every one concerned, and especially those who have the life, limb, and health of others in their keeping. More strict discipline and closer supervision of the various operations, especially at the working-face would no doubt have a decided tendency to eliminate the avoidable accidents.

SOUTHERN INSPECTORATE: MR. E. R. GREEN.

Canterbury.

Springfield Colliery, Springfield.—In common with other Canterbury mines, water-drainage is excessive, owing to recent wet and stormy weather. The pit is worked chiefly for fireclay, which underlies a 2 ft. seam of coal, the latter being subsequently dropped and railed with fireclay to the owner's sanitary stoneware and pipe-manufacturing works in Christchurch. 1,324 tons of fireclay was mined during the year. Five men employed.

Homebush Colliery, Glentunnel.—The original mine is finished and shut down, the seam being exhausted. Output is maintained from the Engine seam (5 ft. 6 in.), of which about 3 acres remain unworked, also a portion of the 3 ft. 6 in. seam in the south side, where a few men are working. The seams worked hitherto are bounded by faults and local disturbances. Prospecting and boring operations extending over a period of two years has failed to locate a workable seam in the Glentunnel basin. At 70 chains northward two workable seams were found at a depth of 250 ft. by the diamond drill. These, with the Bush Gully seam farther north, will probably form supply for future requirements. The Engine seam heading is being driven to surface.

St. Helens Colliery, Whitecliffs.—The mine-inlet which was closed in June, 1911, on account of spontaneous fire is abandoned. The plant has been removed to an old site on the frontage, where a steep dip is driven to the lower or 6 ft. seam, where it had previously been left unworked below drainage-level. Three levels are driven 5 chains westerly, and the top pillar is being drawn.

Tripp's Coal-mine, Mount Somers (late Woolshed Creek).—Work having been resumed, the roadways are restored and ventilation conducted by brattice to working-faces.

Albury Coal-mine, Albury.—Workings in good order, and a steady supply of coal being produced for local requirements.

North Otago.

St. Andrew's Colliery, Papakaio.—Mine in good order, and ventilation good. Pillaring outward from incrop; abundance of timber on hand for use as required. Two separate shafts are provided for ventilation and second outlet.

Prince Alfred Colliery, Papakaio.—A slight heating was apparent at the head of the old dip, where the stopping required to be reinforced. Ventilation could be improved at the working-face, where pillaring, by attention to air-brattice, which required repairs.

Ngapara Coal-mine, Ngapara.—Seam strong. Output reduced as compared with former years.

Broadleaf Coal-mine, Shag Point.—Workable coal-seam between the fault and outcrop now nearly exhausted. Prospecting is being conducted on the hill-face fronting the sea.

Shag Point Coal-mine, Shag Point.—Coal to rise of workings now practically exhausted. The dip is being extended, and a pair of new lower levels are driven therefrom to work homeward longwall.

Allandale Colliery, Shag Point.—Work continues extracting pillars left at first working, where those to rise are approaching exhaustion. It is not decided whether the lower seam will be reopened and developed.

South Otago.

Fernhill Colliery, Abbotsford.—Owing to recent wet weather and falls in old workings, water-percolation has been considerable on the north side of haulage heading. Coal won, however, has been obtained from the south side of the heading. Repairs to air-shaft are under way.

Freeman's Colliery, Abbotsford.—Owing to spontaneous heating, a considerable portion of Nos. 7 and 9 dip pillars were recently sealed up. No. 10 dip is being opened on a panel-system on trial, the seam having been previously worked by bord and pillar. Ventilation adequate throughout the mine. Several places not in actual use required fencing, as pointed out to the mine-manager. Rules posted; report-books and plan to date.

Green Island Colliery, Green Island.—Some heating had arisen in the waste, and water-inflow having increased, the mine was closed down temporarily. The roof was usually bad and hard to keep where troubled by slip or thread faults.

Jubilee Colliery, Saddle Hill.—Development was proceeding to dip, where the seam was found, having a band of stony inferior coal in the centre. Rise-pillars continue to be successfully drawn. The sand overlying the coal-seam effectively smothers and minimizes spontaneous ignition in the waste. Furnace-ventilation good.

Saddle Hill No. 1 Colliery, Saddle Hill.—Under the new furnace-ventilation good air was being circulated, and working-places were adequately ventilated. Pillar and head coal-extraction was conducted safely. Substantial brick and ash stoppings were in on the line of waste, where spontaneous ignition was held in subjection. Second outlet travelling-way was maintained in good order.

Saddle Hill No. 2 Colliery, Saddle Hill.—Pillar and head coal-working was continued safely. Roof-pressure was causing pillars to sink and floor to rise, whereby the face roadways were low in places. Under fan-ventilation air was well conducted by brattice to working-faces. Any leakage of black-damp from the waste was being rapidly diluted, and carried direct to the return airway. Owing to "creep," a considerable area of coal-seam which was standing pillared is considered as lost.

Lauriston Colliery, Brighton.—Ventilation good; mine in good order; rules posted.

Ferndale Coal-mine, Taieri Beach.—A small output is mined for local requirements.

Waronui Colliery, Milton.—Electricity is utilized for fan-drive and dip-pumping. The main and tail rope system of haulage is in vogue. The dip is driven 800 ft. easterly, and levels north and south; all narrow work, the several sections being laid off on a panel-system, which will enable their being blocked off with only two stoppings when finally worked out.

McGilp's Coal-mine, Milton.—Driving in solid seam 16 ft. in thickness. The return airway required brattice and attention for adequate ventilation.

Taratu Colliery, Lovell's Flat.—Present work consists of extraction of pillars and head coal in No. 2 mine. The dip was being pumped dry in order to resume development in that direction. Ventilation good; report-books kept. The owners' intention was to reopen the shaft workings, which had been standing for two years, and were filled with water.

Hawthorn Den Coal-mine, Kaitangata.—A small mine, worked for local supplies.

Wangaloa Coal-mine, Kaitangata.—A small mine, worked for land-sale only.

Longridge Coal-mine, Kaitangata.—Levels are driven, and the thin seam (3 ft.) is worked longwall.

Kaitangata Colliery, Kaitangata.—Prospecting on north side being confined to a rising heading by a stone drive into the fault. No. 5 dip section: The No. 2 heading and south extension sections being finished, were closed with permanent sand and ash-fire stoppings. Pillaring in Mundy's dip section continues, and No. 6 dip section is being driven and developed. Pillar-places in No. 3 lift, Oliver's dip, were in good working-order. The seam here was 20 ft. to 25 ft. in thickness, with a hard conglomerate roof. Nos. 20 and 21 dip sections were being extended, chiefly with a view to connection with No. 2 mine at a future date. I tested the air in return airway at foot of upcast air-shaft with gas-testing lamp, which showed the presence of about ½ per cent. of firedamp. Removal of explosives magazines on surface to more distant sites is under consideration. During the year a complete new electric light and power plant was installed, also a new Ingersoll air-compressor, and additional steam-boiler power was added to the plant, which was being modernized in every respect.

Kaitangata No. 2 Colliery, Kaitangata.—Development was proceeding, and a pair of headings, with levels to south. Boiler-plate reinforcement-rings were placed in position where the new drive crossed the old workings.

Castle Hill Collieries, Kaitangata.—North side workings in No. 7 dip are finished and stopped off. Coal was mostly obtained from behind a roll, where the seam unexpectedly thickened to 20 ft., with a local change in dip towards easterly. Four pairs of men working in the Jordan's seam. Travelled airway to ventilating-furnace; all in good order. The man-hoisting emergency apparatus is regularly reported on, and is stated to be in good working-order.

Benhar Colliery, Stirling.—Work consisted of bringing several pillar and head coal places back from the "fault." Warned the manager to be careful in cases where, although the roof appeared to be strong, blocks of coal might be liable to come away from clay-partings in the roof. The bulk of output is used on the property in connection with the owners' stoneware and pottery works. During the year 4,000 tons of pipeclay was mined.

Clydevale Coal-pit, Clydevale.—An opencast pit worked for station requirements.

Mainholm Coal-pit, Pomahaka.—An opencast pit. During the year 3,058 tons of lignite was produced.

Central Otago.

Coal Creek Collieries, Roxburgh.—The seam at the old mine is still afire at outcrop above water-level. The new dip is driven in a block of coal, which is, unfortunately, three-parts crushed, and inferior; but drives are taken narrow, and care exercised against spontaneous ignition underground.

McPherson's Coal-pit, Roxburgh.—Underground workings where fire occurred are blocked off with clay-stopping at surface. Output is being maintained from the opencast workings.

Perseverance Coal-mine, Roxburgh.—No one about; surface arrangements in good order. On the 3rd May a miner named Simon Weatherall sustained dislocation of spine, caused by being jammed between two trucks while riding on the haulage incline. Death ensued on the 7th May.

Alexandra Colliery, Alexandra.—Workings clean, and ventilated adequately. Remaining pillars may soon become exhausted if present rate of output is maintained.

New Alexandra Colliery, Alexandra.—Owing to the Clutha River being in high flood a good opportunity was afforded of examining underground workings under most adverse conditions of overlying water-pressure. Several hours' additional pumping were required daily, and slightly increased pressure was visible at "wet back" joints, otherwise the workings appeared to be in their usual safe and satisfactory condition. Underground workings are approaching the boundary of the dam-site, which, it appears, is the freehold of the Alexandra Borough Council.

Cambrian Coal-pit, including Welshman's Gully Pit, Cambrian's.—An opencast pit, output from which fulfils local requirements.

Landervale Coal-pit, Cambrian's.—Opencast pit; worked for local use.

St. Bathan's Coal-pit, St. Bathan's.—Opencast pit, which supplies local trade.

Beck's Coal-pit, Oturehua.—Opencast pit, usually kept in good working-order.

White's Coal-pit, Oturehua.—Opencast; water-drainage troublesome.

Oturehua Coal-pit, Oturehua.—An opencast shallow pit; output used locally.

Gimmerburn Coal-pit, Gimmerburn.—An opencast pit, worked in a small way for local use.

Dillon's Coal-pit, Blackstone Hill.—A small quantity mined for own use.

Macrae's Coal-pit, Macrae's Flat.—An opencast pit, worked for supply of steam-coal to the scheelite-mine.

Clyde Collieries, Clyde.—A recent thunderstorm had been the cause of a deal of sludge which had lodged in the lower levels; however, they are now cleaned up again. Ventilation fair.

Shepherd's Creek Coal-mine, Bannockburn.—All places driven narrow towards the dip, where the roof is liable to sand-breaks; floor also rather soft. Alterations of dip to flat and rising ahead provides strong indication of incrop of coal-seam. One roof-break, where running sand and water appeared, is now normal, with no further injury than the loss of the working-place. Ventilation fair.

Ranfurly Coal-mine, Bannockburn.—A prospecting-drive is being sunk on old workings. The prospectors are aware that an accumulation of black-damp may be expected to exist in old workings which they are approaching.

Cairnmuir Coal-mine, Bannockburn.—The coal-seam occupies an unusual angle to dip, where it is recurving and evidently rising to the surface again (evidently a syncline). The fault is being driven on, in the expectancy of again striking the good seam latterly worked.

Cardrona Coal-pit, Cardrona.—Opencast, heavy stripping, 20 ft., being removed with water. The deposit is found much faulted and disturbed, consequently the lessee has difficulty at times in supplying the requirements of the settlers in this out-of-the-way district. Altitude of pit, 3,500 ft.

Gibbston Coal-mine, Gibbston.—Altitude of this mine, 3,350 ft. Having driven to the outcrop on the farther side of the Gibbston Saddle, the pillars are now being brought back to the rise of water-free level. This work is being conducted in a safe and satisfactory manner. Twenty successive falls of snow during the past winter interfered considerably with the mountain-tramway haulage, by reason of slips, &c.

Nevis Crossing Coal-pit, Nevis.—Opencast. During the year 500 tons of coal was produced.

Southland.

Pukerau Coal-mine, Pukerau.—Output continues on same scale as formerly.

Nelson's Coal-mine, Pukerau.—Output reduced owing to water-inflow and natural disadvantages of working to dip.

Hefferman's Coal-mine, East Gore.—Ventilation fair. The method of work in vogue appears to allow of rather extensive robbing of pillar and head coal at first working for future recovery.

Green's Coal-mine, Gore.—The dip drive having been extended, levels are being broken away on both sides in the usual manner. Roof strong. Fan-ventilation apparently adequate. Report-book and plan kept.

Bushy Park Coal-pit, Corydon.—An opencast pit, from which 2,160 tons of lignite was raised during the year.

Burnwell Coal-mine, Chatton.—Seam, 25 ft. Workings in good order, and ventilation excellent.

Chatton Coal-mine, Chatton.—Workings in good order, and ventilation excellent.

Ramsay's (late Pacey's) Coal-mine, Chatton.—Drawing pillars and head coal from old mine, and preparing to drive dip of seam. Ventilation good. Powder-magazine approved.

Springfield Coal-mine, Waikaka Valley.—Mine-mouth well timbered up and made secure. Powder-magazine approved. Rules posted, and report-book kept.

Willowbank Colliery, Waikaka Valley.—A new roadway had been made through some old workings, which will facilitate haulage. Owing to stentons not being through in two of the lower places air was dull with powder-smoke. Instructed mine-manager that brattice was highly necessary for ventilation. Report-book and plan kept.

Glenlee Coal-pit, Waikaka Valley.—An opencast pit, safely worked for small output.

Edge's Coal-mine, Waikaka Valley.—Driving a pair of levels westward on the strike of the seam.

Rossvale Coal-mine, Waikaia.—Mine in good working-order, and ventilation good. Extraction of inby pillars will be again proceeded with.

Waikaia Coal-mine, Waikaia.—The area affected by "creep" is now comparatively settled, but pillars and head coal are considerably crushed. A decreased output has latterly been produced at this mine.

Argyle Coal-pit, Glenary.—An opencut pit, worked for supply of local requirements.

Waimea Coal-mine, Waimea.—The old mine became flooded, and owner now reopening in another place.

Lynch's Coal-mine, Waimea.—Seam, 6 ft. Roof sound and strong.

Princhester Creek Coal-pit, The Keys.—Output for local supply continues to be provided from this irregular deposit.

Mataura Collieries, Mataura.—The ventilation under natural conditions can only be described as inadequate. The owners are contemplating installation of mechanical or other means for providing sufficient air to working-places. Otherwise the mine is well conducted. Report-book and plan kept.

Mataura Lignite-pit, Mataura.—Opencast, stripping 12 ft., and becoming heavier as the seam is followed to the dip. The working-face is about 200 yards in length, and a mechanical stripper is in use in addition to hand-work and carting.

Boghead Coal-mine, Mataura.—Seam 16 ft., stripping 12 ft., and is kept well ahead of working-face.

Waimumu Coal-pit, Waimumu.—A reduced output is now being obtained from this opencast pit.

Clarke's Coal-pit, Wyndham.—Opencast. Seam, 10 ft. Stripping 6 ft. of gravel.

Ota Creek Coal-pit, Wyndham.—Opencast. Stripping 4 ft. Lignite 6 ft.

Robin Hood Coal-pit, Pine Bush.—An opencast pit, worked for local requirements.

Graham's Coal-mine, Fairfax.—A shallow underground working on a small scale.

Ardlowie Coal-pit, Fairfax.—An opencast working for lignite used locally.

Nightcaps Colliery, Nightcaps.—No. 1 mine: Nos. 1, 2, and 3 dips, top seam, have been pillared outward; and at No. 3 dip driving has been carried southward in the solid. The fault at foot of No. 4 dip proved troublesome, and the measures were found to be considerably disturbed. Ventilation is well conducted by brattice to working-faces. Temperature in return airway, 59° Fahr.

No. 2 mine: The stone drive was badly affected by "creep," necessitating a fresh haulage-way underground. The balance of the coal from this section will be won from a new tunnel-entrance, which will shorten the haulage. Some heat was perceptible in the pillar-workings against the waste, where more air-brattice was being erected. Opencast working continues, stripping being kept well ahead. A new mine is being set away in the outcrop of the lower seam (10 ft.), which occurs at 90 ft. below the main seam being worked. The principal loading-bank, stage-buildings, and offices were completely destroyed by fire on the 19th September last. The cause of fire remained unexplained. Fortunately, the hauling-engine and boiler were saved, and loading was renewed with the loss of only one day.

New Brighton Coal-mines, Nightcaps.—Coming back on pillars from the boundary of School Commissioners' Reserve. Coal-seam open-jointed, and care required for safety of working. Ventilation good. Plan kept.

Beaumont Coal-pit, Nightcaps.—Opencast, seam 20 ft., stripping kept fairly ahead of working face. Hauling-engine with tramway and loading-bank are now laid to the roadside.

Mount Linton Coal-pit, Nightcaps.—Open workings in good order.

ACCIDENTS.

Seven serious accidents were reported during the year, of which one (Simon Weatherall) resulted fatally. An accident considered non-serious, sustained by Wm. McAllister, resulted in the death from septic poisoning.

Fatal Accidents.

3/5/12.—Perseverance Coal-mine, Roxburgh: Simon Weatherall, thirty-four, miner; sustained dislocation of spine while riding on trucks on haulage incline.

5/7/12.—Kaitangata Colliery, Kaitangata: Wm. McAllister, twenty-five, trucker; struck head against iron crowbar on roof. Death resulted from septic poisoning on the 14th July, 1912.

Non-fatal Accidents.

16/1/12.—Kaitangata Colliery, Kaitangata: John Bennie, fifty-four, miner; bruised back by piece of coal falling from roof while drawing a prop.

25/3/12.—Castle Hill Mine, Kaitangata: Wm. Fraser, sixty-one, wagon-trimmer; fractured arm while running a wagon under screens.

13/5/12.—Kaitangata Colliery, Kaitangata: Dennis Gavin, thirty, winchman; fractured left lower limb, caught by hauling-rope at head of No. 19 dip.

8/5/12.—Nightcaps Colliery, Nightcaps: John Foster, twenty-nine, miner; injured ankle by fall of coal from face.

24/6/12.—Castle Hill Mine, Kaitangata: Carl Hunnichen, thirty-eight, miner; injured knee, slipped on pavement.

28/6/12.—Kaitangata Mine, Kaitangata: Wm. Proctor, forty-one, underviewer; slight burns face and arms, due to ignition of firedamp while shot-firing.

COAL-MINERS' RELIEF FUND.

Payments, 1912, £984 8s. 1d.; 1911, £889 11s. 1d.: increase, 1912, £94 17s.

FIRECLAY AND PIPECLAY OUTPUT.

Canterbury and Otago, 6,923 tons.

ANNEXURE B.

QUESTIONS ASKED AT THE MINE-MANAGERS EXAMINATION, 1913, FOR FIRST-CLASS CERTIFICATES OF COMPETENCY.

SUBJECT 1.—*Prospecting, Opening out a Colliery, Working Coal, and Timbering.*

1. Describe the plant and appliances which you would provide for sinking a shaft to a depth of 1,000 ft., and from which it is proposed to raise 1,000 tons in eight hours, stating thickness of brickwork you would apply to support the sides of shaft, what circumstances would guide you in fixing thickness, how you would fill up the cavities at the back of the walling, and how you would provide for the collection of the water coming out of the strata.
2. Having to drive an incline tunnel dipping 1 in 6 for a distance of 300 yards, and through which it is proposed to raise 800 tons per eight-hours shift, give dimensions of tunnel, method of haulage you would provide, and say how you would ventilate the tunnel during the progress of the driving, also the method of timbering you would adopt for such a work.
3. What is meant by "systematic timbering"? Give your views as to its advantages or disadvantages, and particularly as to its safety and economy. If you adopted it in a mine under your charge how would you carry it out, and what instructions would you give your deputies? Describe the application of this system where pillars are being extracted.
4. In a new colliery in which there are three seams numbered from the bottom upward, Nos. 1 and 2 are separated by 50 ft. of rock strata, 2 and 3 have 70 ft. between them, and from No. 3 to the surface there is 350 ft. of rock; angle of dip, 15°; all the seams have to be worked simultaneously, and you are required to describe and show by neatly drawn sketches how you would connect the various seams with the shaft, so that all the output can be raised from the bottom, and state in which of the seams the workings should be kept in advance of the others, having regard to the removal of the pillars as the bords are finished in each seam.
5. Describe, with sketches, how you would proceed to clear a road through a heavy fall with a rotten roof; the best form of timbering for such work, supposing also side pressure.
6. Describe the method of conveying coal from the working-faces to the main level in a seam dipping 1 in 3. What appliances would you adopt to prevent accidents? and show by sketches the appliances you would prefer.
7. Describe the operation of coal-getting on (*a*) the bord-and-pillar system, and (*b*) the longwall system; and state the precautions which should at all times be observed to prevent accidents from falls at the face, from the roof and sides, and from blown-out shots.
8. How would you proceed to draw the props in a longwall face with shale roof? How many rows of props would you maintain next the face? Give particulars of any appliances you may have used for this work, with sketches, and show how applied.
9. Having to reopen old workings in which an accumulation of water under considerable pressure is known to exist, state what steps you would take to verify the true position of the old workings in relation to the approaching drives, what precaution you would adopt in connection with the work, and the appliance you would provide to control the water when tapped.

SUBJECT 2.—*Mine-gases, Spontaneous Combustion, and Ventilation.*

1. Describe the modern safety-lamp, and say why it is considered safe, how used in testing for firedamp; also state the lowest percentage which can, in your opinion, be detected by the safety-lamp.
2. Describe what is meant by the term "ventilating district," and say how you would satisfy yourself that a fiery colliery is adequately ventilated; also, having regard to splits, what do you consider the extreme velocity allowable for air travelling the working-face of a fiery colliery?
3. The indicated horse-power of an engine is 90, and 8 per cent. is required to overcome frictional resistance in the engine; efficiency of the face is 80 per cent: find what effective horse-power is required.
4. The downcast and upcast shafts are each 1,000 ft. deep; the temperature of the downcast is 60° Fahr., upcast 100° Fahr.; barometer 30°: what is the motive column and water-gauge?
5. Describe how you would lay out and carry on the workings of a colliery where the coal is liable to spontaneous combustion, and say what you understand is meant by this term, and how you would proceed to deal with an outbreak of fire in such a colliery.

6. Give the properties, symbols, and specific gravities of the following gases, and state how each affects the human body :—

   (*a.*) Carbon-monoxide.
   (*b.*) Hydrogen-sulphide.
   (*c.*) Carbon-dioxide.
   (*d.*) Firedamp.

7. Give sketches and describe the various air-crossings you are acquainted with, and state which you consider the best means of constructing such crossings, giving your reasons for preference.

8. Describe fully the principle of ascensional ventilation, and say why it is advantageous; also give sketch of not less than five working-places showing how same is applied.

9. Ventilate the accompanying plan, having regard to haulage. Show by conventional signs position of doors, air-crossings, stoppings, &c.

SUBJECT 3.—*General Mining, Steam Boilers and Engines.*

1. Suppose a beam of kauri timber 12 in. deep by 8 in. wide 12 ft. long: what weight will be sufficient to break it in the following cases :—

   (*a.*) Fixed at both ends and loaded uniformly.
   (*b.*) Supported at both ends and loaded in the middle.
   (*c.*) Fixed at one end and loaded at the other.

2. What size plough-steel mining-rope would you put on a shaft 600 yards deep to wind 150 tons per hour? Show by calculation. Describe the form of capping you would use, say how often you would recap, and state factor of safety you would adopt.

3. Describe and give sketches of what you consider a suitable boiler for colliery work, showing all fittings in position, and state the factor of safety which you consider should be adopted for boilers.

4. Assume a steam-engine with cylinders 12 in. diameter, 24 in. stroke, receiving steam at 80 lb. initial pressure, and cutting off steam at five-eighths of stroke; speed, 400 ft. per minute: what horse-power would be exerted at 80 per cent. efficiency?

5. Describe the appliances required to guard against accidents from overwinding, and state which of them you consider should be made compulsory under the Coal-mines Act.

6. Give briefly your views regarding any branch of coal-mining to which you may have given special study.

7. Having regard to the dangers which may arise from accumulations of coaldust in the passages and roadways of collieries, describe what means you consider should be applied to minimize these.

SUBJECT 4.—*Mine Drainage and Haulage; also Practical Electricity.*

1. What quantity of water should an electrically driven three-throw pump deliver per hour against a total head of 500 yards—size of ram, 6 in. diameter, stroke 9 in., gear ratio 12 to 1, and speed of motor 750 revolutions per minute? What horse-power motor would be required?

2. Having to design a pair of winding-engines to raise 1,000 tons per eight-hours shift from a depth of 600 yards, describe clearly the method you would adopt, having regard to balancing the load, controlling the speed, and minimizing the risk of accidents.

3. What plant would you put down to provide power for two electric haulage motors of 80 horse-power each, at bottom of a shaft 300 yards deep, to work endless-rope haulage? Describe—

   (*a.*) Generating plant.
   (*b.*) Cables you would use, and how you would support them in the shaft.
   (*c.*) The precautions necessary to prevent accident where electric cables are taken underground.

4. In laying down electrical plant what special precautions are to be taken to provide for the greatest safety and efficiency? What are the names of the four electrical units or terms in common use? and explain their meaning. What do you consider a commercially safe voltage to use for power purposes?

5. Make sketches showing a cross-section through a steam-engine cylinder and slide-valve with steam and exhaust ports shown.

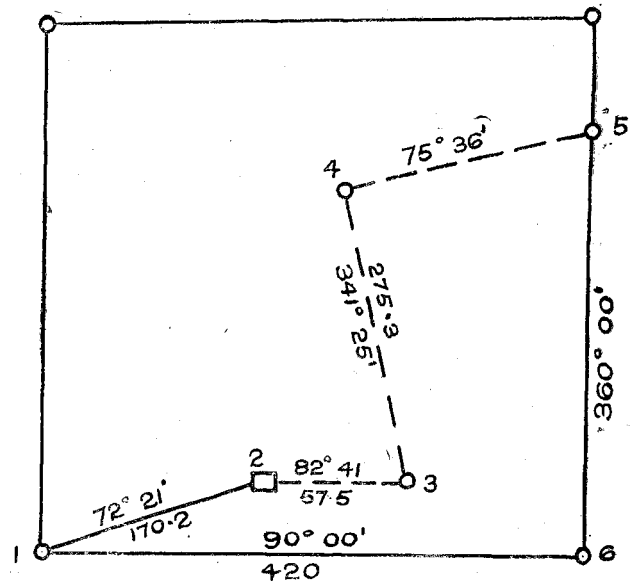
6. Describe any system with which you are acquainted for pumping water from dip workings, and state what system you consider most economical and suitable for a fiery mine.

7. Describe what you consider a suitable lighting plant for lighting the surface and pit-bottom of a colliery raising 1,000 tons daily from a depth of 1,000 ft., giving particulars of the dynamo and size of main cables.

8. Describe what provisions you would insist on working to prevent destruction of surface plant and erections by fire, and possible injury to men employed underground should such occur.

SUBJECT 5.—(*a.*) *Mine-surveying, Levelling, and Making of Plans.*

1. The accompanying diagram represents a mining claim, the positions of a shaft (2) and points (3 and 4) in the underground workings. Compute the distance which should be driven from 4 to 5 to strike the eastern boundary of the claim; and compute and give the distance 5 to 6. (Note.—The distances are given in links.)



2. The angle of elevation from the bottom of the shaft to station 3, allowing for height of instrument and signal, is 1° 15'; the angle of depression from 3 to 4 is 2° 53': give the difference of height between the bottom of the shaft and station 4 in feet.

3. State the difference between a Y and transit theodolite. Which is the better instrument for mining surveying? Give your reasons.

(*b.*) *Geology, Prospecting for Coal, Origin and Mode of Formation of Coal-seams, Faulting; also a General Knowledge of the Geology of Stratified Rocks, and more particularly of New Zealand Coal-measures.*

1. A fairly flat area of about 4,000 acres (say, 3 miles by 2 miles), free of forest, is known to be underlain at a moderate depth by a coal-seam of varying thickness. State how you would examine the area by surface work, boring, &c., so as to ascertain the probable amount of coal, the depth of seam, and the best positions for working shafts. Show by diagrams the number and positions of the bores you would drill (*a*) if the area appeared to be free from faults, and (*b*) if it was traversed by several faults of unknown throw.

2. What classes of coal are mined in New Zealand? State principal localities for each class, and give approximate chemical composition of coal in three or more different localities.

3. Describe briefly the "growth in place" and the "drift" theories of the origin of coal. Explain how vegetable matter may be transformed into bituminous coal and anthracite.

4. In a New Zealand district the rocks appearing at the surface are limestone and calcareous claystone with fossils of Miocene age; the nearest coal-outcrop is many miles away. Discuss as fully as you can the probability of coal being present. (Reference may be made to any locality that fulfils the conditions of the question.)

SUBJECT 6.—*Arithmetic, and a Knowledge of the Coal-mines Act and Amendments, also First Aid to the Injured.*

1. Assume a colliery being worked on the bord-and-pillar method, bords being driven 22 yards, centres 50 yards long by 6 yards wide, inclines 4 yards wide with air-slit in centre of each length of pillar, seam being 8 ft. thick: show by calculation the tonnage obtained from the solid workings, the specific gravity of the coal being 1·25.

2. How many cubic yards of debris would be extracted from a shaft 14 ft. diameter, 75 fathoms deep, and how many gallons of water would such shaft contain?

3. Two men worked eleven days, hewed 150 tons at 1s. 10d. per ton, cut 6 yards at 6s. per yard: what is the total amount earned, and each man's average, and what would the average be if the tonnage rate was increased 8 per cent.?

4. If 2,000 tons large coal cost 9s., and 1,500 tons small coal cost 4s., what would the sales price require to be in order to produce 9 per cent. profit?

5. Suppose a colliery produces 7,500 tons of coal per fortnight, the total cost being 7s. 9d. per ton on wagons at pit-mouth: you are required to apportion the cost to each heading given hereunder, in accordance with what, in your judgment, such costs should be (results to be shown correct to two places of decimals): (*a*) Coal-hewing, (*b*) trucking, (*c*) timbering, (*d*) haulage, (*e*) pumping, (*f*) deputies, (*g*) underviewer, (*h*) manager, (*i*) horse-drivers, (*j*) incidentals, including stores.

6. Are you the holder of a certificate from the St. John Ambulance Society?
7. What are the requisite materials and appliances which should be kept at convenient places at all collieries for the rendering of first aid in cases of accident?
8. How would you render first aid to persons suffering from severe burns?
9. What are the first and subsequent steps to be taken for the relief of persons suffering from the effects of having inhaled noxious gases?
10. How would you bandage with the object of stopping profuse bleeding from the forearm?
11. Describe your knowledge of the Coal-mines Act with reference to—
    (*a.*) Ventilation.
    (*b.*) Reporting of accidents and inspection of the scene of accidents.
    (*c.*) Signals in shafts and engine-places.
    (*d.*) The duty of firemen; and briefly state the duties of the manager under the Act.

QUESTIONS ASKED AT THE EXAMINATION FOR SECOND-CLASS MINE-MANAGERS' CERTIFICATES OF COMPETENCY, 1913.

SUBJECT 1.—*Prospecting, Opening out a Colliery, Working Coal, and Timbering.*

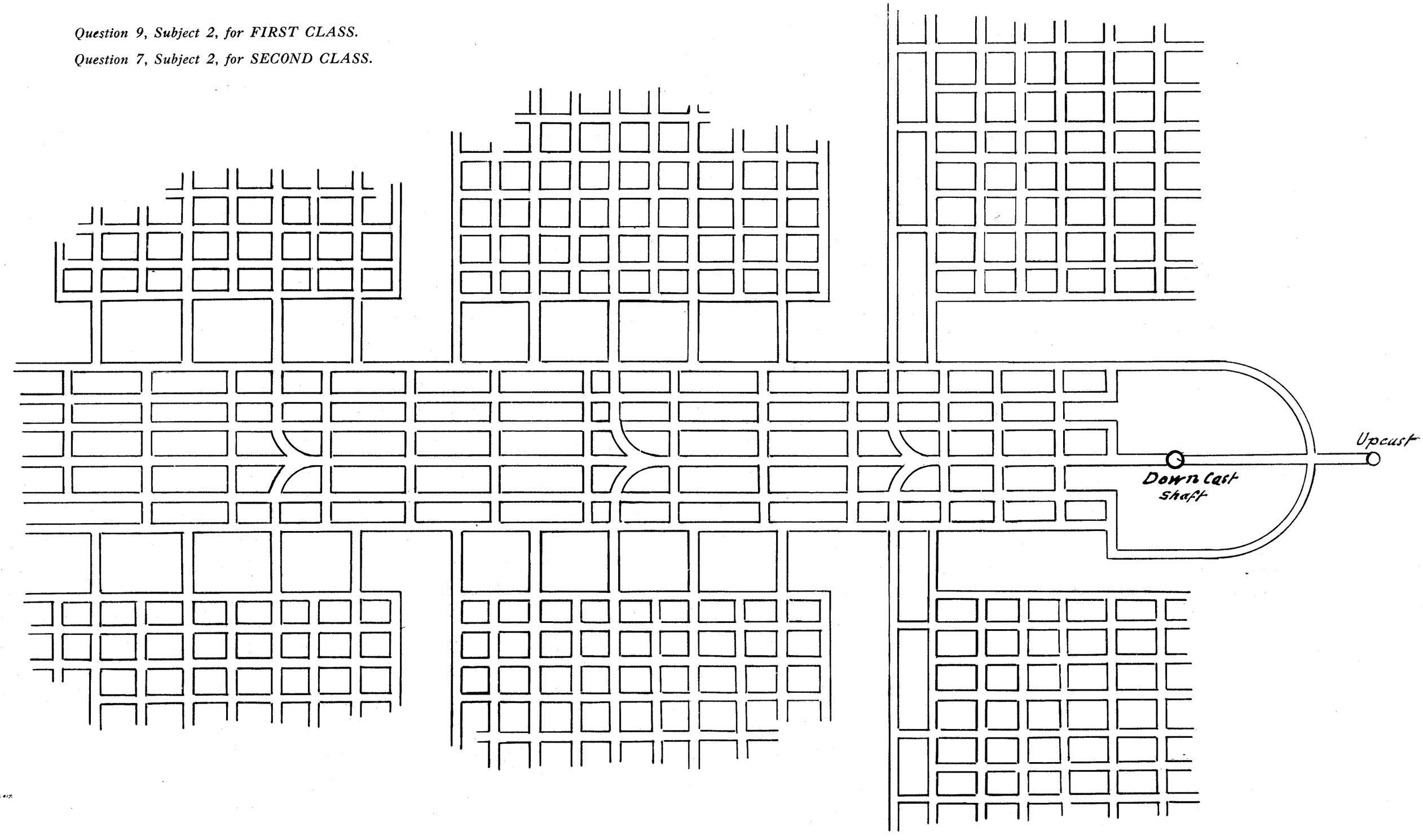
1. What special and general rules do you consider should be strictly observed in order to minimize the risk of injury to men employed in shaft-sinking?
2. Describe what you consider the best means of lighting the bottom of a shaft when sinking, and how would you ventilate a shaft which has to be sunk to a depth of 1,000 ft.?
3. What examinations are required to be made during the sinking of a shaft, and what special features are required to be strictly attended to in order to protect men from being injured by material falling upon them?
4. What are the advantages and disadvantages of systematic timbering in mines, having special regard to safety?
5. In visiting the working-places of your colliery on your rounds of inspection, to what special features would you direct your attention?
6. Give your experiences of electric shot-firing, and say what is meant by "electric hang-fires." When such occur, how much time should elapse before returning to the face of working?
7. Describe the operations of coal-winning in (*a*) bord-and-pillar workings, (*b*) longwall workings; and state the condition which would guide you in adopting either one of these systems in preference to the other.
8. If you were hewing coal in a bord on the outbye side of a ventilating district and observed your lamp full of flame, what steps would you take, and in what order would you take them?

SUBJECT 2.—*Mine-gases, Spontaneous Combustion, and Ventilation.*

1. Describe the modern safety-lamp, and say why it is considered safe, how used for testing for firedamp, and state the lowest percentage which can, in your opinion, be detected by the safety-lamp.
2. Describe what is meant by the term "ventilating district," and say how you would satisfy yourself that a fiery colliery is adequately ventilated; also, having regard to splits, what do you consider the extreme velocity allowable for air travelling in the working-faces of a fiery colliery?
3. Give your experience, if any, in dealing with underground fires. Say what, in your opinion, is the best course to adopt with such outbreaks, and what you consider is the cause of such occurrences.
4. Give the properties, symbols, and specific gravity of the following gases, and state how each affects the human body:—
    (*a.*) Carbon-monoxide.
    (*b.*) Hydrogen-sulphide.
    (*c.*) Carbon-dioxide.
    (*d.*) Firedamp.
5. Give sketch of what you consider a good construction of air-crossing.
6. Having headings going one to the dip and the other to the rise, say which would be the easiest to ventilate, and why.
7. Ventilate the annexed plan, having regard to the haulage. Show by conventional signs position of doors, air-crossings, stoppings, &c.

Question 9, Subject 2, for FIRST CLASS.

Question 7, Subject 2, for SECOND CLASS.



SUBJECT 3.—*General Mining, Mine-drainage, and Haulage.*

1. Inspectors' reports from all parts of the world show that a considerable number of accidents occur on underground haulage-roads: state what, in your opinion, should be done to minimize these accidents in connection with the various systems with which you are acquainted.
2. Suppose you were working a seam of coal with naked lights and found it necessary to put the workings on with safety-lamps, what rules and regulations would you be required to conform to?
3. Describe any system with which you are acquainted with for pumping water from dip workings, and state what system you consider most economical and suitable for a fiery mine.
4. State the natural law which governs the workings of pumps and siphons, and sketch what you consider a suitable position in which to apply the latter method of dealing with water in underground workings (sketches to have figured dimensions).
5. What do you consider the best system of signalling for use in shafts and underground haulage-roads? Give reasons for preference.
6. Give sketches of the various systems of timbering for use in coal-mines, having special regard to timbering for carrying heavy pressure from side and top weight.
7. If required to tap water from old workings, what steps would you adopt to verify the position of the old workings in relation to the approaching drives? State what appliances you would use and the safeguards you would adopt, and how you would arrange for controlling the water when tapped.

SUBJECT 4.—*Elementary Electricity, Arithmetic, and Knowledge of Coal-mines Act, also First Aid to the Injured.*

1. Does the fact that electric signals are transmitted with great rapidity through great length of wire give us any information as to the speed of electric currents?
2. Would it be possible to transmit signals along a pipe by means of a slow-moving current of water? If so, how?
3. Name the four electrical units.
4. A plant requires 700 electrical horse-power at a pressure of 150 volts: what is the resistance, and what current is used?
5. State conditions under which, in your opinion, it would be unsafe to take electricity underground.
6. How many cubic inches are there in 29 cubic yards.
7. In one district of a colliery working nine hours, 8 horses and 8 drivers are employed hauling coal at the rate of 25 trips per day with an average of 3 tons per trip: what is the cost per ton, charging 6s. per day for each driver and 5s. per day for each horse?
8. The area of a block of coal is 5,760 yards: what is the area in acres, roods, perches, and yards? What weight of coal is there in the block, the seam being 5 ft. thick, and running 18 cwt. to the cubic yard?

First Aid.

1. Are you the holder of a certificate from the St. John Ambulance Society?
2. What are the requisite materials and appliances which should be kept in convenient places at all collieries for the rendering of first aid in case of accident?
3. How would you render first aid to persons suffering from severe burns?
4. What is the first and subsequent steps to be taken for the relief of persons suffering from having inhaled noxious gases?
5. How would you bandage with the object of stopping profuse bleeding from the forearm?

Knowledge of Coal-mines Act.

1. State your knowledge of the Coal-mines Act with reference to—
   - (*a.*) Ventilation.
   - (*b.*) Reporting of accidents and inspection of scene of accidents.
   - (*c.*) Signals in shafts and on engine planes.
   - (*d.*) The duties of a fireman under the Act; and briefly state the duties of an under-viewer under the Act.

List of Persons who have obtained Certificates under the Coal-mines Acts.

First-class Mine-managers' Certificates.

Issued under the Coal-mines Acts, 1886 and 1891.

Aitken, T., Wendon.
Alexander, T., Brunnerton.
Austin, J., Sheffield.
Binns, G. J., Dunedin.
Bishop, J., Brunnerton.
*Brown, T., Westport.
Brown, T., Glentunnel.
Cameron, J., Denniston.
Campbell, J. C., Fairfield.
Cochrane, N. D., Dunedin.
Collins, W., Taupiri.
Dando, M., Brunnerton.
*Elliott, R., Wallsend.
*Ferguson, A., White Cliffs.
*Freeman, J., Green Island.
*Geary, J., Kamo.
Gray, J., Abbotsford.
*Harrison, J., Brunnerton.
Irving, J., Kaitangata.
Jemison, W., Waimangaroa.
*Kenyon, J., Shag Point.
Kerr, G., Kamo.
*Lindsay, W., Otago.
Lloyd, J., Invercargill.
*Louden, J., Green Island.
Love, A., Whangarei.
Mason, J., Nightcaps.
May, J., Greymouth.
Moody, T. P., Kawakawa.
Moore, W. J., Springfield.
*Nelson, J., Green Island.
Ord, J., Huntly.
*Redshaw, W., Whangarei.
Reed, F., Westport.
*Richardson, D., Abbotsford.
Shore, J., Kaitangata.
Shore, T., Orepuki.
*Shore, W. M., Kaitangata.
*Smart, W., Christchurch.
Smith, A. E., Nelson.
Smith, T. F., Nelson.
Sneddon, J., Mosgiel.
Swinbanks, J., Kawakawa.
Taylor, E. B., Huntly.
Thompson, A., White Cliffs.
Walker, J., Collingwood.
Williams, W. H., Shag Point.

Issued under the Coal-mines Acts, 1886, 1891, 1905, and 1908, after Examination.

Armitage, F. W., Auckland.
Armstrong, J., Brunnerton.
Barclay, T., Kaitangata.
Barclay, W., Kaitangata.
Bennie, Boyd, Waihi.
Bishop, T. O., Reefton.
Brown, J. C., Denniston.
Campbell, Peter, Fairfield.
Carruthers, J., Shag Point.
Carson, W., Kaitangata.
Coombe, J., Waihi.
Coulthard, J., Taylorville.
Dixon, C. W., Granity.
Dixon, W., jun., Kaitangata.
Duggan, George, Burnett's Face.
Dunn, Andrew, Denniston.
Dunn, W., Brunnerton.
Dunn, W. R., Thames.
Elliott, R., jun., Denniston.
Fleming, J., Kaitangata.
Fletcher, James, Granity.
Fox, R. A., Denniston.
Fry, Sydney, Waimangaroa.
Gibson, John, Westport.
Gillanders, A., Shag Point.
Gowans, W., Millerton.
Green, E. R., Abbotsford.
Green, J., Brunnerton.
Hamilton, J. S., Burnett's Face.
Herd, J., Brunnerton.
Heycock, C. R., Nightcaps.
Hill, Robert, Abbotsford.
Hosking, G. F., Auckland.
*Hughes, D., Preservation Inlet.
Hughes, Joh., Puponga.
*Jebson, D., Canterbury.
Johnson, W. P., Thames.
Jones, T., Kimihia.
Leitch, J., Blackball.
Leitch, W., Blackball.
Marshall, A. G., Denniston.
McCaffrey, Patrick, Ferntown.
McCormack, W., Denniston.
McEwan, Robert, Coromandel.
McGeachie, J., Mokau.
Milligan, J., Denniston.
Milligan, N., Westport.
Morgan, William, Waihi.
Murray, T., Westport.
*Newsome, F., Denniston.
Newton, James, Brunnerton.
Scoble, E. J., Waihi.
Shore, Joseph, Kaitangata.
Smith, George, Fairfield.
Sowerby, H., Denniston.
Tattley, E. W., Huntly
Tattley, F. J., Mercer.
Taylor, A. H., Waikato.
Thomson, Thomas, Denniston.
Turner, G. F., Shag Point.
Westfield, C. H., Fairfield.
Young, James H., Waimangaroa.

Issued under the Coal-mines Act, 1886, on Production of English Certificate.

Binns, G. J., Dunedin.
Black, T. H., Waipori.
Broome, G. H., Ngakawau.
Cater, T., Auckland.
Cochrane, N. D., Dunedin.
*Garrett, J. H., Auckland.
Hayes, J., Kaitangata.
Hodgson, J. W., Ross.
*Lindop, A. B., Springfield.
Macalister, J., Invercargill.
*Nimmo, J., Oamaru.
*Straw, M., Westport.
Tattley, W., Auckland.

Issued to Inspectors of Mines by virtue of Office, under the Coal-mines Acts of 1886 and 1891.

*Coutts, J., Thames.
Gordon, H. A., Wellington.
*Gow, J., Dunedin.
McLaren, J. M., Thames.
*Wilson, G., Thames.

Issued under the Coal-mines Acts of 1891, 1905, and 1908, on Production of Certificate from a recognized Authority outside the Dominion.

First Class.

Alison, J., Mangatini.
Alison, R., Greymouth.
Clark, W., Blackball.
Davidson, Gavin, Blackball.
*Dixon, J., Westport.
Fletcher, George, Westport.
Frame, Joseph, Kaitangata.
Gillick, J., Kaitangata.
Goold, A. L., Auckland.
Irvine, James, Dunedin.
James, Isaac Angelo, Westport.
*Jordan, R. S., Kaitangata.
Kane, D., Denniston.
Kirkwood, D., Coromandel.
Lamont, J , Devonport.
Lewis, W., Blackball.
Mark, W. S., Kaitangata.
McAvoy, H., Christchurch.
Nelson, E., Hikurangi.
Paterson, D. S. A., Kawhia.
Pollock, James, Green Island, Otago.
*Proud, Joseph, Wanganui.
*Scott, Joseph, Ngahere.
Tennent, R., Brunnerton.
Twining, C. E., Dunedin.
Watson, James, Greymouth.
Wight, E. S., Auckland.
Wood, William, Mokihinui.

Second-class Mine-managers' Certificates.

Issued under the Coal-mines Act, 1891.

Carson, M., Kaitangata.
Collier, Levi, Kamo.
Clarke, Edward, Shag Point.
Elliot, Joseph, Coal Creek.
Harris, John, Denniston.
Herd, Joseph, Brunnerton.
Howie, James, Kaitangata.
*Leeming, William, White Cliffs.
Lobb, Joseph, Mokau
*Love, Alexander, Orepuki.
McIntosh, Allan, Shag Point.
McLaren, J. M., Thames.
*Marshall, J., Ngakawau.
Murray, Thomas, Denniston.
*Nimmo, George Stewart, Ngapara.
Radcliffe, William, Reefton.
*Roberts, John, Brunnerton.
*Ross, John, Kawakawa.
Sara, James, Reefton.
Smith, Charles, Whangarei.
Thomas, James, Springfield.
Wallace, William, Huntly.
*Willetts, John, Papakaio.
Willetts, John Morris, Papakaio.
Young, William, Waimangaroa.

* Deceased since issue of certificates.

Issued under the Coal-mines Acts, 1886, 1891, 1905, and 1908, after Examination.

Allen, J., Brunner.
Austin, W. B., Sheffield.
Ball, A., Kimihia.
Barber, John, Shag Point.
Barclay, T., Kaitangata.
Barclay, T., jun., Kaitangata.
Barclay, William, Kaitangata.
Barnes, A. E., Shag Point.
Broome, J., jun., Gore.
Brown, Robert, Kaitangata.
Cadman, J., Hikurangi.
Campbell, Peter, Fairfield.
Carruthers, J., jun., Nightcaps.
*Carson, Joseph, Kaitangata.
Charles, E., Glentunnel.
Cherrie, R. C., Mokau.
Christie, James, Saddle Hill.
Clemo, G., Whangarei.
Craig, John, Coal Creek Flat.
Dale, E. G., Kaitangata.
Dixon, W., jun., Kaitangata.
Doel, G., Lovell's Flat.
Duncan, James, Kaitangata.
Duncan, J. E., Kaitangata.
Duncan, John, Lovell's Flat.
Ferguson, A., Kaitangata.
Ferguson, G., Roa.
Fox, R. A., Blackball.
Harris, A., Saddle Hill.
Heyes, T., Kaitangata.
Heycock, C. R., Nightcaps.
Hill, R., Abbotsford.
Hodson, John, Kaitangata.
Holden, J., Drury.
Hughes, Job, Roa.
Hunter, A., Southland.
Kells, F. H., Denniston.
Kirkland, H. S. S., Nightcaps.
Lewis, David, Puponga.
Lewis, J., Nightcaps.
Lindsay, J. B., Orepuki.
McAllister, Neil, Kaitangata.
McLelland, J., Kaitangata.
McLelland, A. C., Kaitangata.
McNeill, D., Fairfield.
Milligan, J., Denniston.
Mills, Walter, Huntly.
Neilson, J., Runanga.
Neilson, Moffat, Abbotsford.
Newburn, S., Kaitangata.
Ogilvie, W. W., Saddle Hill.
Orr, Hugh, Fairfield.
Parcell, W., jun., Bannockburn.
Penman, C. P., Kaitangata.
Price, F. J., Burnett's Face.
Scoble, E. J., Blackball.
Snow, T., Mercer.
Tattley, F. J., Mercer.
Taylor, Joseph, Collingwood.
Thompson, Joseph, Blackball.
Todd, T., Nightcaps.
Waldie, A. B., Mokau.
Watson, A., Soldier's Creek.
Westfield, C., Fairfield, Otago.
Whittleston, A. W., Shag Point.

Issued under the Coal-mines Acts of 1891, 1905, and 1908, on Production of Certificate from a recognized Authority outside the Dominion.

Arundel, W., Hikurangi.
Baxendale, J., Mine Creek.
Black, J., Granity.
Boyd, J., Hikurangi.
Brownlie, T., Huntly.
Burt, A., Huntly.
Burt, W. Huntly.
Clarkson, S., Kaitangata.
Cross, G., Hikurangi.
Dickinson, W., Gore.
Dodd, W., Granity.
Dowgray, R., Granity.
Eyeington, G., Huntly.
Greenwell, R., Huntly.
Grenall, S., Granity.
Inglis, A., Huntly.
Jones, T., Kimihia.
Kerr, D., Collingwood.
Lennox, W., Springfield.
Little, W., Wellington.
Littlewood, G. G., Denniston.
Longstaff, H. C., Kaitangata.
McCall, John, Wellington.
McGeachie, J., jun., Mokau.
McGuire, P., Mount Somers.
McGuire, William, Seddonville.
Parsonage, W., Dunollie.
Penman, A., Huntly.
Robertson, J., Granity.
Robertson, R., Roa.
Sneddon, J., Blackball.
Strachan, J., Dunedin.
Tennant, D., Paparoa.
Talbot, H., Huntly.
Webb, T. E., Huntly.

UNDERVIEWERS' CERTIFICATES.

Issued under the Coal-mines Amendment Act, 1909.

Allan, James, Puponga.
Attrill, Charles Waterford, Mercer.
Bond, John, Waikaia.
Boustrage, T. Hubert, Brunnerton.
Broome, James, Gore.
Clough, Henry, Millerton.
Davidson, William, Mine Creek.
Davis, William, Runanga.
Donaldson, James, Kaitangata.
*Falconer, Andrew, Abbotsford.
Flynn, John, Bannockburn.
Green, Richard, Abbotsford.
Hawthorn, James, Puponga.
Hunter, Peter, Ngakawau.
Johnston, William Crowan, Gore.
Johnstone, Thomas, Denniston.
Levick, Harry, White Cliffs.
Mann, William, Granity.
Marsh, Charles George, Glentunnel.
Muncaster, William, Runanga.
McAlister, Robert, Kaitangata.
McGrane, Reginald, Seddonville.
McKenzie, David, Nightcaps.
McNeill, William, Fairfield.
Newlands, George, Brunnerton.
Nimmo, Thomas, Papakaio.
Nimmo, William, Ngapara.
Penman, John, Denniston.
Proctor, William, Kaitangata.
Robertson, William, Mosgiel.
Todd, Thomas, Nightcaps.
Walker, John, Blackball.
Williams, William, Kaitangata.
Wilson, Daniel, Kaitangata.
Winter, John, Denniston.

Issued under the Coal-mines Amendment Act, 1909, after Examination.

Brown, Charles Henry, Denniston.
Carson, F. Kaitangata.
Clark, W. S., State Collieries.
Dowgray, John, Millerton.
Hunter, Peter, Stockton.
Johnston, C. M., Seddonville.
McDonald, Thomas, Ngakawau.
McLeod, J. G., Millerton.
Morley, J. T., Denniston.
Peacock, Thomas, Denniston.
Pearson, William, Burnett's Face.
Strongman, C. J., Cobden.
Sweeney, J. L., State Collieries.
Turner, Alfred, Kiripaka.

Issued under the Coal-mines Amendment Act, 1910.

Beardsmore, E., Denniston.
Cuthbertson, Robert, Fairfield.
Evans, William, Abbotsford.
Fisher, T., Westport.
Gibson, M., Abbotsford.
Greene, M., Kaitangata.
Hadcroft, J., Runanga.
Hunt, W., Shag Point.
Jones, David, Nightcaps.
Jones, Morris, Nightcaps.
Jones, W., Waikaka Valley.
Kitto, Richard, Kaitangata.
Manderson, P., Runanga.
Mann, D., Granity.
Marshall, J. W., Westport.
Mason, Edward, Kingston Crossing.
Mitchell, Alexander, Runanga.
McCaughern, John, Kaitangata.
Neill, S., Kawakawa.
Newburn, S., Kaitangata.
Statham, Robert, Kaitangata.
Walker, J. R., Brighton.

* Deceased since issue of certificates.

FIREMEN AND DEPUTIES' CERTIFICATES.

Issued under the Coal-mines Amendment Act, 1909.

Aitken, George, Glentunnel.
Allan, A. George, Abbotsford.
Allan, Charles, Brunnerton.
Beardsmore, Edward, Denniston.
Berry, Albert Henry, Huntly.
Blaney, James, sen., Kaitangata.
Boyd, Robert, Waronui.
Bradley, Robert, Denniston.
Buchols, Joseph, Waikaka.
Burgess, William Charles, E. Gore.
Callaghan, Frederick, Kiripaka.
Campbell, Samuel, Millerton.
Chamley, William, Millerton.
Clausen, Emil P., c/o J. Worthington, 33 Hiropi Street, Newtown, Wellington.
Connelly, Michael, Denniston.
Connew, John, Puponga.
Coppersmith, John, Denniston.
Coulthard, Thomas, Brunnerton.
Cowan, Robert Black, Gibbston.
Cuthbertson, Robert, Fairfield.
Darby, James, Huntly.
Davis, Evan, Denniston.
Deeming, William, Hikurangi.
Dellaway, Archibald, Denniston.
Dickson, Richard, Hikurangi.
Dillon, Lawrence M., Nightcaps.
Duncan, Frank, Huntly.
Duncan, Hugh, Kaitangata.
Evans, John, Granity.
Evans, William, Abbotsford,
Findlay, Charles, Denniston.
Foot, Frederick Ernest, Denniston.
*Fullick, George, Runanga.
Gibson, Matthew, Abbotsford.
Gibson, Robert, Millerton.
Gilmour, William, Millerton.
Glover, Richard, Runanga.
Gray, Thomas, Abbotsford.
Gribben, John, Kaitangata.
Headcroft, James, Runanga.
Hamilton, John, Hikurangi.
Hargreaves, Charles, Millerton.
Harris, John, Reefton.
Harris, Joseph T., Saddle Hill.
Hartley, John, Denniston.
Hay, James, Denniston.
Heron, Ralph, Kimihia.
Higgins, Thomas James, Denniston.
Hislop, William, Denniston.
Holden, Samuel, Granity.
Housley, Benjamin, Huntly.
Howe, George Charles, Shag Point.
Jackson, Samuel, Millerton.
Jarvie, William Marshall, Kaitangata.
Jaspers, George F., Denniston.
Jenkins, James, Ngakawau.
Johnston, C. Mountier, Seddonville.
Jones, David, Nightcaps.
Kaye, Charles, Runanga.
Kitto, Richard, Kaitangata.
Leeming, J. T., South Malvern.
Lutton, William, Millerton.
Mann, Duncan, Millerton.
Mason, William, Denniston.
Mears, Andrew David, Runanga.
Moncrieff, Thomas, Nightcaps.
Moore, Thomas, Mangatini.
Morganti, Charles, Ngakawau.
Murdoch, Colin McColl, Stirling.
McCaffrey, James, Seddonville.
McCoughem, John, Kaitangata.
McDonald, John T., Millerton.
McGarry, Isaac, Millerton.
McGhee, William, Kaitangata.
McGill, Douglas Thomas, Waikaka.
McGill, John, Huntly.
McKenzie, James, Nightcaps.
Newburn, Robert, jun., Kaitangata.
Newburn, Samuel, Kaitangata.
Nicholas, William, Kaitangata.
Oliver, William, Kaitangata.
Parcell, Henry Clyde, Bannockburn.
Park, Francis, Stirling.
Peckham, Henry William, Huntly.
Penman, Robert, Kaitangata.
Richards, James, Brunnerton.
Rodgers, Edwin, Kaitangata.
Sanderson, John, Kurow.
Scott, Charles, Nevis.
Scott, John, Runanga.
Skellern, John, Huntly.
Smith, Edwin, Springfield.
Smith, William, Huntly.
Smith, William, Seddonville.
Sneddon, James, Blackball.
Southward, John, Runanga.
Statham, Robert, Kaitangata.
Taylor, David, Roa.
Taylor, James, Springfield.
Thin, William, White Cliffs.
Travis, James, Alexandra South.
Tripp, Albert, Kaitangata.
Wallace, John, Mataura.
Wardrope, Francis, Hikurangi.
Watson, Andrew, Roa.
West, George Thomas, Waronui.
White, James, Roa.
Whorsky, John, Huntly.
Wilson, Walter William, Springfield.
Young, Thomas Gardner, Waikaia.

Issued under the Coal-mines Amendment Act, 1909, after Examination.

Allan, James, Brunnerton.
Anderson, Walter, Blackball.
Armstrong, V., Runanga.
Atkinson, J., Puponga.
Ball, A., Kimihia.
Berry, T., jun., Huntly.
Birchall, J., Burnett's Face.
Blair, Peter, Huntly.
Boddy, Archibald John, Runanga.
Bond, W. T., Huntly.
Broadbent, Samuel, Huntly.
Brown, J., jun., Denniston.
Buchanan, William, Millerton.
Burdon, George, Denniston.
Burt, T., Huntly.
Burt, W., jun., Huntly.
Carson, Frederick.
Clark, W. S., Dunollie.
Connolly, John, Runanga.
Connolly, John Joseph, Runanga.
Curran, James, Ngakawau.
Cuthbertson, John, Glentunnel.
Danks, Peter, Millerton.
Darby, W., Huntly.
Davidson, Thomas, Mine Creek.
Davis, Oliver James, Runanga.
Dowgray, John, Millerton.
Downes, William Norbury, Cobden.
Duggan, Francis, Runanga.
Dutton, John, Granity.
Ferguson, A., Kaitangata.
Fox, Henry John, Blackball.
Gilligban, H., Runanga.
Griffen, James, Kaitangata.
Hall, R. H., Huntly.
Hardie, J., Millerton.
Harvey, D., Huntly.
Hawkins, Joseph, Burnett's Face.
Hendry, John, Millerton.
Hicks, J. R., Kiripaka.
Hilton, Thomas, Denniston.
Honey, Archibald John, Denniston.
Hopkinson, Joseph, Seddonville.
Innes, Andrew, Runanga.
Isherwood, T., Runanga.
James, F. T., Seddonville.
Johnson, J. H., Hikurangi.
Johnson, Thomas, Huntly.
Jones, J., Kimihia.
King, Thomas Henry, Granity.
Lander, Matt Currie, Runanga.
McAvoy, William, Ngakawau.
McDonald, Thomas, Burnett's Face.
McKenty, H., Denniston.
McKernan, John, Millerton.
McLaughlin, J. W., Huntly.
McMillan, John, Huntly.
McMillan, John, Kaitangata.
Maddison, W., Huntly.
Makepeace, Henry, Runanga.
Mitchell, A., Seddonville.
Morganti, Louis, Millerton.
Moreland, S., Hikurangi.
*Mosley, J. T., Denniston.
Moye, John Patrick, Denniston.
Myers, Richard, Millerton.
Newton, Charles, Runanga.
Nicholson, David, Huntly.
Nicholson, J., State Collieries.
Niven, Peter, Ngakawau.
Nolan, John, Granity.
O'Brien, Denis Quinlan, Millerton.
O'Brien, Martin, Millerton.
Parker, Andrew, Greymouth.
Parr, Joseph, Burnett's Face.
Paul, James, Seddonville.
Pearson, Samuel George, Burnett's Face.
Pearson, William, Burnett's Face.
Phillips, J., Puponga.
Powell, J., Dunollie.
Reed, W. H., Hikurangi.
Robson, W., State Collieries.
Rowse, J., Runanga.
Ruston, Edwin Walter, Huntly.
Seddon, William, Huntly.
Smith, J. A., Seddonville.
Smith, Thomas W., Millerton.
Southward, William, Runanga.
Strongman, Charles James, Cobden.
Sweeney, John Lewis, Runanga.
Tate, Anthony, Seddonville.
Taylor, Christopher, Millerton.
Thawley, William, Denniston.
Thomson, Thomas, Mine Creek.
Veitch, D., Blackball.
Vurlow, Frederick Alexander, Denniston.
Wallwork, Moses, Runanga.
Wear, Daniel, Huntly.
Webster, Oliver, Huntly.
White, Edward, Granity.
Wilson, J. T., Kamo.
Wood, W., Huntly.
Worthington, T., Millerton.
Young, Thomas, Granity.

Issued under the Coal-mines Amendment Act, 1910.

Broadfoot, W., Millerton.
Burgess, R. S., Waikaka.
Cain, Alexander, Waikaia.
Cameron, D., North Chatton.
Churchill, S. G., Alexandra South.
Clasen, Charles, Shag Point.
Crabbe, George, Alexandra South.
Cumming, J. S., Denniston.
Cunningham, Thomas, Kaitangata.
Dixon, A., Nightcaps.
Garrey, W., Kaitangata.
Gray, Hugh, Dunedin.
Halsey, W. J., Saddle Hill.
Hartshorne, W. C., Brunnerton.
Hodgetts, I., Burnett's Face.
Hunt, William, Shag Point.
Junker, F. A., Waikaia.
Kidd, G. C., Albury.
King, J., Granity.
Lee, S., Nightcaps.
Mackie, N., Longridge.
McAuley, John, Kaitangata.
McClimont, John, Mount Somers.
McDowell, R., Nightcaps.
McIntosh, A. S., Shag Point.
McIvor, W., Waikaka.
Nelson, J. H., Pukerau.
Ramsey, George, Waikaka.
Robinson, R., Ngakawau.
Russell, H. C., Bannockburn.
Saunders, W., Denniston.
Stevenson, J., Shag Point.
Thomas, B., Denniston.
Tinker, G., Nightcaps.
Whittlestone, G. F., Abbotsford.

* Deceased since issue of certificates.

ANNEXURE C.

STATISTICS OF WORKINGS IN COAL-MINES, 1912.

Name of Mine and Locality.	Name of Manager.	Number of Years worked.	Quality of Coal.	No. of Seams worked.	Thickness of Seams.	Thickness worked.	Dip of Seam.	System of Underground Working.	Number of Shafts.	Dimensions of Shafts.		Output delivered by	Output for 1912.			Approximate Total Output to 31st December, 1911.	Approximate Total Output to 31st December, 1912.	Number of Men ordinarily employed.			Power used for drawing Mineral.	Pumps.			Means of Ventilation.	Date of Inspector's Last Visit.
										Size of Shaft or Adit.	Depth of Shaft or Length of Adit.		Coal.	Slack.	Total.			Above.	Below.	Total.		Stroke.	Size of Barrel.	Height of Column.		
NORTHERN INSPECTION DISTRICT.																										
North Auckland Coalfields.													Tons.	Tons.	Tons.	Tons.	Tons.									
Kawakawa Colliery ..	R. Dickson ..	½	semi-bitm.	1	2′ to 9′	2′ to 9′	1 in 3	bord and pillar	..	6′ x 4′	30′	adit	237	..	237	41	278	1	2	3	horse	..	..	..	natural	20/7/12
Hikurangi Coal Company ..	W. R. Dunn ..	21	ditto	1	2′ to 14′	2′ to 12′	1 in 8	ditto	3	6′ x 6′ 9′ x 6′	1,000′ 1,850′	„	54,618	..	54,618	767,449	822,067	17	68	85	steam	10″ 10″	6″ 8″	72′ 72′	fan	10/12/12
Northern Colliery ..	Edwin Nelson ..	15	„	1	2′ to 12′	3′ to 12′	varied	„	2	6½′ x 6′ 8′ x 8′	462′ 195′	„	43,436	..	43,436	408,676	452,112	12	59	71	„	4″ 10″	3″ 6″	10′ 195′	„	10/12/12
Hikurangi-Waro Mine ..	E. W. Tattley ..	..	„	1	10′ to 12′	..	„	„	2	10′ x 6′	430′	..	..	..	..	..	..	27	22	49	..	8″ 10″	5″ 4″	130′ 195′	„	9/12/12
Kiripaka Mine	„ ..	8	„	1	9′	9′	1 in 5	„	..	7′ x 9′	530′	adit	12,341	..	12,341	278,007	290,348	10	20	30	steam	8″	10″	200′	„	14/9/12
Te Kiripaka Mine.. ..	A. Turner ..	..	„	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9	..	9	..	..	..	..	..	..
Ruatangata-Kamo Mine ..	George Clemo ..	..	„	1	3′ to 6′	3′ to 6′	1 in 4	bord and pillar	2	8′ x 4′ 12′ x 6′	60′ 140′	shaft	110	..	110	..	110	2	7	9	steam	..	..	..	natural	23/7/12
Whangarei-Kamo Mine ..	A. H. Taylor ..	3	„	2	4′ to 6′	4′ to 6′	1 in 4	ditto	2	9′ x 6′	100′	„	5,405	..	5,405	3,048	8,453	5	16	21	„	6″	4½″	100′	exhaust steam	11/12/12
Waikato Coalfield.																										
United Colliery	F. J. Tattley ..	1	brown	1	50′ to 54′	25′	1 in 7	„	3	15′ x 5′ 9′ diam. 6′ x 6′	212′ 140′ 700′	„	5,230	..	5,230	115,733	120,963	30	16	46	„	24″	14″	120′	ditto	11/10/12
Taupiri Extended Mine ..	William Wood ..	24	„	1	10′ to 34′	20′	1 in 10	„	2	10′ diam. 2′ to 9′ x 5½′	166′ 209′ 190′	„	91,599	37,601	129,200	2,237,155	2,495,263	100	396	496	„	12″ 12″ 12″	2–5″ 2–5″ 2–6″	204′ 400′ 190′	fan	8/10/12
Ralph's Mine	James Fletcher	21	„	1	10′ to 60′	20′	1 in 10	„	3	8½′ diam.	230′ 140′	„	87,130	41,778	128,908							18″ 12″	1–6″ 2–5″	380′ 230′	„	9/10/12
Pukemiro Colliery ..	E. S. Wight ..	..	„	1	18′	..	1 in 25	..	..	..	..	..	..	..	..	..	..	18	..	18	..	..	..	..	..	..
Huntly Brick and Fireclay Company	R. Greenwell ..	¼	„	1	18′	6′	level	bord and pillar	1	8′ x 6′ 2′ x 4′	8′	bord and pillar	600	..	600	..	600	..	3	3	manual	..	..	..	natural	..
Mokau Coalfield.																										
Mangapapa Colliery ..	William Lennox	28	„	1	6′ to 8′	6′ to 8′	1 in 10	ditto	1	9′ x 6′	1,752′	ditto	3,762	..	3,762	73,586	77,348	3	9	12	horse	..	..	..	fan	12/11/12
Output of mines included in previous statements at which operations are suspended or abandoned ..													..	..	..	2069,209	2069,209	..	..	..	..	..	..	..	..	..

Statistics of Workings in Coal-mines, 1912—*continued*.

Name of Mine and Locality.	Name of Manager.	Number of Years worked.	Quality of Coal.	No. of Seams worked.	Thickness of Seams.	Thickness worked.	Dip of Seam.	System of Underground Working.	Number of Shafts.	Dimensions of Shafts.		Output delivered by	Output for 1912.			Approximate Total Output to 31st December, 1911.	Approximate Total Output to 31st December, 1912.	Number of Men ordinarily employed.			Power used for drawing Mineral.	Pumps.			Means of Ventilation.	Date of Inspector's Last Visit.
										Size of Shaft or Adit.	Depth of Shaft or Length of Adit.		Coal.	Slack.	Total.			Above.	Below.	Total.		Stroke.	Size of Barrel.	Height of Column.		
WEST COAST INSPECTION DISTRICT.																										
Nelson Coalfields.													Tons.	Tons.	Tons.	Tons.	Tons.									
Puponga	P. McCaffrey ..	9	bitm.	1	7′ to 10′	10′	1 in 3½	bord and pillar	..	10′x 6′ 6″	41 ch.	direct haulage	19,924	4,481	24,405	135,696	160,101	26	45	71	steam	14″ 8″ 5″ 10″	8″ 4½″ 3½″ 6″	270′	fan	5/12/12
North Cape	J. Hughes ..	2	,,	1	4′	4′	1 in 3½	ditto	..	7′ x 7′	18 ch.	horse haulage	4,666	..	4,666	1,700	6,366	9	13	22	horse	..	..	..	natural	5/12/12
Buller Coalfield.																										
Seddonville State Coal-mine	I. A. James ..	9	,,	1	12′	12′	variable	,,	1	6′ x 12′ (shaft) 10′ x 7′ (tunnel)	150′ (shaft) 72 ch. (tunnel)	endless rope	56,161	16,532	72,693	400,104	472,797	16	87	103	steam	..	..	..	fan	19/12/12
W stport Stockton ..	H. McAvoy ..	4	,,	1	4′ to 20′	12′	,,	,,	1	*B* 8′ x 7′ *C* 13′ x 8′ *D* 13′ x 7′	60 ch. 26 ch. 13 ch.	endless rope and electric locomotives	79,971	45,060	125,031	332,129	457,160	40	100	140	electric	..	..	..	,,	21/12/12
Millerton	W. McCormack	21	,,	1	4′ to 40′	12′	,,	,,	..	10′ x 7′ 11′ x 7′ 12′ x 7′ 10′ x 6′	72 ch. 53 ch. 11 ch. 24 ch.	endless rope	279,613	49,817	329,430	3431,993	3761,423	116	468	584	gravity	..	..	..	,,	20/12/12
Ironbridge Mine	G. Smith ..	21	,,	2	3′ to 20′	full height	,,	,,	..	10′ x 6′	76 ch.	ditto									steam	two 8″	Tang x 4″ x	yes 12″	,,	12/12/12
Coalbrookdale	N. Milligan ..	31	,,	1	4′ to 20′	ditto	,,	,,	..	10′ x 6′	44 ch. 25 ch.	,,	229,352	69,284	298,636	6045,799	6344,435	146	413	559		one 8″	Came x 4″ x	ron 12″		
																					,,	..	..	..	,,	10/12/12
Whitecliffs Coal-mine ..	Jas. H. Burley..	12	,,	1	16′ to 20′	9′	1 in 4	,,	..	12′ x 9′	1 ch.	horse and dray	116	..	116	6,850	6,966	..	2	2	manual	..	..	..	natural	12/11/12
Rocklands Coal-mine ..	J. P. Burley ..	11	,,	1	20′	8′	1 in 4	,,	..	10′ x 8′	1 ch.	ditto	199	..	199	6,404	6,603	..	2	2	,,	..	..	..	,,	12/11/12
Inangahua Coalfield.																										
Coghlan's Freehold, Boatman's	J. Coghlan ..	16	,,	1	10′	full height	1 in 3	..	..	6′x 6′	610′	,,	81	703	784	4,133	4,917	..	2	2	,,	..	..	..	,,	3/10/12
Archer's Freehold, Boatman's	J. W. Archer ..	17	,,	2	10′	ditto	1 in 3	,,	..	7′ x 5′	800′	,,	1,435	..	1,435	15,281	16,716	1	3	4	,,	..	..	..	,,	3/10/12
Waitahu Coal-mine ..	J. Jude ..	10	,,	1	14′	8′	1 in 4	,,	..	10′ x 6′6″	450′	,,	752	..	752	3,516	4,268	..	2	2	,,	..	..	..	,,	4/10/12
Burke's Creek Coal-mine ..	J. Harris ..	11	,,	1	12′ to 15′	8′	1 in 4	,,	..	12′ x 8′	10 ch.	horse and tram	2,665	398	3,063	11,728	14,791	1	6	7	horse and hand	..	..	..	,,	25/11/12

Lockington's Coal-mine ..	E. F. Lockington	11	,,	1	12′ to 15′	8′	1 in 4	,,	..	10′ x 8′	350′	ditto	228	7	235	2,060	2,295	..	2	2	ditto	..	..	..	,,	20/11/12
Phœnix and Venus Coal-mine	W. Knight ..	31	,,	1	30′	12′	1 in 2	,,	..	6′ x 4′	300′	horse and dray	504	977	1,481	27,978	29,459	2	2	4	manual	..	..	..	,,	27/11/12
Watson and Moyle's Coal-mine	O. Moyle ..	4	,,	1	12′	12′	1 in 4	,,	..	8′ x 6′	450′	ditto	320	850	1,170	2,734	3,904	1	2	3	,,	..	..	..	,,	27/11/12
Lankey's Creek Coal-mine ..	F. Knight ..	10	,,	1	8′	8′	1 in 20	,,	..	7′ x 5′	200′	,,	106	..	106	17,207	17,313	1	4	5	,,	..	..	..	,,	4/3/12
Golden Point Coal-mine ..	R. L. Kearns ..	4	,,	1	16′	10′	1 in 3	,,	..	6′ x 5′	280′	,,	510	..	510	748	1,258	..	2	2	,,	..	..	..	,,	28/11/12
Loughlin's Coal-mine ..	R. L. Kearns ..	7	,,	1	5′	5′	1 in 6	,,	..	10′ x 5′	790′	,,	1,152	..	1,152	8,419	9,571	1	3	4	,,	..	..	..	,,	28/11/12
Merrijigs Coal-mine ..	H. Grigg ..	2	,,	1	2′ 6″	2′ 6″	1 in 1	,,	..	6′ x 4′	220′	,,	130	31	161	233	394	..	2	2	,,	..	..	..	,,	28/11/12
Reefton Coal-mine ..	C. A. Svenson ..	10	,,	1	8′	8′	1 in 4	,,	..	6′ x 5′	660′	,,	197	..	197	3,915	4,112	..	2	2	,,	..	..	..	,,	4/10/12
Grey Coalfield.																										
Paparoa Coal-mine ..	C. R. Heycock ..	4	,,	1	8′ to 16′	10′ to 12′	1 in 3	,,	..	10′ x 7′6″	3,000′	endless rope	3,807	2,540	6,347	65,013	71,360	20	40	60	gravity	..	..	..	fan	13/12/12
Blackball Coal-mine ..	J. S. Hamilton ..	22	,,	2	15′	15′	1 in 6	,,	2	9′ x 6′ 10′ x 7′	1,232′ 600′	ditto	135,871	67,007	202,878	1469,946	1672,824	55	300	355	steam & electric	6″ 9″	4″ 9″	90′ 90′	,,	16/11/12
North Brunner Coal-mine ..	James Armstrong	3	,,	1	6′	6′	1 in 3	,,	2	9′6″x6′6″	400′	self-acting inclines & endless rope	6,055	6,784	12,839	23,706	36,545	20	50	70	steam	..	..	..	,,	20/11/12
Brunner Coal-mine ..	R. Allison ..	48	,,	1	12′	12′	1 in 4	,,	3	12′ x 10′ 12′ x 10′ 14′ x 6′	4 ch.	direct haulage	9,568	14,772	24,340	2296,931	2321,271	7	33	40	,,	11″ 6″	7″ 4″	40′ 25′	,,	20/11/12
Point Elizabeth No. 1—																										
No. 1 Section	John Coulthard	8½	,,	1	8′ to 16′	8′ to 10′	variable	,,	..	10′ x 7′	11 ch.	endless rope & direct haulage	94,418	94,417	188,835	1413,463	1602,298	84	252	336	,,	2′ 9″	8″	380′	,,	14/11/12
No. 2 Section	H. Sowerby ..	8½	,,	2	variable 4′ to 12′	full height	1 in 5	,,	..	10′ x 7′	12 ch.	ditto									,,	3′	12″	520′	,,	21/11/12
Point Elizabeth No. 2 ..	James Bishop ..	..	..	..	(Under development)			..	..	..	..	..	..	..	..	..	..	70	30	100	..	..	..	..	..	26/11/12
Mount Burnett Coal-mine ..	James Young ..	..	..	..	(Under development)			..	..	..	..	..	..	..	..	..	..	16	..	16	..	..	..	..	..	6/12/12
Output of mines included in previous statements at which operations are abandoned or suspended												..	..	..	..	1562,453	1562,453	..	..	..	..	..	..	..	..	..

SOUTHERN INSPECTION DISTRICT.

													Tons.	Tons.	Tons.	Tons.	Tons.									
Canterbury.																										
Springfield, Springfield ..	J. Taylor (P.)* ..	36	brown and fire-clay	2 1	2′ 5′	all ,,	1 in 6	bord and pillar	1	6′ x 4′	80′	shaft	62	213	275	91,412	91,687	1	4	5	steam	steam-pump		exhaust steam from pump	30/10/12
Springfield Fireclay, Springfield	J. Bishop ..	12	ditto	1 1	2′ 10′	,,	1 in 6	ditto	1	6′ x 5′ 4′ x 3′	200′ 50′	adit	..	..	..	472	472	..	..	..	horse	steam-pump		ditto	30/10/12
Sheffield Fireclay, Sheffield ..	John Austin ..	..	fire-clay	1	8′	,,	1 in 10	,,	..	..	..	,,	..	..	..	..	..	..	2	2	..	..	..	..	..	..
Homebush, Glentunnel ..	James Lamont ..	40	brown	1	5′	,,	1 in 3	,,	1	6′ x 5′ 4′ x 3′	10 ch. 50′	tunnel	8,693	945	9,638	267,908	277,546	9	32	41	horse	Tangye		steam-jet	5/12/12

* At mines where six men or less are employed certificated managers are not compulsory, but the manager shall hold a permit; such managers are here marked (P).

Statistics of Workings in Coal-mines, 1912—*continued.*

Name of Mine and Locality.	Name of Manager.	Number of Years worked.	Quality of Coal.	No. of Seams worked.	Thickness of Seams.	Thickness worked.	Dip of Seam.	System of Underground Working.	Number of Shafts.	Dimensions of Shafts.		Output delivered by	Output for 1912.			Approximate Total Output to 31st December, 1911.	Approximate Total Output to 31st December, 1912.	Number of Men ordinarily employed.			Power used for drawing Mineral.	Pumps.			Means of Ventilation.	Date of Inspector's Last Visit.
										Size of Shaft or Adit.	Depth of Shaft or Length of Adit.		Coal.	Slack.	Total.			Above.	Below.	Total.		Stroke.	Size of Barrel.	Height of Column.		
SOUTHERN INSPECTION DISTRICT—*continued.*																										
Canterbury—continued.													Tons.	Tons.	Tons.	Tons.	Tons.									
St. Helen's, Whitecliffs ..	W. Thin (P.)* ..	31	brown	1	6′	all	1 in 3	bord and pillar	1	6′ x 5′ 4′ x 3′	5 ch. 80′	engine plane	954	..	954	20,159	21,113	1	5	6	steam	T	ang	ye	ditto	29/10/12
Mount Somers, Mount Somers	W. Dixon ..	11	,,	1	20(	12′	1 in 4	,,	..	7′ x 6′	5 ch.	ditto	2,181	829	3,010	43,044	46,054	1	7	8	,,	T	ang	ye	natural	25/10/12
Woolshed Creek (now Tripp's Mine), Mount Somers	J. McClimont (P.)	46	,,	1	40′	15′	1 in 9	,,	..	7′ x 6′	5 ch.	adit	1,647	446	2,093	57,876	59,969	1	4	5	horse	T	ang	ye	,,	25/10/12
Albury, Albury	Hugh Gray (P.)	21	,,	1	12′	8′	1 in 6	,,	1	6′ x 5′ 4′ x 3′	5 ch. 68′	,,	382	..	382	12,344	12,726	1	2	3	,,	T	ang	ye	,,	25/7/12
Elephant Hill, Waihao Downs	E. Richards ..	44	,,	1	14′	8′	1 in 10	,,	..	6′ x 5′	20 ch.	,,	..	..	..	668	668	..	..	..	..	..	..	..	,,	..
Waihao Forks, Waihao Forks	P. Campbell ..	17	,,	1	6′	5′	..	,,	..	5′ x 4′	100′	,,	111	44	155	3,002	3,157	2	4	6	steam	..	..	..	,,	29/2/12
PRIVATE PITS.																										
Acheron, Lake Coleridge ..	K. Murchison ..	30	,,	1	4′	all	..	,,	..	..	..	,,	55	..	55	505	560	..	1	1	hand	..	..	..	,,	..
Dalgety, Hakataramea ..	C. W. Ensor ..	31	,,	1	30′	15′	semi-vertical	levels	..	..	..	,,	202	..	202	3,055	3,257	..	1	1	,,	..	..	..	,,	..
North Otago.																										
Wharekuri, Wharekuri ..	A. Shanks ..	..	,,	1	40′	13′	vertical	,,	..	6′ x 4′	3 ch.	,,	..	..	..	2,585	2,585	..	..	..	..	..	..	..	..	..
Awakino, Awakino ..	D. Scott ..	27	,,	1	7′	6′	,,	,,	..	..	..	,,	..	..	..	5,808	5,808	..	..	..	..	..	..	..	..	..
St. Andrew's, Papakaio ..	T. Nimmo (P.)..	34	,,	1	7′	6′	1 in 8	bord and pillar	2	6′ x 6′ 4′ x 3′	5 ch. 60′	,,	1,737	..	1,737	46,261	47,998	1	4	5	horse	..	..	..	furnace	5/12/12
Prince Alfred, Papakaio ..	A. Beardsmore(P.)	43	,,	1	9′	7′	1 in 9	ditto	1	5′ x 6′ 4′ x 3′	5 ch. 51′	,,	1,000	..	1,000	56,039	57,039	1	2	3	,,	..	..	..	natural	5/12/12
Ngapara, Ngapara ..	W. Nimmo (P.)	34	,,	1	25′	8′	1 in 7	,,	1	6′ x 6′ 4′ x 4′	10 ch. 50′	,,	704	..	704	27,759	28,463	1	1	2	,,	..	..	..	,,	..
Broadleaf, Shag Point ..	G. W. Brooke (P.)	4	pitch	1	5′	all	1 in 10	,,	..	6′ x 5′	150′	,,	194	52	246	2,036	2,282	..	2	2	,,	..	..	..	,,	4/12/12
Shag Point, Shag Point ..	C. Clasen (P.) ..	4	,,	1	3′	,,	1 in 6	,,	1	6′ x 5′ 4′ x 4′	250′ 25′	,,	970	382	1,352	4,188	5,540	1	4	5	,,	..	..	..	,,	4/12/12
Allandale, Shag Point ..	A. McIntosh ..	25	,,	1	7′	,,	1 in 4	,,	1	6′ x 5′ 5′ x 4′	350′ 60′	engine plane	2,951	1,487	4,438	316,667	321,105	3	10	13	steam	T	ang	ye	furnace	4/12/12
South Otago.																										
Fernhill, Abbotsford ..	James Gray ..	35	brown	1	15′	12′	1 in 10	,,	1	6′ x 6′ 4′ x 4′	5 ch. 30′	adit	6	1,193	1,199	150,799	151,998	7	3	10	self-acting incline	..	..	..	natural	27/11/12
Freeman's Coal Company, Abbotsford	C. H. Westfield	32	,,	1	7′ to 14′	all	1 in 7	,,	2	6′ x 6′ 5′ x 4′	1,400′ 150′	engine plane	19,713	2,943	22,656	449,660	472,316	6	38	44	steam & horse	..	..	..	fan	27/11/12

Green Island, Green Island	T. Barclay, jun.	25	,,	1	10′	8′	1 in 10	,,	1	6′ x 5′ 4′ x 3′	5 ch. 35′	ditto	1,615	..	1,615	116,779	118,394	2	4	6	ditto	Tangye		exhaust steam	26/11/12
Jubilee, Saddle Hill ..	Thomas Barclay	15	,,	1	18′	12′	1 in 10	,,	1	6′ x 5′ 4′ x 3′	10 ch. 40′	,,	21,946	3,633	25,579	210,824	236,403	7	25	32	,,	Tangye		furnace	26/11/12
Saddle Hill (No. 1), Saddle Hill	W. W. Ogilvie	40	,,	1	20′	15′	1 in 10	,,	..	6′ x 5′ 4′ x 3′	10 ch. 100′	,,	2,845	5,297	8,142	199,664	207,806	3	11	14	,,	.. .. ..		,,	26/11/12
Saddle Hill (No. 2), Saddle Hill	Robert Hill ..	11	,,	1	22′	15′	1 in 10	,,	1	6′ x 5′ 4′ x 3′	5 ch. 30′	,,	4,261	9,342	13,603	155,088	168,691	8	17	25	,,	.. .. ..		fan	26/11/12
Lauriston, Brighton ..	J. R. Walker (P.)	26	,,	1	7′	6′	1 in 20	,,	..	6′ x 5′	3 ch.	,,	236	55	291	7,933	8,224	1	1	2	steam	Tangye		natural	20/12/12
Brighton, Brighton ..	A. McColl (P.) ..	25	,,	1	4′	all	1 in 20	,,	1	5′ x 4′ 4′ x 3′	2 ch. 48′	adit	..	47	47	3,160	3,207	..	1	1	horse	.. .. ..		,,	20/12/12
Ferndale, Taieri Beach ..	S. H. Fairbairn	29	,,	1	10′	8′	..	level	..	10′ x 8′	100′	level	12	..	12	1,007	1,019	..	..	..	hand	.. .. ..		,,	..
Waronui, Milton	J. Carruthers ..	8	,,	1	18′	8′	1 in 7	bord and pillar	..	6′ x 6′	15 ch.	engine plane	15,153	5,251	20,404	82,282	102,686	13	26	39	electric tail-rope system	Tangye		fan	6/9/12
McGilp's, Milton	J. J. Cooper (P.)	8	,,	1	22′	15′	1 in 8	ditto	..	6′ x 6′	5 ch.	adit	4,683	..	4,683	9,428	14,111	1	3	4	hand	.. .. ..		natural	12/9/12
Good's, Waitahuna ..	William Good ..	2	lignite	1	..	..	..	open face	..	..	..	open face	10	..	10	48	58	1	..	1	,,	.. .. ..		..	..
Taratu, Lovell's Flat ..	Thomas Shore ..	11	brown	1	20′	12′ to 15′	1 in 10	bord and pillar	2	13½′ x 5½′ 6′ x 4′	200′ 185′	shaft and level	10,829	2,472	13,301	144,977	158,278	7	13	20	steam	Tangye		fan	13/9/12
Hawthorn Den, Kaitangata	T. Cunningham (P.)	4	,,	1	9′	all	..	ditto	..	6′ x 6′ 6′ x 4′	5 ch. 2 ch.	drive adit	109	..	109	293	402	..	1	1	hand	.. .. ..		natural	..
Wangaloa, Kaitangata ..	J. Smith ..	31	,,	1	10′	7′	1 in 6	,,	..	6′ x 5′	1 ch.	,,	35	5	40	2,044	2,084	..	1	1	,,	.. .. ..		,,	..
Longridge, Kaitangata ..	N. Mackie (P.) ..	4	,,	1	4′	all	1 in 4	,,	..	5′ x 4′	100′	,,	958	..	958	1,529	2,487	..	4	4	,,	.. .. ..		,,	17/12/12
Kaitangata, Kaitangata ..	A. S. Gillanders	36	,,	3	50′ in aggr'gate	,,	1 in 1½ to 1 in 30	,,	1	10′ x 7′ 8′ x 4′ 6″	51 ch. 580′	engine plane	83,765	43,996	127,761	2714,181	2841,942	71	256	327	steam & compressed air	2′ 6″ 6″ 280′ three pumps		fan	..
Castle Hill, Kaitangata ..	W. Carson ..	19	,,	4	50′ in aggr'gate	..	1 in 1½ to 1 in 20	,,	1	11′ x 6′ 6″ 9′ diam.	45 ch. 526′	ditto									ditto	ditto 6″ 500′		furnace	..
Benhar, Stirling	C. Murdoch (P.)	49	lignite	1	25′	12′	1 in 10	,,	1	6′ x 6′ 4′ x 4′	5 ch. 50′	,,	5,111	754	5,865	136,097	141,962	1	6	7	steam	Snow pump		exhaust steam	17/12/12
Mount Wallace, Stirling ..	D. Scott ..	17	,,	1	20′	12′	..	,,	..	12′ x 12′	4 ch.	adit	120	..	120	8,718	8,838	..	1	1	horse	.. .. ..		natural	17/12/12
Adams', Clydevale ..	Acton-Adams	4	,,	1	4′	all	..	open	..	..	..	open	10	..	10	185	195	..	..	..	..	.. .. ..		..	..
Mainholm, Waipahi ..	J. G. Drummond (P.)	27	,,	1	20′	,,	..	,,	..	..	..	,,	3,058	..	3,058	56,795	59,853	3	..	3	horse	.. .. ..		..	..
Central Otago.																									
Coal Creek, Roxburgh ..	J. Barber ..	42	,,	1	20′ to 50′	10′ to 20′	..	bord and pillar	..	6′ x 5′	2 ch.	adit	1,891	..	1,891	56,116	58,007	1	3	4	horse	siphon		natural	17/10/12
McPherson's, Roxburgh ..	R. McPherson, (P.)	42	,,	1	80′	all	..	open	..	..	..	open	2,620	..	2,620	56,144	58,764	3	..	3	,,	drainage-tunnel		,,	17/10/12
Perseverance, Roxburgh ..	S. Vernon (P.) ..	25	,,	1	75′	25′	1 in 3	bord and pillar	..	7′ x 6′	5 ch.	engine plane	2,593	..	2,593	50,886	53,479	1	3	4	Pelton wheel	hydraulic jet-pump		,,	17/10/12
Alexandra, Alexandra ..	D. Mathias (P.)	31	,,	1	9′	7′	1 in 7	ditto	1	6′ x 5′	5 ch.	ditto	2,384	..	2,384	78,595	80,979	1	4	5	steam	Snow pump		exhaust steam	16/10/12
Molyneux, Alexandra ..	James Pollock ..	14	,,	1	28′	9′	1 in 20	,,	1	5′ x 3′ 6″ 6′ x 4′	60′ 80′	shaft	6,674	1,560	8,234	107,743	115,977	4	14	18	,,	Tangye		ditto	16/10/12
Cambrian (including Welshman's Gully Pit), Cambrians	J. McGuckin ..	51	,,	1	30′	all	..	open	1	5′ x 4′ ..	60′ ..	open	166	..	166	47,772	47,938	1	..	1	horse	.. .. ..		..	..
Laudervale, Cambrians ..	Robert Jones ..	8	,,	1	20′	,,	..	,,	..	..	..	,,	108	..	108	650	758	1	..	1	,,	.. .. ..		..	..
St. Bathan's, St. Bathan's ..	J. Enright ..	15	,,	1	indefinite	15′	..	,,	..	..	..	,,	184	..	184	5,272	5,456	2	..	2	,,	.. .. ..		..	..

Statistics of Workings in Coal-mines, 1912—*continued.*

Name of Mine and Locality.	Name of Manager.	Number of Years worked.	Quality of Coal.	No. of Seams worked.	Thickness of Seams.	Thickness worked.	Dip of Seam.	System of Underground Working.	Number of Shafts.	Dimensions of Shafts.		Output delivered by	Output for 1912.			Approximate Total Output to 31st December, 1911.	Approximate Total Output to 31st December, 1912.	Number of Men ordinarily employed.			Power used for drawing Mineral.	Pumps.			Means of Ventilation.	Date of Inspector's Last Visit.
										Size of Shaft or Adit.	Depth of Shaft or Length of Adit.		Coal.	Slack.	Total.			Above.	Below.	Total.		Stroke.	Size of Barrel.	Height of Column.		
SOUTHERN INSPECTION DISTRICT—*continued.*																										
Central Otago—continued.													Tons.	Tons.	Tons.	Tons.	Tons.									
Rough Ridge, Oturehua ..	John Beck (P.)..	26	lignite	1	35′	all	..	open	..	..	..	open	758	..	758	26,522	27,280	2	..	2	horse	drainage tunnel			..	..
Idaburn, Oturehua ..	J. White (P.) ..	42	,,	1	20′	,,	..	,,	..	..	..	,,	718	..	718	42,069	42,787	2	..	2	,,	drainage tunnel			..	..
Oturehua, Oturehua ..	R. Thomas (P.)	20	,,	1	7′	,,	..	,,	..	..	..	,,	420	..	420	1,305	1,725	1	..	1	,,	Douglas pumps			..	..
Gimmerburn, Gimmerburn ..	C. Dougherty ..	56	,,	1	12′	,,	..	,,	..	..	..	,,	36	..	36	3,109	3,145	1	..	1	,,	..	..	..	..	..
Clyde, Clyde	G. F. Turner ..	40	brown	2	40′	14′	1 in 2	bord and pillar	..	6′ x 6′	5 ch.	engine plane	2,493	..	2,493	57,625	60,118	1	4	5	steam	Tangye			natural	10/1/12
Shepherd's Creek, Bannockburn	J. Hodson (Cromwell and Bannockburn Collieries Coy.; T. K. Harty, managing director)	35	,,	1	8′	7′	1 in 6	ditto	..	6′ x 6′	200′	ditto	3,669	..	3,669	71,301	74,970	3	12	15	,,	Tangye			exhaust steam	3/10/12
Excelsior, Bannockburn		17	,,	1	6′	5′	1 in 6	,,	..	6′ x 5′	20 ch.	,,	..	..	..	59,202	59,202	..	..	..	,,	Tangye			natural	..
Cairnmuir, Bannockburn ..	A. W. Whittlestone	10	,,	1	12′	10′	1 in 1	,,	..	6′ x 6′	5 ch.	,,	4,713	..	4,713	24,102	28,815	2	12	14	,,	Tangye			,,	3/10/12
Ranfurly, Bannockburn ..	George Crabbe(P.)	2	,,	..	..	..	..	..	..	..	..	..	..	..	..	654	654	2	..	2	..	..	..	..	..	3/10/12
Cardrona, Cardrona ..	R. McDougall(P.)	28	,,	1	30′	all	..	open	..	..	..	open	281	..	281	24,647	24,928	3	..	3	horse	..	..	..	..	14/11/12
Gibbston, Gibbston ..	John Duncan ..	26	,,	1	15′	10′	1 in 5	bord and pillar	..	6′ x 5′	20 ch.	adit	829	106	935	18,794	19,729	1	2	3	steam	..	..	..	natural	15/11/12
Ryder's, Nevis	R. Toms (P.) ..	12	,,	1	45′	30′	semi-vertical	levels	..	..	..	,,	1,064	..	1,064	6,870	7,934	..	3	3	horse	..	..	..	,,	13/3/12
Nevis, Nevis	R. Toms ..	16	,,	1	20′	..	vertical	,,	..	..	..	,,	..	..	..	5,624	5,624	..	..	..	,,	..	..	..	,,	13/3/12
Nevis Crossing, Nevis ..	R. Ritchie (P.)..	9	,,	1	16′	16′	open	..	..	..	..	open	1,294	..	1,294	8,838	10,132	3	..	3	,,	..	..	..	..	13/3/12
Gold and Scheelite Proprietary, Macrae's	D. B. Waters ..	6	lignite	1	10′	all	,,	..	..	..	..	,,	552	..	552	2,038	2,590	1	..	1	,,	..	..	..	..	..
Dillon's, Blackstone Hill ..	John Dillon ..	15	,,	1	12′	..	,,	..	..	..	..	,,	10	..	10	215	225	..	..	..	..	..	..	..	..	..
Southland.																										
Pukerau, Pukerau ..	F. A. Junker(P.)	32	,,	1	16′	9′	1 in 8	bord and pillar	..	8′ x 8′	10 ch.	adit	980	..	980	37,171	38,151	..	2	2	horse	..	..	..	natural	..
Nelson's, Pukerau ..	J. H. Nelson (P.)	23	,,	1	16′	10′	1 in 8	ditto	..	6′ x 6′	3 ch.	,,	47	..	47	4,408	4,455	..	1	1	,,	windmill			,,	..
Heffernan's, East Gore ..	A. Hoffman (P.)	34	,,	1	20′	12′	1 in 7	,,	..	6′ x 6′	5 ch.	engine plane	3,035	..	3,035	50,794	53,829	1	2	3	steam	Snow pump			,,	25/4/12
Green's, Gore	W. C. Johnston (P.)	24	,,	1	17′	12′	1 in 20	,,	1	10′ x 8′ 4′ x 3′	10 ch. 50′	ditto	13,545	..	13,545	114,590	128,135	1	7	8	,,	Tangye			fan	10/12/12

Bushy Park, Croydon ..	George Flett (P.)	7	,,	1	20′	all	..	open	..	..	..	open	2,160	..	2,160	15,491	17,651	2	2	4	,,	Tangye			..	..
Burnwell, Chatton ..	D. Cameron (P.)	13	,,	1	20′	12′	1 in 10	bord and pillar	..	10′ x 8′	5 ch.	engine plane	1,923	..	1,923	27,552	29,475	1	1	2	,,	..	..	..	natural	25/4/12
Ramsay's (late Pacey's), Chatton	G. Ramsay (P.)	9	,,	1	20′	18′	1 in 10	ditto	..	8′ x 6′	10 ch.	ditto	7,945	..	7,945	42,025	49,970	1	5	6	,,	..	..	..	,,	25/4/12
Chatton, Chatton ..	J. Ramsay (P.)	10	,,	1	20′	12′	1 in 6	,,	..	8′ x 8′	5 ch.	adit	634	..	634	12,294	12,928	..	1	1	horse	steam-pump			,,	25/4/12
Springfield, Waikaka Valley	J. Milne (P.) ..	19	,,	1	17′	10′	1 in 10	,,	..	9′ x 8′	5 ch.	engine plane	3,681	..	3,681	24,824	28,505	1	3	4	steam	steam-pump			,,	25/4/12
Willowbank, Waikaka Valley	E. Charles ..	16	,,	1	15′	10′	1 in 10	,,	..	9′ x 8′	5 ch.	ditto	5,306	..	5,306	58,654	63,960	1	4	5	,,	steam-pump			,,	25/4/12
Glenlee, Waikaka ..	D. T. McGill ..	19	,,	1	14′	all	..	open	..	..	..	open	457	..	457	12,219	12,676	1	..	1	horse	..	..	..	..	25/4/12
Edge's, Waikaka	W. McIvor (P.)	13	,,	1	16′	12′	1 in 4	bord and pillar	..	8′ x 8′	3 ch.	engine plane	5,065	..	5,065	29,616	34,681	1	3	4	steam	steam-pump			natural	24/4/12
Landslip, Waikaia ..	W. Kyle (P.) ..	21	,,	1	17′	all	1 in 12	ditto	..	6′ x 5′	4 ch.	ditto	578	..	578	36,028	36,606	1	1	2	,,	steam-pump			,,	17/7/12
Rossvale, Waikaia ..	R. Thompson (P.)	9	,,	1	10′	8′	1 in 12	,,	1	6′ x 5′ 4′ x 3′	10 ch. 60′	adit	4,749	..	4,749	23,107	27,856	1	6	7	horse	..	..	..	,,	17/7/12
Waikaia, Waikaia ..	A. Cain (P.) ..	5	,,	1	10′	8′	1 in 6	,,	..	6′ x 5′	5 ch.	engine plane	842	..	842	13,406	14,248	1	1	2	steam	steam-pump			,,	17/7/12
Muddy Terrace, Waikaia ..	F. A. Junker (P.)	9	,,	1	14′	7′	1 in 10	,,	..	6′ x 6′	5 ch.	ditto	88	..	88	18,548	18,636	1	1	2	,,	steam-pump			,,	17/7/12
Argyle, Upper Waikaia ..	C. H. Hutton (P.)	21	,,	1	20′	all	..	open	..	..	..	open	114	..	114	3,825	3,939	1	..	1	horse	..	..	..	..	..
Anderson's, Wendon ..	E. Radford ..	4	,,	1	18′	10′	vertical	levels	..	8′ x 6′	100′	adit	..	..	..	5,727	5,727	..	..	..	,,	..	..	..	natural	..
Waimea, Kingston Crossing	J. E. Johnstone (P.)	4	,,	1	6′	all	..	bord and pillar	..	6′ x 6′	2 ch.	,,	324	..	324	2,149	2,473	1	2	3	,,	..	..	..	,,	..
Lynch's, Kingston Crossing	E. Mason (P.) ..	2	,,	1	6′	,,	..	ditto	..	6′ x 6′	3 ch.	,,	1,082	..	1,082	900	1,982	1	..	1	,,	..	..	..	,,	..
Princhester Creek, The Key	W. O. Kempthorne	10	brown	1	6′	,,	irregular	open	..	..	..	open	187	..	187	974	1,161	1	..	1	,,	..	..	..	..	..
Mataura Collieries (Limited), Mataura	James Broome ..	16	lignite	1	17′	12′	1 in 10	bord and pillar	..	8′ x 6′	5 ch.	engine plane	14,941	..	14,941	134,574	149,515	3	8	11	steam	steam-pump			natural	10/12/12
Mataura Lignite, Mataura ..	W. Coster (P.) ..	36	,,	1	18′	all	..	open	..	..	..	open	10,842	..	10,842	106,102	116,944	8	..	8	horse	steam-pump			..	10/12/12
Boghead, Mataura ..	W. Kyle (P.) ..	14	,,	1	16′	,,	..	,,	..	..	..	,,	3,374	..	3,374	16,448	19,822	2	..	2	,,	steam-pump			..	10/12/12
Waimumu, Mataura ..	G. W. Williams (P.)	13	,,	1	9′	7′	..	,,	..	..	..	,,	204	..	204	29,972	30,176	1	..	1	,,	steam-pump			..	10/12/12
Ota Creek, Wyndham ..	E. Genge (P.) ..	32	,,	1	6′	all	..	,,	..	..	..	,,	485	..	485	15,724	16,209	1	..	1	,,	steam-pump			..	9/12/12
Clarke's, Wyndham ..	G. W. Clarke (P.)	6	,,	1	12′	,,	..	,,	..	..	..	,,	945	..	945	8,816	9,761	2	..	2	,,	steam-pump			..	9/12/12
Robin Hood, Pine Bush ..	J. Couser ..	31	,,	1	14′	,,	..	,,	..	..	..	,,	43	..	43	3,188	3,231	..	..	..	,,	..	..	..	..	..
Heatherlea, Mataura ..	F. Barber ..	1	,,	..	..	..	..	,,	..	..	..	,,	44	..	44	..	44	..	..	..	..	..	..	..	..	..
Graham's, Fairfax ..	P. S. Graham (P.)	34	,,	1	6′	all	1 in 20	bord and pillar	..	5′ x 5′	5 ch.	adit	52	..	52	16,546	16,598	..	1	1	hand	..	..	..	natural	..
Ardlowie, Fairfax	E. Poole ..	10	,,	1	10′	,,	..	open	..	..	..	open	11	..	11	901	912	..	..	..	..	..	..	..	..	..
Nightcaps, Nightcaps ..	W. Barclay ..	31	,,	3	36′ in aggr'gate	34′	1 in 7	bord and pillar	..	10′ x 10′ 9′ x 6′	20 ch. 20 ch.	adit	89,874	..	89,874	788,575	878,449	29	100	129	steam, compressed air, and horse	three Tangyes			two fans	13/12/12
Wairaki, Nightcaps ..	L. Dillon (P.) ..	12	,,	1	6′	all	1 in 7	ditto	..	6′ x 5′	2 ch.	,,	189	..	189	10,906	11,095	1	1	2	horse	..	..	..	natural	6/4/12
New Brighton, Nightcaps ..	A. Hunter ..	6	,,	1	12′ to 20′	12′	1 in 7	,,	..	6′ x 6′	5 ch.	,,	5,384	..	5,384	12,683	18,067	2	6	8	steam	..	..	..	,,	6/4/12
Wairio, Nightcaps ..	R. Sheddan (P.)	7	,,	1	17′	9′	..	,,	..	8′ x 8′	2 ch.	,,	220	..	220	3,932	4,152	1	2	3	,,	..	..	..	,,	6/4/12
Beaumont, Nightcaps ..	T. Moss (P.) ..	4	,,	1	20′	15′	1 in 4	open	..	..	..	open	1,077	..	1,077	2,280	3,357	3	..	3	,,	steam-pump			..	6/4/12
Mount Linton, Nightcaps ..	W. Smith (P.) ..	18	,,	1	20′	15′	..	,,	..	..	..	,,	878	..	878	1,505	2,383	2	..	2	,,	steam-pump			..	6/4/12
Wildbush, Riverton ..	Roderique ..	5	,,	1	11′	all	..	,,	..	..	..	,,	20	..	20	556	576	..	..	..	..	..	..	..	..	..
Bush Siding, Seaward Bush	F. R. Bowden ..	10	,,	1	32′	,,	..	,,	..	..	..	,,	..	..	..	6,613	6,613	..	..	..	steam	steam-pump			..	..

Statistics of Workings in Coal-mines, 1912—*continued.*

Name of Mine and Locality.	Name of Manager.	Number of Years worked.	Quality of Coal.	No. of Seams worked.	Thickness of Seams.	Thickness worked.	Dip of Seam.	System of Underground Working.	Number of Shafts.	Dimensions of Shafts.		Output delivered by	Output for 1912.			Approximate Total Output to 31st December, 1911.	Approximate Total Output to 31st December, 1912.	Number of Men ordinarily employed.			Power used for drawing Mineral.	Pumps.			Means of Ventilation.	Date of Inspector's Last Visit.
										Size of Shaft or Adit.	Depth of Shaft or Length of Adit.		Coal.	Slack.	Total.			Above.	Below.	Total.		Stroke.	Size of Barrel.	Height of Column.		
SOUTHERN INSPECTION DISTRICT—*continued.*																										
PRIVATE PITS.													Tons.	Tons.	Tons.	Tons.	Tons.									
Wellwood Park, Pukerau ..	A. M. Mason ..	11	,,	1	7′	all	..	,,	..	..	..	open	24	..	24	224	248	..	..	..	..	..	..	..	..	..
Otikerama Station, Pukerau	W. J. Voight ..	15	,,	1	7′	,,	..	,,	..	..	..	,,	..	..	..	300	300	..	..	..	..	..	..	..	..	..
Tuach's, Waimumu ..	J. Tuach ..	6	,,	..	..	..	..	,,	..	..	..	,,	6	..	6	75	81	..	..	..	..	..	..	..	..	..
Linwood, Te Anau ..	T. Roberts (N.Z. Tourist Dept.)	12	,,	1	7′	all	..	,,	..	..	..	,,	125	..	125	1,640	1,765	1	..	1	..	..	..	..	..	..
Output of mines included in previous statements at which operations are suspended or abandoned	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1877,565	1877,565	..	..	..	..	..	..	..	..	..
Totals, Southern District, Middle Island	..	..	..	..	..	..	..	..	..	..	..	..	411,255	81,052	492,307	9742,799	10235106	264	713	977						
Totals, West Coast District, Middle Island	..	..	..	..	..	..	..	..	..	..	..	..	927,801	373660	1301461	17290139	18591600	632	1867	2499						
Totals, North Island	..	..	..	..	..	..	..	..	..	..	..	..	304,468	79,379	383,847	5952,904	6336,751	234	618	852						
Grand Totals ..	..	..	..	..	..	..	..	..	..	..	..	..	1643524	534091	2177615	32985842	35163457	1130	3198	4328						

Output of mines included in statement for 1890, but whose operations were suspended prior to 1890 (less three, which are again included in body of statement—namely, Hill's Creek, 779 tons; Lovell's Flat, 323 tons; Wyndham, 1,988 tons: total, 3,090 tons)	132,732
Output of mines included in former statements, but whose operations were suspended prior to 1889	172,529
Output of Waikaka, Adam's Flat, and Waimea Mines, inserted twice in statement for 1891	6,518
	35,475,236

ANNEXURE D.

TECHNICAL ARTICLES.

MINE-RESCUE APPLIANCE: A DANGER OCCURRING IN THE USE OF AN APPARATUS IN WHICH AN INJECTOR IS EMPLOYED.

By Professor JOHN CADMAN, D.Sc., Birmingham University.

SINCE the general introduction of self-contained breathing-appliances into mines a number of serious accidents have occurred, which have called attention to the dangers attendant on the use of such apparatus. The accidents at Felling, Cadeby, Caeduke, Bellevue, in the United Kingdom, and a number in the United States, all point to the necessity for a very searching inquiry into the design and application of these appliances.

Although a carefully prepared general scheme of training is laid down in a Home Office order, the type of apparatus to be employed is left to the selection of the mine-owner. As the number of manufacturers of such appliance is few, the owner must perforce make his choice from apparatus in many respects admittedly clumsy and imperfect.

The coal-owners of the South Midlands conducted a long series of experiments with a view to selecting an efficient and safe apparatus, and the results of the research brought about considerable improvement in nearly all the types then in existence; and although legislation to enforce the universal application was inevitable, and indeed desirable, it seems unfortunate that a little more time was not given to permit a more thorough investigation of the subject. Various designs have been adopted in different districts, and a large number of sets of apparatus have been installed, and it is only after a series of accidents as referred to at the commencement of this paper that certain fundamental defects are realized.

The writer wishes to draw attention to a serious defect in design which has been very clearly disclosed by the recent accident at Caeduke, near Swansea. The circumstances of the case are briefly as follows: It was found necessary to erect a stopping in a roadway from which gas was issuing from an area of goaf in which spontaneous combustion had occurred. Men wearing Draeger apparatus were employed to do the work. The superintendent accompanied the men, and after being at work for a period of from an hour to an hour and a half he collapsed, and succumbed to carbon-monoxide poisoning.

An examination of the apparatus revealed that the absorbent cartridge was punctured by two small holes, and that two of the tube-connections were leaking, and that such leaks were capable of permitting the atmosphere containing carbon-monoxide to get into the apparatus.

Small leakages in appliances where joints and tubes are used must inevitably occur, no matter how the apparatus is designed, and no matter how perfect it may be when first manufactured. With the wear-and-tear on the tubes and joints, the apparatus must sooner or later permit leakage, and when such leakage allows the foul atmosphere to penetrate into the breathing-circuit it must be admitted that such a design is imperfect.

In some of the apparatus at present in use an injector is introduced into the breathing-circuit, with the object of promoting circulation and keeping the air-supply cool and refreshing. The injector certainly brings about the desired effect, but in doing so it converts the apparatus into two zones of different pressure. On one side of the injector a positive pressure is obtained, and on the other side a negative pressure. It is in the negative-pressure zone that leakage from outside the apparatus to the inside may occur.

The following experiments have been made with different types of compressed-oxygen apparatus to demonstrate this point:—

Apparatus.	Pressure in Absorbent Chamber, in Inches, of Water. (Subject at Rest.)	Pressure in Absorbent Chamber, in Inches, of Water. (Subject working.)	Maximum Negative Pressure near back of Injector, in Inches of Water.
Draeger, new type single cylinder (mouthpiece)	From ·2 to − ·6	+ ·2 to − ·6	− 2·65
Old type, twin cylinder (helmet) ..	− ·2	+ ·1 to − ·3	..
Meco (mouthpiece)	+ 1 to − ·7	+ 2·2 to − 2	− 3·3
Proto (Fleuss)	+ ·4 to 1	+ ·2 to ·8	No injector.
Weg	+ ·6 to + 2·2	+ ·4 to + 4	,,

It will thus be seen that the apparatus in which the injector is used has a negative pressure within the absorbent cartridge and within certain parts of the circulation-tubes, sufficient to allow extensive leakage to occur if punctures or leaky joints are present.

In order to ascertain how far leakage may occur, a further series of experiments were made upon a small orifice, such as a small puncture or a leaky joint.

Results.

Pressure, in Inches, of Water.	Volume of Gas leaking, in Litres, per Minute. Orifice-size, ·07 in. dia.
·1	·8
·2	1·3
·4	1·6
·5	2·2

During the life of any apparatus permitting a negative pressure to exist in the circulating-tubes, leakage of a dangerous character, either due to accident or wear-and-tear, may occur; and, as has just been demonstrated, a very small aperture will permit volumes of considerable extent to be sucked into such an apparatus.

It is interesting to note how far such leakages may become dangerous. In ordinary practice in galleries where smoke is employed leakage may produce no symptoms of discomfort, because the solid matter in the smoke—the CO_2 and sulphur-fumes—may all be absorbed by the absorbent cartridge, and there remains sufficient oxygen in the pungent atmosphere to produce no ill effect. Further, the atmosphere in the practice gallery does not, as a rule, contain any carbon-monoxide. An apparatus, then, possessing a serious leak may be passed as perfectly sound in the practice gallery as usually employed for training.

Let me direct your attention now to the behaviour of an apparatus possessing a leak in the negative-pressure zone when used underground in atmospheres containing carbon-monoxide, or devoid of oxygen.

A man absorbs, if moving quietly about (at the rate of three miles per hour), 1,000 c.c. of oxygen per minute, and with violent exertion as much as 3,000 c.c. (Some definite data on this subject is available in a paper written by Drs. Gordon Douglas and Haldane.*) Take a case in which an apparatus possesses a leak of 1 litre per minute, which is employed in atmospheres containing different percentages o carbon-monoxide. Assuming, as is probable, that about three-fourths of the CO leaking into the apparatus is absorbed by the blood, the following is the approximate period which a man could remain in such an atmosphere before becoming incapacitated (according to Dr. Haldane). When 450 c.c. of carbon-monoxide have been absorbed a man would be stumbling about quite helpless and stupid, as his blood would be at least 50 per cent. saturated.

Percentage of CO in Atmosphere.	Time to produce Incapacitation. (450 cc. absorbed = Incapacitation.)
½	2 hours.
1	1 hour $\frac{\text{c.c. CO}}{7{\cdot}5 \times 60} = 450$.
2	½ hour.
3	20 minutes.
4	15 minutes.
5	12 minutes.

On the other hand, if the atmosphere contains no carbon-monoxide, but is devoid of oxygen, as in an atmosphere of firedamp or black-damp, with the supply of oxygen 2 litres per minute, as is usual in rescue apparatus of this type, the man would still be in great danger of falling down unconscious during any considerable exertion, and this would be so even if the leakage were much less than 1 litre per minute. For as soon as the oxygen consumption equalled 2 litres per minute, the apparatus would rapidly fill with firedamp or nitrogen, and, instead of the man being checked in his work by the bag becoming too empty for comfortable breathing, he would very soon be breathing freely an atmosphere containing a dangerously low percentage of oxygen. The result of this would be that he would fall down unconscious before he was aware of his danger. The larger the leak, the more rapidly and certainly would this occur, although during rest or slight exertion there would be no danger except from enormous leakage.

In the case of an apparatus possessing positive pressures throughout, small leakages are harmless, and can be easily detected. The breathing-bag becomes deflated, and a man wearing the apparatus finds it difficult to breathe. In this manner the wearer's attention is drawn to the defect, and in the case of a small leak, such as would prove fatal in a negative-pressure apparatus, ample opportunity is afforded the wearer to quietly withdraw to a place of safety.

It appears quite clear that any apparatus which will permit of leakage from the outside to the inside may become a source of considerable danger, and, as it is extremely difficult to detect or guard against such leaks, any apparatus of this character should be avoided; indeed, in no circumstances should an apparatus possessing an injector be used for mine-rescue work.

A large number of such apparatus (Meco and Draeger) are already being used in mines in this country, and immediate steps should be taken to convert them to positive-pressure apparatus; otherwise calamities must inevitably occur.

FIREMEN'S CERTIFICATES.

THE following memorandum has been issued by the Home Office (United Kingdom):—

1. After the 1st January, 1913, no person can be appointed to act as fireman, examiner, or deputy, and no person already employed as a fireman, examiner, or deputy can continue to be so employed, unless he has obtained a fireman's certificate as required by the Coal-mines Act, 1911, section 15. *This requirement applies to all firemen, examiners, or deputies.* No exception is made for persons holding managers' or under-managers' certificates.

A *full* certificate for a fireman, examiner, or deputy certifies three things—(1) that he can test for gas with a safety-lamp, (2) that he can measure an air-current, (3) that his hearing is good.

* "The Capacity of Air-passages under Varying Physiological Conditions," by C. G. Douglas and J. S. Haldane. *Journal of Physiology*, vol. 45, 1912.

All firemen, &c., appointed *after the passing of the Act* (*i.e.*, after the 16th December, 1911) have to obtain the full certificate, with the exception only of firemen, &c., employed in mines in which inflammable gas is unknown, who are required to obtain a certificate as to (2) and (3) only, and not as to (1).

On the other hand, firemen, &c., who were appointed *before the passing of the Act* are exempted from obtaining a certificate as to (2), and need only obtain a certificate as to (1) and (3), or (if employed in a mine in which inflammable gas is unknown) need only obtain a certificate as to (3).

2. The certificate can only be obtained from one of the mining schools, institutions, or authorities approved by the Secretary of State, and in order to obtain it a candidate must pass an examination in the subjects mentioned in paragraph 4 below. A candidate is allowed to sit at any examination for the purpose held by any of the approved schools, institutions, or authorities; and the approved schools, institutions, or authorities have been asked to arrange to hold examinations as far as possible locally in centres convenient to the workers. For information as to the times and places of examinations held by any such school, &c., write to the secretary of the school, &c.

3. *It is not necessary that a candidate before examination should have attended the classes of the school or institution or authority to which he presents himself for examination or the classes of any other school, institution, or authority.* The examination is mainly of a practical character, and only requires such knowledge as a fireman of experience should have already acquired.

Men, however, who have not previously held the post of fireman, examiner, or deputy, and no doubt many also who have held the post, will require, before going in for the examination, to have some instruction; and classes have been formed in most mining districts for the purpose of giving instruction in the subjects in which candidates for certificates will be examined.

A word of explanation may be useful here, as there has been some misapprehension among firemen, &c., as to the nature of the instruction required.

In some districts where classes of an advanced character have been formed it has been supposed that it was necessary to attend these classes in order to qualify for a certificate. This is a mistake. The duties of a fireman, examiner, or deputy include, indeed, other matters besides the detection of gas and the measurement of air, and it is very advantageous that a fireman, &c., should have as thorough a knowledge as possible with regard to all matters which may bear upon his duties; but it should be clearly understood that this advanced instruction is not required for the fireman's certificate under the Act, and that the only matters in which a candidate need obtain instruction for the purpose of getting a certificate are the subjects mentioned in paragraph 4 below.

4. *The subjects of examination will be those set out below in this paragraph, and those only. A candidate will not be asked any questions in regard to any other matter.*

Part I.—Gas-tests.

A candidate will be required to show that he is able to make accurate tests for inflammable gas, and that he can do this with any of the various kinds of safety-lamp, and with any of the various kinds of oil, *in use in the district in which he is employed.* For this purpose he will be required, *first*, to show to the examiner that he understands the method of detecting inflammable gas by means of a safety-lamp; and, *secondly*, to make correct observations of gas-caps as they appear on the flames of various kinds of safety-lamps burning the various kinds of oil. By a correct observation is meant that the candidate must be able to judge by the size and appearance of the cap how much gas approximately is present. He will be tested with percentages of gas from 2 per cent. upwards, and no candidate will pass who is unable to see a 2-per-cent. cap.

A candidate who ordinarily wears glasses will not necessarily be called upon to make the observations without them, but it will rest with the examiner to decide by such test as he thinks fit whether the eyesight is so defective that under the working-conditions in a mine a candidate would not be able to make accurate observations.

Part II.—Air-measurements.

A candidate will be required to show that he can measure the quantity of air in an air-current. The quantity of air, in cubic feet per minute, passing through the airway of a mine being found by multiplying the number of square feet in the cross-section of the airway by the speed of the air-current in feet per minute, the candidate will be required, *first*, to measure the speed of the air-current passing through the airway of a mine, or through some gallery corresponding to or representing the airway of a mine, both (i) by means of an anemometer, and (ii) by observing the speed at which dust or smoke is carried by the air-current; and, *secondly*, to calculate from measurements the size (*i.e.*, cross-sectional area) of the airway or gallery in which the air to be measured is passing.

Part III.—Hearing.

The candidate's hearing will be tested. The Act requires that his hearing should be such as to enable him to carry out his duties efficiently. This does not mean that a fireman must possess a standard of hearing above that of the average man, nor is it required that his hearing must be up to the standard in both ears. If the candidate is able to hear sounds audible to the average man it will be sufficient. The tests will usually be of a simple nature, and will naturally be varied by the examiner with different candidates and at different times.

5. A candidate who claims to be exempted from Part I of the examination must produce to the school, &c., to which he presents himself for examination a certificate from the manager of his mine that he is employed in a mine in which firedamp is unknown. Note, however, that a fireman, &c., employed in a mine in which gas is unknown, who claims exemption from Part I., would have to pass this part of the examination afterwards if at any time he obtained employment as a fireman, &c., in a gassy mine.

A candidate who claims to be exempted from Part II must produce a certificate from his manager that he was employed as a fireman, examiner, or deputy on the 16th December, 1911.

6. Each candidate will be examined separately, and not in the presence of other candidates.

7. A fee for the examination will be payable by the candidate in accordance with the scale appended.

8. The Act provides also for further certificates as to eyesight and hearing to be obtained by a fireman, examiner, or deputy, at intervals of five years. The object of these further certificates is to ensure that a fireman's eyesight continues to be such as to enable him to make accurate tests for firedamp, and that his hearing continues to be such as to enable him to carry out his duties efficiently. The first of these certificates will not be required until the expiration of five years from the date on which he got his fireman's certificate as above. A fireman, examiner, or deputy will be able to get his five-yearly certificate either from one of the schools, institutions, or authorities approved by the Secretary of State or from a doctor selected by himself. The fee for obtaining this certificate will be payable by the fireman's employer.

SCALE OF FEES.

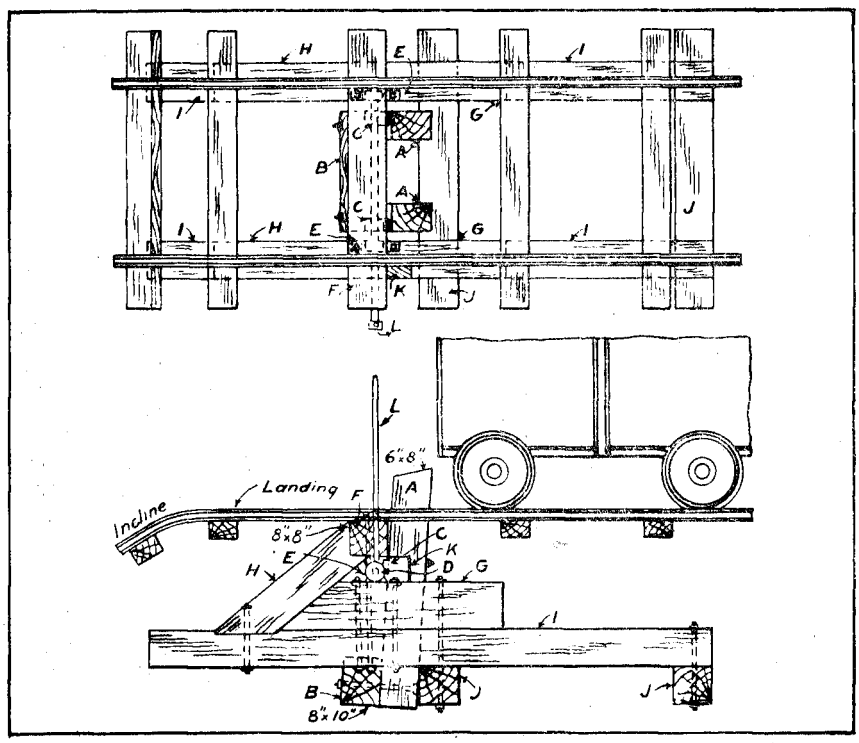
(1.) For the full examination (*i.e.*, gas-tests, air-measurements, and hearing), 7s. 6d. (This will only apply in the case of new firemen appointed after the passing of the Act.)

(2.) For candidates taking two parts only of the examination (*e.g.*, gas-tests and hearing), 5s. (This will be the fee for most existing firemen—*i.e.*, firemen appointed before the passing of the Act.)

(3.) For candidates taking only one part (*i.e.*, existing firemen employed in mines in which gas is unknown, who will be examined as to their hearing only), 2s. 6d.

SAFETY-BLOCK FOR INCLINES OR JIGS.

To prevent the accidental return of a car or skip that has been hoisted to the top of an incline and detached, the device shown in the accompanying drawing is recommended by the State Mine Inspector, Albany, N.Y. It consists of two almost upright timbers A, fastened to the square shaft D by the straps C. The shaft is turned in two places to fit the boxes E. The bottoms of the timbers A are bolted to a transverse piece B. The hoisted car hits the timbers A, which revolve with the shaft, permitting the car to pass. The weight of B then brings them to the upright position and the cross



AUTOMATIC SAFETY-STOP FOR TOP OF INCLINE.

piece F prevents their swinging in the other direction. To release the car, the lever, which is attached to a square portion of the shaft, is used to force the timbers down below the level of the axles. The specification of material for installing the device on an incline with a track of 3 ft. gauge is given in the table.

SPECIFICATION OF MATERIALS FOR SAFETY-BLOCK.

	Timber.	Iron.
A	2 pieces 6 in. x 8 in. x 4 ft. 4 in.	4 bolts $\frac{1}{2}$ in. x 20 in.
B	1 piece 8 in. x 10 in. x 2 ft. 2 in.	2 bolts $\frac{5}{8}$ in. x 14 in.
F	1 piece 8 in. x 8 in. x 5 ft.	2 bolts $\frac{5}{8}$ in. x 17 in.
G	2 pieces 8 in. x 10 in. x 4 ft.	2 bolts $\frac{3}{4}$ in. x 28 in.
H	2 pieces 8 in. x 8 in. x 3 ft. 2 in.	2 bolts $\frac{3}{4}$ in. x 34 in.
I	2 pieces 8 in. x 8 in. x 10 ft.	4 bolts $\frac{1}{2}$ in. x 10 in.
J	2 pieces 8 in. x 8 in. x 5 ft.	2 bolts $\frac{1}{2}$ in. x 18 in.
K	1 piece 5 in. x 6 in. x 1 ft. 1 in.	1 shaft $1\frac{15}{16}$ in. x $1\frac{15}{16}$ in. x 4 ft. 4 in.
		1 piece $\frac{3}{8}$ in. x $1\frac{1}{2}$ in. x 5 ft.
		2 clamps for shaft.
		2 boxes $2\frac{1}{2}$ in. x 8 in. x 2 in. bore.

The above drawing and specification will, of course, require amendment to suit the gauge of our New Zealand colliery truck-roads, but with such an automatic appliance in use accidents could not happen by neglect to put the stop-block in position, and no tub could descend until the attendant pulled the lever. It would cost a little more to fix than the primitive block and bolt in use here, but would save life.

A CHART OF MINE-GASES.

By FRANK REED, M.I.M.M., Inspecting Engineer of Mines, New Zealand.

Common Name.	Proper Name.	Chemical Formula.	Composition (Molecular).	Density.	Specific Gravity.	Character.	Effect.	Combustibility.	Explosive.	Caused by	Practical Test for.	Where found.
Firedamp. (1)	Methane or light carburetted hydrogen.	CH_4	12 parts C. 4 H.	8	0·55 when pure.	No colour. No taste. No smell when pure.	Suffocates. Will not support life. 50% may be breathed for some time. 60 to 70% required to endanger life.	Burns in air. Alone or pure extinguishes flame.	When mixed with air explodes when 6 to 16% present. Most explosive, 9·5%. Temperature of ignition 1202° F.	Is natural product like oil or coal, and is found in proximity to both, as a product of the decomposition of vegetable matter.	Safety-lamp, with pure vegetable colza oil ¾%, slight cap, by expert observer. With mixed colza and mineral oil. 1½% small cap, faint and incomplete. In shape a truncated cone. 2% complete, well-defined triangular cap to expert observer. 4% cap a pointed triangle 1·2 in. high.	Rises to roof and highest parts of mine.
Whitedamp. (2)	Carbon monoxide or carbonic oxide.	CO	12 C. 16 O.	14	0·967	No colour. No taste. Slight smell when present in large quantities.	Poisonous, being absorbed by coloured substances in the blood. Death occurs when man's blood saturated 80%. May be traced as the cause of death by a pinkness in the blood when held to the light. Produces giddiness, palpitation, fullness in the head, debility, and loss of power over the limbs, but no pain. During rest in a man— 0·1% in 2 hours produces symptoms. 0·1% in 2½ hours produces disablement. Noticeable symptoms never produced with less than 0·02% Exact percentage required to cause death in an hour or two is unknown; it would vary with different individuals. Usually 0·5% in an animal, although as little as 0·2% possibly fatal.	Combustible alone.	Never present in explosive proportions in a mine. Explosive at— 2 vol. CO. 5 vol. air.	Incomplete combustion of substances containing carbon, such as coal burning with insufficient air. Explosion of CH_4. Some explosives such as blasting-powder and nitro-cotton. Producer- and suction-gas manufacture.	As 12% necessary to be observable on light, light test impracticable. Mouse or bird affected in $\frac{1}{10}$th of the time of man. Cages large enough to permit animal to move about should be used. Birds give more timely warning, and exhibit more easily noticed symptoms than do mice. The following scale is the result of experiments upon canaries: 0·09%, no result observable after one hour; 0·12%, lost liveliness in 15 min., weaker but stayed on perch after one hour; 0·15%, slight distress 3 min., fluttered from perch 18 min.; extreme weakness (muscular power almost lost) one hour; 0·29%, pronounced signs of distress 1½ min., unsteady 3 min., fell from perch 5 min.	The main danger to life in connection with explosions at collieries. After gas (CH_4) or dust explosion. After blasting with certain explosives. Gob or coal fires in mines.
Blackdamp. (3)	Nitrogen and carbon dioxide or carbonic acid.	N CO_2	CO_2 {12 C. 32 O. From 3% to 25% CO_2. the rest N. (Average in collieries, about 13% CO_2, and 87% N.	14 22	N 0·971 CO_2 1·527	No colour. No smell. Slightly acid taste. Neutral.	1·25% CO_2, breathing deepens, which symptoms increase as the amount of oxygen diminishes. Toxic symptoms, 6 to 8% CO_2. Actual danger to life, 25% CO_2. Drowns similar to water.	Lights burn dimly and are finally extinguished.	Non-explosive at any mixture with air.	Explosion of gas (CH_4). Lights and blasting. Breathing of men and animals. Gob-fires. CO_2 exuded by minerals and rocks.	A light burns dimly in 1% CO_2 with 19% O, and will not burn in air containing less than 17·2 O. Approximate quantities may be determined by Dr. Haldane's graduated glass tube, in which is inserted a lighted taper.	Depends on proportions present. On the floor or low-lying workings when blackdamp contains more than 5·25% of CO_2 present, but when less or when CH_4 is mixed with the blackdamp it is lighter than air and ascends to the roof.
Stinkdamp. (4)	Sulphuretted hydrogen.	H_2S	2 H. 32 S.	17	1·183	No colour. Smell of rotten eggs.	Very poisonous when pure. Diluted, causes headache and giddiness.	Combustible.	Explosive.	Indicates heating of coal or gob. Before or by mine fires. Indicates spontaneous combustion about to occur. Foul stagnant water in some mineralized rocks.	Smell of rotten eggs. Darkens silver, also paper moistened with solution of lead acetate.	Vicinity of gob or mine fires. Heating coal or gob.

APPENDIX C.

GEOLOGICAL SURVEYS BRANCH

(SEVENTH ANNUAL REPORT OF THE).

CONTENTS.

LETTER OF TRANSMITTAL.

Mines Department (Geological Survey Branch),
Wellington, N.Z., 23rd June, 1913.

SIR,—

I have the honour to forward herewith the seventh annual report of the Geological Survey Branch of the Mines Department. It covers the twelve months ending 31st May, 1913.

I have, &c.,

P. G. MORGAN,
Director, N.Z. Geological Survey.

The Under-Secretary of Mines, Wellington.

REPORT.

SUMMARY OF FIELD OPERATIONS.

DURING the twelve months ending 31st May, 1913, detailed field surveys were made in the Buller-Mokihinui and the Reefton subdivisions. In addition, a portion of the Te Puke district was surveyed in somewhat less detail by Mr. J. A. Bartrum, Assistant Geologist, and flying visits to a number of places were made by various members of the staff.

In the Buller-Mokihinui Subdivision field-work was conducted by the Director, who during a period of about four months was assisted by Mr. J. A. Bartrum. The topographical work was in charge of Mr. H. S. Whitehorn, Assistant Topographer. The survey of the subdivision has now been brought to a conclusion, though accidents to members of the party and the extremely bad weather experienced during the greater part of the past two seasons have prevented as much attention being given to various minor areas as was desirable. The preparation of a detailed report upon the subdivision is now in hand.

Work in the Reefton Subdivision was begun by Dr. Henderson, Mining Geologist, in November, 1912, and was continued until the end of May. Good progress was made, although the same succession of bad weather as that experienced in the adjoining Buller-Mokihinui Subdivision was encountered. The area surveyed is in the Grey watershed, and adjoins the Grey mouth Subdivision (Bulletin No. 13). Another field season will be required in order to complete the survey.

Mr. J. A. Bartrum was occupied in the survey of the Te Puke district from the 10th September to the 14th October. After his return to Wellington he wrote a report, which, with accompanying map, will be found on later pages. He then, as already mentioned, joined the Buller-Mokihinui party.

In order to furnish reports needed by the Mines Department special visits were made by the Director to Cape Foulwind, Seddonville, Poerua, and Nelson. Similar visits were made by Dr. Thomson to Sandy Bay (Motueka district) and to Waimate.

PALÆONTOLOGICAL WORK.

During the year Dr. J. Allan Thomson, Palæontologist, continued his work on the late Cretaceous and the Tertiary fossils, the special object of which is to clear up the confusion that at present exists with regard to the age and distribution of New Zealand coal-measures. Dr. Thomson has particularly devoted himself to the study of the Tertiary Brachiopoda, a work in which he has had the voluntary assistance of Mr. C. A. Cotton, M.Sc., Lecturer on Geology at Victoria College.

Mr. Henry Suter was re-engaged for a period of six months in order to continue the work of revising the type specimens of New Zealand Tertiary Mollusca. Our thanks are due to Mr. Suter for the admirable report he has furnished, and also to the authorities of the various museums who have allowed Mr. Suter to examine their type material.

Some progress has been made in the classification of the Palæozoic and Mesozoic fossils, selections from which have again been sent to various specialists. New Zealand owes a debt of gratitude to these gentlemen, who have undertaken the examination of this material, and have agreed to write reports thereon, without fee or reward other than the advancement of science.

During the year Dr. Thomson, accompanied by Mr. C. A. Cotton, visited East Marlborough and North Canterbury in order to examine important fossil localities and geological sections. The results of this work are described by Dr. Thomson on a later page.

PUBLICATIONS.

The only publication besides the annual report (No. 6) issued during the past year was the report on the Waihi-Tairua Subdivision (Bulletin No. 15), written by Dr. J. M. Bell, formerly Director of this Survey, and Mr. Colin Fraser, formerly Mining Geologist. This bulletin, which contains 192 pages of letterpress, and is accompanied by a large number of maps, fully describes the Waihi, Waitekauri, and other mining fields included in the Whitianga, Tairua, Ohinemuri, and Waihi North survey districts.

Bulletin No. 16, entitled "The Geology of the Aroha Subdivision, Hauraki," was prepared by Dr. J Henderson, and is now almost ready for issue. In this bulletin an area that extends from Waihi and Paeroa southward to Tauranga, and includes the mining districts of Karangahake and Te Aroha, is described.

Palæontological Bulletin No. 1, written by Dr. J. Allan Thomson, and entitled "Materials for the Palæontology of New Zealand," is now practically ready for publication. Palæontological Bulletin No. 2, written by Mr. Henry Sutor, was originally named "Result of a Revision of Captain F. W. Hutton's 'Catalogue of Tertiary Mollusca of New Zealand, 1873,'" but is now being printed under the title of "Revision of the Tertiary Mollusca of New Zealand, based on Type Material, Part I." The manuscript of Part II is now ready for the printer, but a number of the illustrations have yet to be prepared.

The manuscript index to the reports of the old Geological Survey (vols. 1 to 22) mentioned in last year's report as having been prepared by Dr. Henderson, is now ready for publication. Material for a bulletin to be entitled "Minerals of New Zealand" is being collected, but owing to the smallness of the staff and the amount of other work in hand, there is no prospect of this publication, which it is believed would be of great use to prospectors and others, being completed during the current year. For similar reasons the compilation of a geological map of New Zealand is suspended for the present.

LIBRARY.

Some forty or fifty books have been added by purchase to the library during the year, and many valuable exchanges received from foreign geological surveys and other scientific institutions. The library now contains about 2,500 volumes, besides duplicates and a number of small pamphlets, copies of journals, &c.

FIELD-WORK IN THE BULLER-MOKIHINUI SUBDIVISION.

Introduction.

Since a detailed geological report upon the Buller-Mokihinui Subdivision is now in preparation, only a brief account of last year's work will be given. Topographical work by Mr. H. S. Whitehorn began in September, 1912, and was not quite completed at the end of May, 1913. Geological field-work was begun by the Director on the 17th October, and continued, with a number of interruptions caused by other work, until the 23rd May, 1913. During the greater part of the period from the 1st November, 1912, to the 7th April, 1913, Mr. J. A. Bartrum, Assistant Geologist, was also in the field. The areas topographically and geologically surveyed include portions of Mokihinui, Ngakawau, Orikaka, and Inangahua survey districts, together with the whole of Steeples, Waitakere, and Ohika survey districts.

General Geology.

The general geology of the Buller-Mokihinui Subdivision was briefly sketched in the last two annual reports, and on this occasion only one or two features need reference. The most interesting section of country examined during the season was afforded by the Buller Gorge. From the Nine-mile Ferry to the Little Ohika Stream the prevailing rock is a granite, gneissic in places. Just east of the Little Ohika argillite and greywacke belonging to the Greenland (Aorere) Series outcrop for a few chains along the coach-road. Eastward these rocks are unconformably succeeded by a peculiar series of breccias and breccia-conglomerates, with minor bands of finer material. These rocks, called by McKay the Hawk Crag breccias,* are found on both sides of the Buller Gorge for several miles, and to the south are well developed in the Blackwater valley, whence they probably extend into the Reefton Subdivision. The Hawk Crag breccias are believed to belong to the lowest horizon of the Eocene coal-measures. East of the cliff known as Hawk's Crag is a series of conglomerates, grits, sandstones, and siliceous shales, with one or two thin seams of impure pitch-coal. The conglomerates are remarkable as almost everywhere containing water-worn pebbles and grains of coal. They thus appear to correspond to the Omotumotu beds described in Bulletin No. 13 (pp. 65–67), and, since there is no evidence of contemporaneous erosion, are considered to indicate an unconformity in the Tertiary sequence. East of Berlin's Greenland rocks and quartz-porphyry outcrop along the banks of the Buller. At Burley's a thick seam of brown coal makes its appearance, and is succeeded at a higher horizon by the calcareous claystone and limestone typical of the Oamaru Series on the west coast of the South Island.

The various important faults that traverse the Buller district were further studied during the past season, and will be fully described in the forthcoming detailed report.

Economic Geology.

The chief mineral resource of the Buller-Mokihinui Subdivision lies in its bituminous coal. Brown coal and lignite are also of some importance. At one time the alluvial gold-deposits employed several thousands of miners, but at the present day, owing to the exhaustion of the richer material, alluvial mining has become a minor industry. Auriferous-quartz mining has never been of any consequence, and presents but moderate possibilities for the future. Numerous small lenticular veins carrying barite are found near Millerton, but none of these is of economic importance. Several valuable minerals, such as platinum, monazite, cassiterite, and chromite

* Reports of Geological Explorations during 1882, vol. 15, 1883, pp. 140, 142–144.

are known to occur in small quantity. The district contains an inexhaustible supply of granite that could be used as a building-stone if desired. The cement possibilities of the Cape Foulwind district are described in a separate report, printed on later pages. A few further remarks may be made under the headings of (1) coal, (2) alluvial gold, and (3) auriferous-quartz lodes.

(1.) *Coal.*

The coals of the Westport district are believed to occur in two series of different geological ages. The older series, probably Eocene in age, but possibly late Cretaceous or Cretaceo-Eocene, contains the well-known bituminous-coal seams worked near Denniston, Millerton, and Seddonville. The younger series, of Miocene age, contains the brown coal and lignite that occur near Cape Foulwind, at Charleston, and in the eastern part of the Buller Gorge.

Only small areas of the bituminous-coal measures were examined during the past year, these having been almost completely surveyed during the previous season. Full consideration was given to the coal possibilities of the relatively down-faulted lowland area near Westport, and a special report thereon was prepared for the Westport Harbour Board (see pp. 124–126).

Immediately east of Cape Foulwind small seams of lignite outcrop in the Miocene rocks that here form cliffs along the seashore. These seams are of no economic value at this point, but inland may thicken. At Tauranga Bay, south of Cape Foulwind, several lignite-seams of good quality outcrop on the beach. These, which are separated from one another by layers of shale of no great thickness, are from 1 ft. to perhaps 4 ft. thick. At Charleston, a few miles southward, a large seam of lignite outcrops in many places, and over an area of some hundreds of acres has very little cover. It forms a useful fuel for local use.

In general it may be said that lignite will probably be found under much of the lowland country between Westport and Charleston. It is evident, however, that the thickness, and, to a minor extent, the quality, vary. Moreover, since the dip is eastward, the depth at which lignite occurs away from the coastal belt is considerable.

The thin seams of pitch-coal occurring in the Buller Gorge east of Hawk's Crag have already been mentioned. The brown coal at Burley's is markedly lower in water and sulphur than the Charleston lignite, and therefore of decidedly better quality. It is an excellent coal for household use. In the same horizon are outcrops of coal in Nada Creek (a tributary of the Blackwater), in Pensini Creek, in Slug Creek (a tributary of Pensini Creek), and near Three-channel Flat. The area of brown coal indicated by these outcrops is considerable, but it is only part of a much larger field that includes the greater part of the Inangahua Valley from Inangahua Junction to Reefton. The following analyses made in the Dominion Laboratory indicate the composition of the lignites and brown coals in the area examined last season :—

——	(1.)	(2.)	(3.)	(4.)	(5.)	(6.)
Fixed carbon	36·75	33·55	40·62	37·60	44·16	54·73
Volatile hydrocarbon	38·20	44·53	43·26	38·67	44·26	20·86
Water	19·20	19·17	13·52	18·65	10·22	7·19
Ash	5·85	2·75	2·60	5·08	1·36	17·22
	100·00	100·00	100·00	100·00	100·00	100·00
Total sulphur (per cent.)	5·57	6·00	4·50	4·28	4·18	0·50
Evaporative power per pound (from calorimeter)	9·29	..	11·55	..	11·63	..
Practical evaporative power (assuming 60 per cent. efficiency)	5·57	..	6·93	..	6·98	..
Character of coke	Non-caking	Non-caking	Non-caking	Non-caking	Loose	Pulverulent.

(1.) From Tauranga Bay.
(2.) From Charleston.
(3.) From John Burley's mine, Buller Gorge.
(4.) From Nada Creek (station 46).
(5.) From west bank of Pensini Creek.
(6.) From thin seam near Hawk's Crag (pitch-coal).

(2.) *Alluvial Gold.*

In bygone years the chief centres of alluvial-gold mining in the Buller-Mokihinui Subdivision were Charleston; Addison's; Bradshaw's; the terraces north-east of Westport known as German Terrace, Giles Terrace, Fairdown Terraces, &c.; and Mokihinui. For many years the banks of the Buller near Berlin's were worked, and though not rich, must, in the aggregate, have yielded a considerable amount of gold. South of Westport several sluicing claims are still at work near Bradshaw's, Addison's, and Charleston, but the terraces to the north-east and the Mokihinui diggings are now all but deserted. A little gold is still obtained by beach-combers near Westport and Charleston. An almost untouched field for alluvial mining has lately been brought into some prominence by the success of the Carthage Gold-mining Company, which is working a buried black-sand lead near the sea-coast, west of Fairdown, by hydraulic sluicing and elevating.

From the neighbourhood of the Blackwater River upwards the beaches and bed of the Buller River have been worked by dredges, but on the whole dredging has been a commercial failure, and not a single dredge is now at work.

(3.) *Auriferous-quartz Lodes.*

At present no quartz lodes are being worked in the Buller-Mokihinui Subdivision, though active operations are in progress at the Swastika Gold-mine, a few miles from the extreme north-eastern corner of the area. In the Britannia Claim, near Waimangaroa, rich but small shoots of gold-bearing quartz have been worked from time to time. Recently only a little desultory prospecting has been in progress. In the Waimangaroa Valley the Beaconsfield Claim, many years ago, was worked without profit to its owners. Attempts to work quartz lodes near Denniston and in Cascade Creek have also been made.

The various mines and prospects just mentioned worked or tested quartz lodes in Greenland rocks of the same age and character as the auriferous rocks of the Reefton district. Recently it was announced that rich gold-bearing stone had been found in granite country near Mokihinui Railway-station. A visit was made to the spot, and the alleged auriferous material found to consist of loose boulders of pegmatite. Three samples of this were selected, and, after being well washed, were forwarded to the Dominion Laboratory, but assay failed to detect either gold or silver in the stone. It is just possible that the values reported as having been obtained in former samples were due to the presence of a little alluvial gold entangled on the surface of the pegmatite boulders.

OFFICERS' REPORTS.

DR. J. HENDERSON, MINING GEOLOGIST.

Dr. Henderson, Mining Geologist, submits the following report on his work during the past twelve months:—

Office-work.

Until the end of September, 1912, I was engaged in the preparation of Bulletin No. 16, entitled "The Geology of the Aroha Division, Hauraki." Since then the reading and revision of the proof sheets have occupied small portions of my time, which otherwise has been given to field-work.

Reefton Subdivision.

Field-work in the Reefton Subdivision.

Field-work in the Reefton Subdivision was commenced in October, and was continued without interruption until the end of May, 1913. The Reefton Subdivision includes the survey districts of Brighton, Maimai, Reefton, Temiko, Waiwhero, Mawheraiti, and Waitahu. During the season the whole of Mawheraiti and parts of Maimai, Waiwhero, and Waitahu were examined.

Structure and Physiography.

The Reefton Subdivision forms part of the foreland to the west of the great alpine chain. Plateau-forming movements acting unevenly and through long time-intervals have produced enormous fractures, dividing the whole region into earth-blocks, which have their axes in a general meridional direction. The most easterly of these blocks forms Victoria Range, and may be considered to extend far to the southward as the Wainihinihi peneplain of Bulletins Nos. 1, 6, and 13. The next block to the west forms the Brunner Range in its northern portion, but has been down-warped to the south until on reaching the Big Grey it is entirely covered by fluviatile deposits. To the westward of the Brunner Block lies a great rift valley drained southward by the Mawheraiti and Grey rivers and northward by the Inangahua. The Paparoa Range is formed by the block next to the west, while the coastal plain flanking the Paparoas is built upon a depressed block still farther westward. The active denuding agents obtaining in this portion of New Zealand have sculptured the elevated blocks into rugged mountain-ranges, the debris from which has partly filled the rift valley and covered the southern portion of the Brunner Block. Although no glaciers or permanent snowfields now exist within the subdivision, there is abundant evidence that the higher portions of the Victoria and Paparoa ranges were at one time glaciated.

General Geology.

The Reefton Subdivision adjoins the area dealt with in Bulletin No. 13, and the classification there adopted will be followed as far as circumstances permit.

Greenland Series.—The rocks of the Greenland Series constitute the oldest beds in the portion of the subdivision so far examined. These rocks form the southern part of the Paparoa Range as developed within the district and the whole of the Brunner Block to the east of the Mawheraiti River. They consist of greywacke and argillite, and have in general steep dips.

Coal-measures.—Thick beds of conglomerate belonging to this series occur in the basin of Slaty Creek, and reach as far south as Moonlight Creek.

Greymouth Series.—Rocks of this series are developed in the lower portion of Moonlight Creek. They consist of soft green sandstones dipping usually at low angles to the east. Pebble and shell beds occur, and in Fitzgerald Creek is a small outcrop of foraminiferal limestone. Seams of lignite up to 25 ft. in thickness occur at the base of this series.

Pliocene Beds.—The strata of the Greymouth Series are of marine deposition, while the Pliocene Beds are certainly of fresh-water origin. No unconformity was discovered between the two series, and difficulty was experienced in referring some outcrops of soft greenish-blue sandstone to their proper formation. It is believed that both series form part of an ancient delta, the former being the marine foreset beds and the latter the terrestrial topset beds.

Pleistocene Deposits.—Morainic deposits occur in the Paparoa Range, in the valley of the Otututu River, and near the heads of Mirfin, Burton, and Stony creeks. The glaciers do not seem to have ever left the mountain valleys, and the snowfields which fed them were probably inextensive. Fluvio-glacial deposits are found on the eastern side of the Grey Valley near Waiuta, and probably some of the auriferous gravels near Nobles are of fluvio-glacial deposition. Gravels of purely fluviatile origin form high terraces on both sides of the Grey River. Their chief development is towards the Paparoa Range, where great areas of swamp pakihis are underlain by these gravels.

Recent Deposits.—These form the lower terraces and flood-plains of the rivers and the screes of the mountain-slopes.

Igneous Rocks.—The greater part of the Paparoa Range consists of granitic and gneissic rocks. The granite is found intruding the rocks of the Greenland Series, and is certainly older than the coal-measures. Its intrusion was probably due to the regional stresses which caused the alpine overthrust. Acid dykes are of frequent occurrence, and seem to be segregated from the granite they traverse. Basic dykes also occur, and these were intruded after the solidification of the parent igneous mass.

Dolerite.—Dykes of dolerite were observed in close connection with the quartz lodes of Moonlight, Blackball, Slab Hut, and Snowy creeks.

Economic Geology.

Payable alluvial gold was discovered within the subdivision in the middle sixties, and for many years its exploitation was the most important industry. At present most of the alluvial gold is obtained by dredging, only one small alluvial claim being in operation, while the amount of gold obtained by ground-sluicing is now inconsiderable. The existence of auriferous-quartz lodes at Reefton and Moonlight was early recognized, and the first quartz-crushing battery was erected in Moonlight Creek in 1866. At present the principal industrial activity of the district is directed to the exploitation of the quartz lodes occurring near Reefton. Coal-mining is carried on chiefly as an adjunct to reef-mining.

Alluvial Gold.—The alluvial gold is found on both sides of the great rift valley. On the western side it occurs from the southern boundary of the subdivision to as far north as Blacksand Creek. In Blackball, Moonlight, and Shellback creeks the gold is undoubtedly derived directly from the numerous quartz lodes which traverse the Greenland rocks. In Slaty, Kakapo, and Blacksand creeks, on the other hand, the conglomerates at the base of the coal-measures must be considered the immediate source. The gold of Bare Bottom Creek is also probably derived from these conglomerates, although the reefs of the older rocks may have contributed to some extent. On the eastern side alluvial gold is found almost continuously along the flank of the rift valley, notable localities being Duffers, Noble's, Blackwater, Adamstown, Antonio, and Slab Hut creeks. The gold of these creeks is derived from the fluvio-glacial and fluviatile gravels of Pleistocene, and from the Old Man Bottom gravels of Pliocene age.

Auriferous-quartz Veins.—Innumerable quartz veins occur in the Greenland rocks of the southern end of the Paparoa Range. A few of these have been worked for their gold-content, but at the present time very little work is going on. When the amount of alluvial gold which must inevitably have been derived from these reefs is considered, the fewness of the payable lodes so far discovered is surprising. The thick scree deposits which almost everywhere mantle the valley slopes militate against prospecting. Only a very few of the auriferous lodes near Reefton have been examined during the past season, and their occurrence is merely mentioned in this place.

Coal.—The chief coal resources of the Reefton Subdivision have as yet received no detailed examination. A small coal-bearing area flanking the mountains exists in the basin of the Moonlight. In Fitzgerald Creek the coal is 25 ft. thick, and stands vertically. In Garden Gully the seam is at least 20 ft. thick, and rests upon the Greenland rocks with the interpolation of a small band of quartz cement. The coal is a lignite of excellent quality, and is used on the Moonlight Dredge for steaming purposes with satisfactory results. The following analyses indicate the composition of the lignite:—

	(1.)	(2.)	(3.)	(4.)
Fixed carbon	34·49	35·60	35·00	34·39
Volatile hydrocarbons	48·51	46·63	47·07	43·84
Water	16·35	17·17	17·11	19·45
Ash	0·65	0·60	0·82	2·32
	100·00	100·00	100·00	100·00
Total sulphur	4·82	4·69	3·07	4·54
Specific gravity	1·20	1·19	1·16	1·23

(1.) Upper 12 ft. of seam, Fitzgerald Creek.
(2.) Lower 12 ft. of seam, Fitzgerald Creek.
(3.) Thick seam, Jenkins' Water-race, Garden Gully.
(4.) 20 ft. seam, township, Garden Gully.

DR. J. ALLAN THOMSON, PALÆONTOLOGIST.

Dr. Thomson, Palæontologist, submits the following report on his work during the last twelve months :—

Introduction.

My work during the past year may be classed under the following headings :—

(1.) Sorting of collections for specialists, with the preparation of short accounts of the literature dealing with the localities involved. This work has occupied a considerable proportion of my time.

(2.) Study of the Tertiary *Brachiopoda*. This has been steadily pursued whenever opportunity offered.

(3.) Field-work on the Cretaceous and Tertiary fossil localities of East Marlborough and North Canterbury. The Awatere Valley, Cape Campbell, the Ure Valley, Kekerangu, and the Middle Clarence Valley were visited during November and December, 1912, and the Waipara district during February and March, 1913.

(4.) Extraneous reports. In May, 1913, I reported on building-stones from Sandy Bay, Motueka district, and in the same month I examined the coal prospects of the Waimate district.

Progress of the Descriptive Palæontology.

Tertiary Mollusca.

The services of Mr. Henry Suter, of Christchurch, were again engaged for a period of six months from the 14th August, 1912. During this period he completed the revision of the type specimens of the Tertiary *Mollusca* in the Canterbury, Otago, Otago School of Mines, Auckland University College, and Melbourne Museums, including also some of Hector's and Kirk's types in the Geological Survey which had been discovered during the year, and a few of Hutton's types of 1873 that were returned from Adelaide University by Mr. W. Howchin. There are still a considerable number of Hutton's types in Adelaide which it has not yet been possible to obtain. In addition Mr. Suter has described all the new species that have been found so far in the Geological Survey collections. When these results have been published our systematic knowledge of the Tertiary *Mollusca* will be tolerably complete, and the next task must be the definition of the stratigraphical range of the various species. This will involve the determination of a vast number of specimens from the principal fossil localities, and for this purpose it is highly desirable that Mr. Suter's services should again be obtained.

Tertiary Brachiopoda.

Considerable progress has been made by Mr. C. A. Cotton and myself in the revision of this group, and the greater part of the necessary figures have been prepared. Much new material, however, was obtained during the summer's field-work, making it possible to fix more accurately the range of most of the species, and the examination of this material will delay the completion of the revision for some months. Meanwhile an account of the generic position of the known species can be now supplied. In this list the commonly accepted divisions of the *Magellaninæ* are retained, but some division of the genera in the directions pointed out by Buckman will be attempted in the final revision.

Rhynchonellidæ.
- *Rhynchonella gaulteri* (Morris).
- *Hemithyris squamosa* (Hutton).
- „ *nigricans* (Sowerby).

Terebratulidæ.
- *Terebratula concentrica* (Hutton).
- „ *oamarutica* Boehm.
- „ *magna* (Hamilton).
- „ (?) *neglecta* (Hutton).
- *Terebratulina suessi* Hutton.

Magellaninæ.
- *Magasella kakanuiensis* (Hutton).
- *Terebratella triangularis* (Hutton).
- „ *parki* (Hutton).

Magellaninæ.
- *Terebratella oamarutica* Boehm.
- „ *neozelandica* Ihering.
- „ *radiata* Hutton.
- „ *sanguinea* (Leach).
- „ *rubicunda* (Solander).
- *Magellania gravida* Suess.
- „ *rhizoida* (Hutton).
- „ *tapirina* (Hutton).
- „ *novara* Ihering.
- „ cf. *M. sufflata* Tate.
- „ *ovalis* (Hutton).
- „ *lenticularis* (Deshayes).

Tertiary Cirripedia.

Mr. T. H. Withers, of the British Museum, is making a re-examination of the giant cirripede from Motutapu Island, *Pollicipes (?) aucklandicus* (Hector), and has on loan the whole of the material in the survey collection.

Tertiary Bryozoa.

Mr. E. de C. Clarke, of Auckland University College, had commenced the examination of the Tertiary *Bryozoa*, but on his appointment to the Geological Survey of Western Australia he returned all the material on loan from the Geological Survey.

Other Groups of Tertiary Invertebrates

Arrangements have been made with Mr. D. G. Lillie, Ship Biologist to the 1910 British Antarctic Expedition, who has made large collections by dredging of New Zealand and Antarctic invertebrates, that wherever possible the specialists who work up the material of the Expedition will also undertake the revision of the New Zealand Tertiary forms of the same groups.

Cretaceous Mollusca.

Mr. H. Woods, Demonstrator in Palæontology, Cambridge, having kindly volunteered to undertake the examination of the Cretaceous *Pelecypoda*, in addition to the ammonites and belemnites, the best specimens in these groups from the north-east part of the South Island have been sent to him. Two new ammonites and several belemnites were obtained during the year from Coverham, Clarence Valley, and were also forwarded, but were unfortunately involved in a fire on the s.s. "Turakina," and it is not yet certain whether they have been totally destroyed or not. As Mr. Woods did not expect to be able to commence the study of the specimens until March, and as the amount of material is large, considerable time must elapse before any results may be expected.

Professor Otto Wilckens, of Jena, has also kindly volunteered to examine the Cretaceous *Gasteropoda*, and the best specimens of this group have been forwarded to him. He also hoped to commence their study in the (European) spring.

Cretaceous and Tertiary Leaf Fossils.

A catalogue of the type specimens of these fossils was prepared by myself in the early part of the year, but as Professor P. Marshall, of Otago University, desired to revise the generic identifications, publication of it has been withheld for the present, and the greater part of the specimens in the Geological Survey collections have been forwarded to Professor Marshall.

Jurassic and Triassic Faunas.

The late Professor Georg Boehm, of Freiburg i Br., Germany, who has already written papers on Jurassic and Triassic fossils from New Zealand, had volunteered to undertake or to arrange for the examination of all the Jurassic and Triassic shells of the Geological Survey collections. The Jurassic fossils from the Hokanui Hills, first sent to him, proved to be so badly preserved and inconclusive of horizon that at his request a collection of ammonites from all horizons was despatched to him, but did not reach him before his death. Professor Boehm, from his travels in New Zealand, and his researches on the Jurassic of New Guinea and the Moluccas, was particularly well qualified to work out the New Zealand Jurassic, and by his death New Zealand palæontology has lost a keen and interested friend. It is hoped to arrange that the fossils sent to him will be transferred to other specialists on the Continent. Professor Boehm wrote as follows on the type of *Belemnites catlinensis* (Hector): "It belongs to the group *Hastati;* we in Europe would presume that it comes from the Kelloway."

Mesozoic Floras.

Mr. D. G. Lillie has supplemented the collections previously sent to Dr. A. E. Newell Arber, Demonstrator in Palæonbotany, Cambridge, by fresh collections from the Clent Hills, Mataura, and Waikawa. It has been arranged that the descriptions of both of these collections, which form a part of the 1910 British Antarctic Expedition collections, and of those previously sent by the Geological Survey, will be embodied in the official report of the Expedition. Dr. Arber has already published a preliminary paper entitled "On the Earlier Mesozoic Floras of New Zealand" in the Proceedings of the Cambridge Philosophical Society (vol. 17, part 1 (1913), pp. 121–131), and has also read a paper before the Royal Society, on the 6th March, 1913, entitled "A Preliminary Note on the Fossil Plants of the Mount Potts Beds, New Zealand, collected by Mr. D. G. Lillie, Biologist to Captain Scott's Antarctic Expedition, in the "Terra Nova,' in 1911." The most important results yet made known by Dr. Arber are that *Glossopteris* does not occur in the Mount Potts beds, and that consequently New Zealand did not form part of the great Southern Permo-Carboniferous Continent "Gondwanaland"; further, that the Mount Potts plant-beds are either Rhætic or Lower Jurassic in age, and that the other Mesozoic plant localities are of similar age.

Palæozoic Faunas.

Mr. W. S. Dun, Palæontologist to the Mines Department, Sydney, reports that considerable progress has been made with the examination of the fossils from the Baton River beds, but that pressure of other official work has prevented him from completing a memoir on the subject.

RESULTS OF FIELD-WORK.

A great number of detailed observations on the Cretaceous and Tertiary beds of East Marlborough and North Canterbury have been made, but an account of these must wait until the fossils collected have been determined. The following general observations, however, may now be put on record.

The Amuri Limestone of Marlborough.

In the Annual Report for 1912 I stated that "it cannot be asserted on palæontological grounds that any beds above the Saurian beds are of Cretaceous age." In making this statement I overlooked the fact that McKay had obtained a saurian from the Concretionary Greensand of Amuri Bluff, and that Hector and McKay had obtained belemnites, *Inoceramus*, &c., from a tuff in Limestone Creek, Awatere Valley, lying a few feet below the under-surface of the Amuri limestone. In Muddy Creek, a tributary of the Nidd, Middle Awatere Valley, Mr. C. A. Cotton and myself were successful in obtaining *Inoceramus* in the mudstones a few feet below the flint-beds of the Amuri limestone of this locality. There can be no doubt, therefore, that all the beds below the Amuri limestone are of Cretaceous age, and it is probable

that the lower part of the limestone, at least, is also Cretaceous. As the upper part (the Weka Pass stone) is commonly regarded as Miocene, the inference is that the whole of the Eocene is represented by unfossiliferous Amuri limestone. The evidence for the Miocene age of the Weka Pass stone is, however, very slight, and it is quite possible that it is also Eocene.

The Grey Marls of East Marlborough.

No identifiable fossils could be found in the great thickness of Grey Marls lying east of the Amuri limestone in the Cape Campbell district. In Heaver's Creek, Kekerangu, and in Deadman's Creek the results were also disappointing. At Waipapa Point a few fossils were obtained a little way above the limestone. In the Dee and Mead sections of the Clarence Valley the Amuri limestone passes quite gradually into the Grey Marls, and these are again covered conformably by the Great Marlborough Conglomerate. The lower part of the Grey Marls is unfossiliferous, but in the upper part, besides isolated fossils, a number of derived boulders containing the same fossils were found, pointing to a contemporaneous erosion of similar beds in the near vicinity. The boulders in the upper part of the Grey Marls are of the same nature as those in the overlying conglomerate, and it is not therefore necessary to conclude that this had a glacial origin.

The Great Marlborough Conglomerate.

This rock has been considered as post-Miocene, meaning post-Awatere, by McKay, and as Glacial by Park. In all exposures it lies quite conformably on the Grey Marls, the appearance of unconformity in the Mead section being due to a number of small faults transverse to the bedding. Not only is there no discordance in bedding, but there is a transition in the nature of the deposits, for the upper part of the Grey Marls in the Dee, Mead, and Heaver's Creek sections contains an ever-increasing number of pebbles, and becomes more and more sandy in matrix. In Deadman's Creek there are two distinct bands of conglomerate, apparently lying one above the other, and separated by several hundred feet of sands and sandy mudstones. The lower band lies on the Grey Marls, and is succeeded immediately by about 200 ft. of fossiliferous beds which I propose to name temporarily the Deadman's Creek beds. The enormous blocks of supposed Awatere rocks lying in the stream-bed just below the lower conglomerate are derived not from the conglomerate as was supposed by McKay, but from the Deadman's Creek beds, although there are a few much smaller fossiliferous boulders in both conglomerates. The upper conglomerate is succeeded by upwards of 800 ft. of well-bedded sandstones, passing into mudstones, exposed in Deadman's Creek and the Ericaburn. No fossils were obtained from these beds in the brief examination made of them, but it is difficult to escape from the conclusion that they correspond to the lower part of the Awatere Series. There is a large tract of country between Deadman's Creek and the Clarence River to the south that has never been visited by a geologist, and according to settlers in the district fossils may be found at several places in it.

The Tertiary Beds of the Lower Awatere Valley.

Since the days of Hochstetter these beds have been collectively termed the Awatere Series, and as such have been placed in various positions in correlation tables of the New Zealand Tertiaries. There is certainly, however, a large series of beds with varying fossils underlying the Starborough Creek beds recently described by Park, and in correlation each bed will have to be considered on its merits. In the lower beds in the Medway River, Mr. L. J. Wild has obtained *Cucullæa,* and in Tatchall's Creek, near Ward, Mr. Cotton and I obtained *Limopsis* and other forms of Miocene type.

The Tertiary Beds of the Middle Waipara District.

A few more Tertiary fossils were obtained this year from the Weka Pass stone, especially from the outcrop behind Mr. Stackhouse's farm, Onepunga. From the Weka Pass stone to the top of the Mount Brown beds fossils other than *Brachiopoda* are not common, but a sufficient number of brachipods have been obtained to establish a zonal sequence. The beds richest in *Mollusca* lie near the top of the Mount Brown beds, between the limestones in the railway-cuttings 43 miles 3 chains and 44 miles respectively from Christchurch. These beds are not exposed along the railway-line, and have been previously overlooked, but they present good sections in the Weka Pass stream below the railway and in the Weka Creek above and below the road-bridge. The shells collected will probably permit a correlation to be made with some member of the Oamaru Series as developed at Oamaru. Although a classic locality for the determination of the relationships of the Cretaceous and Tertiary beds, the Middle Waipara and Weka Pass district is not well suited, owing to its poverty in molluscs, to become the standard of reference for the Tertiaries of New Zealand.

SPECIAL REPORTS.

1. THE COAL POSSIBILITIES OF THE WESTPORT FLATS.

By P. G. Morgan, Director.

Introduction.

The first impressions obtained by a stranger on inspecting the Buller Coalfield would probably be extremely favourable to the idea of boring the flats north and south of Westport for coal. The coal-measures of the Denniston and Millerton districts are evidently downfaulted to the west, and if without a detailed knowledge of the geology of the Westport district and other parts of New Zealand one might perhaps conclude that the coal was not so deep as to prevent its being worked from shafts of moderate depth. With wider knowledge these conclusions, as will be shown presently, would be considerably modified.

In order to reach a final opinion on such a problem as that presented by the Westport flats, a careful and detailed geological survey of the whole district is necessary. In addition a knowledge of the geology of other New Zealand coalfields is required. Even when all the possible data have been collected, any conclusion reached can be only a statement of the probabilities, but it is obvious that an opinion formed after an exhaustive study is more likely to be correct than one founded on a hasty and imperfect examination.

Conclusions reached.

The detailed geological survey of the Westport district is not yet completed, but, so far as it has gone, leads to the following conclusions:—

(1.) Bituminous coal exists in part but not in the whole of the comparatively flat country between Birchfield and Addison's.

(2.) Brown coal or lignite of younger age than the bituminous coal has a widespread distribution in the area south of Westport, and may exist in the area north-east of the town.

(3.) The bituminous coal, except where involved in the great fault that skirts the base of the mountains, is everywhere buried beneath a great mass of younger strata, at least 3,000 ft. thick in most places.

(4.) The strata underlying the Recent gravels and sands of the flats dip at low angles towards the great fault at the base of the mountains.

(5.) The truth of the above conclusions can be tested only by trial bores, which in all probability will have to be carried to a depth approaching 3,000 ft. before decisive results are obtained.

(6.) The best sites for prospecting-bores are (*a*) near the coast at Waimangaroa, (*b*) just to the west of the Waimangaroa Junction Railway-station, (*c*) near the coast west of Fairdown, (*d*) about half-way between Cape Foulwind and the coal outcrop on Moran's water-race near Addison's, and (*e*) on the coast west of Birchfield.

(7.) Bore (*a*), near the coast-line west or north-west of Waimangaroa, is recommended as the first that ought to be drilled, but owing to the uncertainty that exists as to the real structure of the strata, the data obtained from any one of the proposed bores or from the completion of the geological survey may render it advisable either to bore in some new locality or to abandon boring altogether. Reasons for these conclusions will now be given, so that the reader may judge as to the probability of each, for most are statements of probability rather than certainty.

1. *Distribution of Bituminous Coal.*

It is universally agreed that the coal-measures of the upland country have been faulted below the level of the flats, but there is no evidence that coal lies beneath the whole area. My reasons for stating that bituminous coal does not exist below the whole area are—

(*a*.) Both on the upland country and elsewhere in New Zealand the coal-seams are observed not to be continuous, but either to lie in so-called basins, towards the edges of which they thin out, or to occur as marginal deposits along the borders of the ancient land.

(*b*.) There is evidence both in the Buller and the Greymouth districts that the bituminous-coal measures thin out to the eastward and the westward (see also Mr. McKay's report of 23rd August, 1912, paragraph 6). By this is meant not that the coal-measures have been removed by erosion, but that they were never deposited in the directions mentioned.

(*c*.) Positive evidence of the westward thinning of the bituminous-coal measures is given by the Cape Foulwind section. Here younger beds, containing thin seams of lignite, are seen to rest on granite. Some persons, including Mr. Alexander McKay, have supposed that the lignite coal near Cape Foulwind is of the same age as the bituminous coal of the uplands, and therefore have drawn a conclusion favourable to the existence of bituminous coal under the flats to the eastward. Unfortunately the evidence of the Cape Foulwind section, if rightly interpreted, is decidedly hostile to this supposition. The bituminous-coal measures, however, may live some miles east of the cape. Evidence of this is given by the coal outcrop on Moran's water-race near Addison's.

2. *Brown Coal and Lignite.*

A thick seam of lignite suitable for household use occurs at Charleston. On the shore-line of Tauranga Bay a number of lignite-seams varying in thickness from 1 ft. to 3½ ft. or more outcrop in the bed of a small stream entering the bay. The thin lignite-seams outcropping on the shore just to the east of Cape Foulwind are well known. The conclusion to be drawn from these occurrences is that lignite underlies a considerable portion of the Addison Flats and the country towards Charleston. It may also occur in the neighbourhood of Westport and northward.

In general the depth of the lignite will be considerable. Its quality may be somewhat improved by depth, but this is doubtful. The lignitic seams will probably be patchy, and vary greatly in thickness. Boring for lignite alone is evidently not to be recommended, but its occurrence in the boreholes will afford some indication of the depth at which bituminous coal may be expected—namely, 1,000 ft. to 1,500 ft. below the lignite.

3. *Depth of Bituminous Coal.*

Above the grits and sandstones containing bituminous-coal seams comes first of all a great thickness of the dark marine mudstone, somewhat calcareous, generally micaceous and in many places sandy, which is known in the Westport district as the "dark marls." These dark marls correspond to similar strata in the Greymouth district, which together with an underlying marine sandstone have a total thickness of not less than 2,500 ft. In the Westport district the thickness is much less, but where unaffected by denudation the dark marls are at least 1,000 ft. thick. Hence on reaching the dark marls by boring, coal cannot be expected for another 1,000 ft. This statement has to be modified by saying that there is evidence that in places the dark marls were removed by erosion before deposition of the overlying Miocene beds, presently to be mentioned, took place. Such erosion may or may not have also removed the coal.

Overlying the dark marls is a series of beds, which are of the geological age known as Miocene, and consist of grits, sandstones, limestones, and mudstones. Towards the base of these beds is the lignite previously mentioned. Lignite may also occur at a higher horizon. An excellent section of the Miocene rocks is seen at Cape Foulwind, where a thickness of about 1,500 ft. is exposed along the cliff-faces. There is good reason, however, for believing that the total thickness of the series is much greater. In the Greymouth district the corresponding beds are at least 3,000 ft. thick, and in the Karamea district are over 3,500 ft. in thickness.

The best estimate of thickness that I can give is as follows: Beds above Cape Foulwind limestone (blue bottom, &c.), at least 1,200 ft.; Cape Foulwind limestone, 25 ft. to 50 ft. or more; beds below Cape Foulwind limestone, 1,000 ft. or more: total, 2,250 ft. or more. This is a minimum estimate, except where there has been overlap on an old-land surface, as at Cape Foulwind, and except in so far as erosion since Miocene times has removed portions of the beds. Some erosion has taken place, but apparently not to any great extent. If, excluding a small area near Cape Foulwind which is certainly not underlain by bituminous coal, we allow 250 ft. as the average amount of erosion undergone by the Miocene beds, it is clear that a bore on the lowlands in order to reach bituminous coal must be in most places at least 3,000 ft. deep, since it has to penetrate at least 2,000 ft. of Miocene strata and 1,000 ft. of dark marls, besides surface gravels. If the bore near Sergeant's Hill pierced nearly 2,000 ft. of blue clays and sandstones without reaching the Cape Foulwind limestone, then I should say that the coal in this locality is at least 4,000 ft. deep. Neither the bore log nor samples of core being available, I cannot speak positively on this point.

I have been requested to select a site at which coal could be reached by a bore of moderate depth. It is possible that such a site could be found close to the main fault along the base of the mountains, but boring in this locality would be useless, for only small crushed blocks of coal can be expected. Elsewhere the possibility of coal near the surface is so small as not to be worth consideration at the present time, and in any case data for a shallow bore are not available, and cannot be obtained without trial boring.

4. *Structure of Strata underlying Flats.*

At Cape Foulwind the Miocene beds are seen to strike a little east of north and to dip at angles of from 10° to 20° towards the east-south-east. The average dip is about 12°, or somewhat over 1 in 5. At this rate of dip even the lignite would be considerably over a mile in depth towards the base of the mountains, but I do not doubt that the dip flattens to the eastward and may even be reversed in direction. The coal-measures underlying the Miocene beds will have similar strikes and dips If the covering of Recent gravels and sands were absent from the flats considerable assistance in coming to definite conclusions regarding structure would be afforded by outcrops of the Miocene beds (blue bottom, yellow sandstone, &c.).

5. *Trial Bores.*

Since the geological structure of the flats is for the most part hidden, trial bores are necessary not only in order to prove the presence or absence of bituminous coal, but also in order to elucidate the geological structure. In some cases it may be advisable to ascertain the depth of surface gravels before beginning a deep bore.

6. *Bore-sites.*

My reasons for placing boring-sites (*a*), (*c*), and (*e*) near the coast are—first, the probable dip of the coal-measures being easterly, the further west one goes the less will be the depth of the coal; and, second, the bores will be clear of the disturbance caused by the great fault to the eastward. On the other hand, if one goes too far to the west the bituminous-coal measures may have thinned out, as at Cape Foulwind. The reason for bore (*b*) near the Waimangaroa Junction

Railway-station is that there is here a greater likelihood of workable coal being found, provided the bore goes deep enough, than elsewhere. The reason for locating bore (*d*) about half-way between Moran's water-race and Cape Foulwind is that while there is no bituminous coal at the cape, the water-race shows a fault-involved outcrop of coal. If the half-way bore finds coal, or even the dark marls of the coal-measures, another bore should be placed half-way between this and the cape. If the first bore is wholly unsuccessful another bore might be tried half-way to the water-race outcrop.

7. *Site of First Bore.*

I recommend a bore in the first place on the coast west or north-west of Waimangaroa Junction, for the following reasons:—

(*a.*) Thick coal outcrops in the old Wellington Mine a little to the east of the main fault, and this coal is likely to continue some distance to the westward.

(*b.*) The depth at which coal will be reached will probably not be so great as nearer the main fault.

(*c.*) The site indicated is clear of the disturbance caused by the main fault.

(*d.*) The site is easily accessible, and a road by which heavy machinery can be transported to it is available.

In starting the bore some difficulty may be caused by the Waimangaroa River gravels, which may be of considerable thickness near the mouth of the stream.

General Observations.

Owing to the nature of the beds to be bored it is necessary that provision for lining all bores should be made, and that work should be carried on continuously by means of three shifts. I repeat the statement that bituminous coal cannot be expected at much less depth than 3,000 ft., except by the operation of some unknown factor. Owing to the geological survey being incomplete I do not offer any decided opinion upon the commercial aspects. It must be remembered that the cost of boring half a dozen or more deep holes will be considerable, and that the prospects of finding workable coal are not so favourable as could be wished. The cost of opening out a coal-seam at a depth of 3,000 ft. is very great. At Sydney Harbour Collieries (Balmain), which I have lately visited, the cost of development, it is said, has exceeded £500,000. In the Westport district faults may be troublesome, and the likelihood of much of the coal (if found) being friable has to be considered.

On the whole the magnitude of the interests at stake seems to justify the boring of the Westport Flats, at least to the extent of one or two deep bores. Such boring must be regarded as of an exploratory nature, and I warn the people of Westport against entertaining high expectations concerning the results.

A matter of great importance in connection with any boring undertaken in the Westport district is the keeping of proper records. Not only should the head driller keep a very careful log, but all cores should be placed in core-boxes, and carefully labelled or marked with the depth. When solid core is not being obtained a sample of the drillings should be taken every few feet, and whenever a change of rock seems to be taking place. These samples should not be mixed, but kept separate in labelled tins or bottles.

Small chips of rock are of especial value. Only after careful inspection by a professional geologist, and the making, if necessary, of analyses or microscopic sections, should bore material be discarded. Even though the boring prove unsuccessful, yet, if one or more bores be carried to 3,000 ft. and careful records kept, the money spent need not be regarded as wasted, for information of value will certainly be obtained.

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2. CEMENT MATERIALS NEAR CAPE FOULWIND.

By P. G. Morgan, Director.

For the manufacture of Portland cement the chief requisites are limestone, clay, a suitable fuel, and cheap transport to market. In the Cape Foulwind district these requirements are all fulfilled. Limestone of excellent quality outcrops over a considerable area, whilst there is a practically unlimited supply of marly clay. From the coal-mines of the neighbourhood cheap and suitable fuel may be obtained. The Westport Harbour Board's railway is constructed almost to the limestone-outcrops, and the port of Westport, seven miles away, affords good shipping facilities.

Limestone.

Limestone outcrops on the coast in the small bay immediately to the north of the Cape Foulwind Railway-station. The outcrop shows about 15 ft. of nearly pure limestone, overlain by marly claystone with calcareous nodules, and underlain by 10 ft. or more of somewhat impure limestone. This again is underlain by grit, almost free from lime in the cliff-face, but to the seaward highly calcareous and apparently passing into limestone. The beds strike north-east (32°), and dip at from 10° to 20° to the south-east. The principal outcrop of limestone, however, extends from half a mile south-west of the railway-station to near Tauranga Bay, over a belt of country with a length of a mile and an average breadth of over 10 chains. The strike is north-east to south-west, as before, and the dip probably under 10° to the south-east. The Westport Harbour Board's quarry and the numerous outcrops all show limestone of fine quality, almost everywhere free from grit or sand, and suitable in every respect for cement-manufacture. The height above sea-level varies from 110 ft. to 160 ft. or more. To the north-west the limestone has been removed by denudation, but it extends south-east under a covering of younger beds to the foot of the Paparoa Range. Southward it is again seen beyond the Little Totara River, near Charleston, whence it extends continuously for many miles to the

south. This district, however, not being as yet tapped by a railway, need not at present be further considered. In the area near Cape Foulwind the thickness shown in the quarry-face is 40 ft., and a bore lately put down proves a further thickness of 45 ft., the upper part of which is nearly pure limestone, whilst the lower part is mainly a somewhat impure ferruginous limestone with bands of purer material. It will thus be seen that between the shore-line and the quarry the limestone has considerably thickened. Southward, beyond the Little Totara River, the thickness is still greater.

Quantity of Limestone.—Data for an exact estimate of the quantity of limestone are not available. The outcrops extend over an area of at least 80 acres. The original thickness of high-class stone was probably 50 ft. or 60 ft., but since much has been removed by denudation it would not be safe to assume a present average thickness of more than 30 ft. until a number of bores have been put down. A rough calculation shows that between 7,000,000 and 8,000,000 tons of limestone is in sight, or, making allowance for caves and material not conveniently situated for quarrying, probably some 6,000,000 tons at least is available for cement-manufacture.

Clay.

Along the shore-line east of Cape Foulwind cliffs, composed principally of bluish calcareous or marly clays or claystones, extend for a mile and a half. These clays occur both above and below the limestone horizon. Near Cape Foulwind they contain several thin bands of limestone, and everywhere abound in calcareous concretions. They extend inland to the foot of the mountains, but are, as a rule, covered by a varying thickness of more or less cemented marine sand. The total thickness of the marly clays is very great, and the supply is practically inexhaustible. They are well suited for admixture with lime in the manufacture of cement. Some layers would probably make excellent bricks, tiles, terra-cotta ware, &c.

Fuel.

The coal-mines of the Westport district can supply the class of coal needed for cement-works at a very low rate. The fact that "soft" and slack coal will be utilized is one of great economic importance, since the use of such coal will lessen the more or less unavoidable waste of coal now taking place. It may be mentioned that the Seddonville State Mine can furnish the most suitable fuel, and therefore the starting of cement-works in the district would probably be of great benefit to that mine.

Analyses of Cement Materials.

The following analyses and remarks by the Dominion Analyst may be quoted in full:—

Dominion Laboratory, Wellington, N.Z., 19th May, 1911.

Report on Specimen No. B/315 (1, 2), forwarded by Mr. H. R. Young, c/o Public Works, Paeroa. Particulars, Cement-stones (No. 1 Marl, No. 2 Limestone) from Cape Foulwind, near Westport.

Analyses.	(1.)	(2.)
Silica (SiO_2)	52·05	2·15
Alumina (Al_2O_3)	18·26	0·51
Iron oxide (Fe_2O_3)	5·09	0·57
Lime (CaO)	4·80	52·95
Magnesia (MgO)	1·73	0·53
Alkalies (K_2O & Na_2O)	3·47	..
Carbonic anhydride (CO_2)	1·40	42·40
Moisture and organic matter	12·75	0·40
Undetermined	0·45	0·49
	100·00	100·00

When burnt off these would have the following composition:—

	1 (*a*).	2 (*a*).
Silica	60·63	3·76
Alumina	21·27	0·89
Iron oxide	5·93	1·01
Lime	5·59	92·56
Magnesia	2·01	0·93
Alkalies	4·03	..
Undetermined	0·54	0·85
	100·00	100·00

A mixture of one part of 1 (*a*) and two parts of 2 (*a*) would give a cement of the following composition:—

Silica	22·72
Alumina	7·68
Iron oxide	2·65
Lime	63·57
Magnesia	1·29
Alkalies	1·34
Undetermined	0·75
	100·00

This analysis corresponds very closely with analyses of the best English and American Portland cements.

J. S. Maclaurin, D.Sc., F.C.S., Dominion Analyst.

Analyses of burnt limestone and of marly clay by Mr. Sidney Fry are as follows :—

	Burnt Limestone.	Burnt Marly Clay.
Silica	6·00	57·72
Alumina and iron oxides	4·10	26·87
Lime	89·90	5·09
Magnesia	..	4·68
Alkalies	..	5·64
	100·00	100·00

The suitability of the Cape Foulwind limestone and clay for the manufacture of a high-grade Portland cement is demonstrated by these analyses.

Transport.

There will be no difficulty and little expense in connecting cement-works with the Westport Harbour Board's railway. Thus coal can be conveniently delivered to the works direct from the mines and the manufactured cement cheaply transported to Westport, whence it may be easily distributed to any part of New Zealand. For an export trade to Australia, the Westport district is probably better situated than any other port of New Zealand.

General Observations.

If cement-works producing 30,000 tons per annum are established the raw materials in sight would suffice for a period of 150 or 160 years. Long before the end of that time the establishment of cement-works to the southward, between Addison's and Charleston, would become economically possible and advisable. The demand for cement in New Zealand cannot be fully supplied by the present manufacturing companies,* and the consumption is rapidly increasing, so that the establishment of the cement industry in a new locality will benefit not only that district, but the Dominion generally. The utilization of some of the friable coal of the Westport district in the manufacture of cement is an additional national advantage. At Cape Foulwind there are few difficulties to be overcome, and these are of a minor character, whilst the main factors are favourable. With efficient management there is no reason why Portland cement of the very best quality should not be made at quite as low a cost as in any other part of New Zealand.

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3. POERUA GOLD-MINE, GREYMOUTH DISTRICT.

By P. G. Morgan, Director.

The Poerua Gold-mine is situated on the lower slopes of a spur of Mount Alexander, near Poerua Railway-station, which is thirty-four miles from Greymouth. The mineral-outcrops that have been prospected consist of six ore-lenses striking nearly east and west, and dipping at angles near 30° to the south. These ore-lenses are known as South lode, Peter's lode, Blind Gully lode, Flaherty's lode, Homestead lode, and Farmer's lode. The first and the last of these are outside the area held by the Poerua Gold-mining Company under lease from the Crown. With the exception of Farmer's lode the ore-lenses cross obliquely the south-west to north-east line, marked on a map published some time ago as "Reef-line." There is, however, no reef or lode striking along this line, and therefore its title as given on the map is a misnomer.

Besides being alike in strike and dip, the various ore-lenses are remarkably similar in other respects. All apparently are situated along fault-planes where the country has been partly or wholly replaced by a mixture of quartz, pyrrhotite, and chalcopyrite. This material carries from a few grains to several ounces of gold per ton, with considerably more silver than is usual in the auriferous-quartz lodes of the South Island. Assays made in the Dominion Laboratory are as follows :—

	Gold per Ton. Oz. dwt. gr.	Silver per Ton. Oz. dwt. gr.	Value per Ton. £ s. d.
1	0 15 2	0 9 10	3 1 3
2	1 8 23	1 2 16	5 18 1
3	0 5 1	0 3 3	1 0 6
4	0 16 8	0 11 8	3 6 6

No. 1 contains 0·70 per cent. of copper; No. 2, 0·52 per cent.; No. 3, 0·47 per cent.; and No. 4, 0·20 per cent. No platinum was detected in any of the samples.

No. 1, from winze below No. 2 level, Peter's lode; No. 2, from Blind Gully outcrop; No. 3, from Homestead lode; No. 4, from outcrop in Peter's Gully.

It has to be noted that the samples represent only the harder quartzose ore, and are, in fact, merely "grab samples."

The country enclosing the lodes or ore-lenses is a soft mica-schist, striking north-east and dipping at high angles to the south-east. At some distance from the lenses the country is in places harder, containing much quartz, and may therefore be called quartz-schist.

The Poerua lodes on the whole bear a considerable resemblance to some of the auriferous-quartz lodes of Central Otago, but the presence of pyrrhotite is a distinguishing feature.

A good deal of exploratory work has been done on the various outcrops. At Peter's lode two levels, Nos. 1 and 2, have been driven on the course of the lode, the latter for a distance of 500 ft. to the east, and over 200 ft. to the west. The distance between the levels is 80 ft. on

* This was written in December, 1912.

the dip of the lode, or 40 ft. if measured vertically. A block of ore between the two levels has been stoped and treated by cyanidation at the 10-head battery erected on the claim. In addition, a winze has been sunk from No. 2 level for over 100 ft. as measured on the dip of the lode, and at 90 ft. down a level going westward has been begun. These mining operations show the existence of a block or shoot of ore with a possible average width or thickness of 2 ft., 100 ft. to 120 ft. in length at the most, and apparently pitching to the westward in its downward course. The average value of the ore probably does not exceed £1 per short ton of 2,000 lb. Ore of this tenor, however, if occurring in sufficient quantity, is capable of yielding payable results under the favourable conditions that exist at Poerua.

Elsewhere than at Peter's lode no workable body of ore has been discovered. The Blind Gully lens pinches out at 15 ft. in depth. The Homestead lens is seemingly of workable size and quality in the bed of North Creek (a branch of Homestead Creek), but drifts on either side of the creek have failed to disclose anything of note. A few tons of ore have been obtained, and are stacked beside the creek. Farmer's lode consists of 2 in. to 3 in. of honeycombed quartz, giving good dish prospects, and assaying up to £20 per short ton, but is cut off by a fault, and in any case is too small to be workable at a profit.

It may be said that the various prospecting-works were warranted by appearances, and have been carried out with good judgment under the direction of Mr. Sydney Fry. The erection of a battery, however, was at no time justified by the prospects of the mine. This work, I understand, was undertaken against the advice of Mr. Fry. It furnishes one more example of the foolishness of imagining that the building of a battery converts a prospect into a dividend-paying mine.

During mining the ore treated at the battery became mixed with much valueless rock, and this was in part the cause of the treatment-results being decidedly unprofitable.

From the facts stated above it will be seen that so far the Poerua Gold-mine has been unsuccessful. The gold-mines that were unprofitable near the surface but proved rich at greater depth are few indeed, and therefore the possibility of improvement at lower levels in the present case is small. The presence of pyrrhotite and one or two other features of the ore-lenses give some indication of improved conditions in depth, but on the whole the evidence for betterment is so vague and uncertain that costly prospecting operations are not advisable.

The shoot in Peter's lode, however, ought to be further prospected by continuing the level now in progress* at 90 ft. down the winze from No. 2 level. If this level is not altogether a blank, either the winze just mentioned ought to be sunk another 90 ft. or 100 ft. on the dip of the lode or another winze sunk to a corresponding depth, and a second low level driven. Unless these works should disclose a payable ore-body no further attempt to prospect Peter's lode or lens in depth ought, in my opinion, to be made.

The remaining ore-lenses are not sufficiently promising to justify any great expense in further prospecting them.

Undoubtedly other lenses of ore similar to those already discovered exist in the property, and probably surface prospecting, more especially along the strike of the known lenses, would disclose one or more of these. Driving on the "tracks" of the lenses—that is, along the associated fault-plans—would be a surer but more expensive means of finding new lenses of ore. Considering, however, the unprofitable character of those already found, I do not feel hopeful as to results, and therefore do not recommend the driving of prospecting-levels except in connection with the Peter's lode shoot.

Whatever may be the character of the ore-bodies hidden beneath the surface, the facts at present known indicate that the chances of failure in future prospecting operations are great, those of success correspondingly small.

It seems to me, therefore, that no prudent man, if correctly informed, would care to invest more than a limited amount of capital in the further development of the Poerua Gold-mine, the mineral wealth of which must be considered as almost wholly speculative.

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4. POSSIBILITIES OF BORING FOR COAL NEAR NELSON.

By P. G. Morgan, Director.

In accordance with instructions, when returning from the Westport district to Wellington, I remained in the Town of Nelson for two days (25th and 26th May, 1913), and, so far as time permitted, examined the neighbouring district with the object of forming an opinion as to its coal possibilities.

My brief examination does not leave me in a position to add materially to the extremely guarded statements made in Bulletin No. 12 (Dun Mountain), (pp. 63–65) regarding the coal-measures. I interpret these statements as indicating considerable doubt concerning the existence of a workable coalfield near Nelson. The available data are such that the advisability of boring the Waimea Plain or otherwise prospecting it remains an open question, which the layman, provided he has common-sense and a clear apprehension of the geological facts, can settle for himself as well as the expert.

Bulletin No. 12 suggests that boring in O'Brien Creek, near Glen's Bridge, or in other localities near the eastern hills, might disclose coal-seams at no very great depth, but states that the coal-measures are probably much faulted in this area, and therefore that bores near the base

* This was written in May, 1913.

of the Moutere Hills would afford a more thorough and convincing test. With this statement I am inclined to concur, and would therefore recommend that any further boring be done near the mouth of Eve's Valley or near Redwood Gully, as suggested in Bulletin No. 12 (p. 65).

It ought to be pointed out, however, that a number of bores will be required to settle the question of the existence of payable coal; that the difficulty of boring through surface gravels and the conglomerate of older age known as the Moutere Gravels is considerable; and that most of the bores will probably require to be deep (1,500 ft. or more). Some form of percussion drill will be needed to penetrate the Moutere Gravels, which will probably be 500 ft. or more thick. A combined percussion and rotary drill may be the most suitable form

I understand that the capital of the Nelson Coalfields (Limited) is but a small sum, quite insufficient for any adequate scheme of prospecting. It is necessary, then, for the company to obtain fresh capital, but the circumstances are such that I do not wish to give any advice that will lead to the present shareholders or others risking their money without having a proper appreciation of the probability of failure. While prospecting for coal near Nelson may be regarded as a legitimate speculation, it is very far from being an ordinary business proposition, where the chances of success or failure may be more or less closely estimated.

The chief known facts bearing on the question of boring the Waimea Plain and adjoining country for coal are—

(1.) Some coal has been found near the eastern margin of the plain in a highly disturbed and faulted state.

(2.) Some coal probably exists beneath the Waimea Plain. This coal may or may not be of workable extent, thickness, &c.

(3.) A number of bores will be required to give positive results.

(4.) Boring will be expensive owing to the nature of the strata and the probable depth of any coal that may exist.

As regards further geological examination of the district near Nelson, personally I should be glad to have an opportunity of examining the important geological sections in that area, but doubt whether a brief inspection would add materially to our positive knowledge of the coal possibilities. The possible coal-bearing area extends westward and southward of that already geologically surveyed, and at some future time will require detailed examination.

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5. INDICATIONS OF COAL NEAR CHERWELL FLATS, GREENHILLS DISTRICT, MARLBOROUGH.

By Dr. J. Allan Thomson, Palæontologist.

Pursuant to instructions received, I proceeded to Cherwell Flats on the 21st February, 1912, accompanied by Mr. C. A. Cotton, and was engaged in examining the neighbourhood till the 23rd February. Mr. W. Scott, of Cherwell Flats, kindly conducted us to the places where coal had been found, and gave us much useful information about localities.

The most promising coal-indication occurs on the south-east slopes of a hill on the southern side of the Cherwell River. This hill is one of the lower peaks of a small range running from Monkeyface past the southern ends of Cherwell Flats, and is about a mile north-east of the highest point of the road running from Cherwell Flats to the Stag River. The ground is Crown land, held at present by Mr. Gibson.

An analysis of the coal, made for local settlers by a Christchurch analyst, shows that it is of rather peculiar composition, and approximates to an oil-shale in the quantity of hydrocarbons and of ash. It is very greasy to the touch, and burns with an offensive odour.

The outcrop is due to an extensive landslip which has had as its sole the actual seam of coal. The latter has acted as a lubricant and has facilitated the slip. The seam has a general dip of 30° in a direction S. 30° E., but the surface is gently undulating. The exposed thickness varies from several inches in the rolls of the bottom to almost nothing. There is no reason to suppose that any great thickness of coal has been removed by the slip, for the slipped material consists entirely of sand and rock material.

The underlying rock is a grey sandstone with irregular veinlets of carbonaceous matter running down from the seam. The overlying rocks are not seen *in situ*, but they are represented in small cliffs at the edge of the slip by beds of soft sand with thin pebble-beds, both having the same strike and dip as the seam. They are much intersected by small faults with downthrows of a few feet each to the north-west.

The continuation of the seam should be found on the southern slope of the hill, and, if the faulting continues at the same rate, at a continuously lower level going west. This slope of the hill affords few outcrops, but in a recently revived creek one-quarter mile to the south-west of the slip, at a level about 200 ft. lower, there is a thin vein of brown carbonaceous pug lying on a grey sandstone and covered by a thin bed of conglomerate, which probably represents the same horizon. The whole hill is composed of alternating beds of sandstone and conglomerate, which are well exposed in cliffs facing the Cherwell River.

This, the main indication, is of no value in itself, but shows that the sandstone-conglomerate series is potentially coal-bearing. Of similar import are other small patches of coaly matter in the same rocks in the Cherwell River on the southern bank above the road-crossing. They are always thin and markedly lenticular, and in some cases merely represent carbonized driftwood.

Other supposed coal-indications of a different nature occur in hard blue sandstone and greywacke on the northern banks of the Cherwell River, and in the small branches of that stream draining Cherwell Flats. They consist of steeply dipping dark pug bands, and are merely comminuted rock along planes of movement. They are of no value as indications of coal.

As the district lies on or near the proposed Cheviot–Kaikoura Railway, and the discovery of coal would be a great boon both to the district and the railway, it will be well to give a short outline of the geology of the district, and to indicate the places where coal would be likely to crop out if present. The district has already been noticed at some length by A. McKay (Rep. Geol. Explor. during 1885, pp. 80–83), and briefly touched on by J. Park (Trans. N.Z. Inst., xliii, pp. 523–24, 1911). McKay considers that the depression between the Kaikoura Mountains and the coastal ranges to the south of Kaikoura is caused fundamentally by a great fault which has let the Cretaceous rocks down against the older rocks of the Kaikoura Mountains. Park, on the other hand, claims that this depression is the floor of an old glacial valley which was overdeepened at Cherwell Flats. Whether either of these views is correct, or both, is immaterial for our present purpose, and need not be discussed here.

McKay has given an account, with which I am in general agreement, of the succession of the Cretaceous and "Cretaceo-Tertiary" rocks in Monkeyface and the limestone hills north of the Cherwell River. The Cretaceous beds succeed one another in regular order from the south-east to north-west, and lie unconformably on older (greywacke) rocks to the south-east, where the base of the series is therefore exposed. Three main divisions may be recognized—a basal series of sandstones and conglomerates several hundred feet in thickness, a middle series of sulphur mudstones and greensands (in which McKay has observed a saurian bone), and an upper member having all the characteristics of the Amuri limestone. The latter is clearly exposed in the hills to the north-east of Cherwell Flats. The mudstones and greensands may be seen in the creeks draining the limestone hills, and in a stream running from Monkeyface to the Cherwell River. The conglomerates and sandstones form Monkeyface and the low range running south-west from it and separating the Cherwell Valley from the valleys of the Stag and the Spey. At one place (a sharp peak about half-way between Monkeyface and the first-described coal-indication) the junction with the underlying rocks is only a few feet below the crest of the range on the south-eastern side, but north and south of this point it runs into lower ground in the tributaries of the Stag and the Spey, and I had not opportunity to examine it there.

Coal may be expected only in the basal series of sandstones and conglomerates if these are of freshwater or estuarine origin at the base. That they are in part marine is shown by two lines of evidence: firstly, the discovery of marine fossils in them near a small lake above the Cherwell River; and, secondly, the abundance of a peculiar grey sandstone with a pœcilitic cement of large calcite crystals which is found also at Amuri Bluff and the Waipara Gorge, in each case in marine strata. On the other hand, the small seam found shows that the lower portion of the series may be non-marine. A knowledge of the Cretaceous shore-lines would be of great service. The district lies nearly half-way between Amuri Bluff and Quail Flat on the middle Clarence River, and the rocks are of the same age in the three localities. At Amuri Bluff the basal beds contain silicified wood in places, but no coal-seams. In the Conway River section of the same rocks to the south-west Haast found no coal in 1870 (Rep. Geol. Explor. during 1870–71, pp. 39–40). On the other hand, at Quail Flat there is a fairly thick seam of inferior coal, and there are also extensive fresh-water beds with plant-fossils. If the Seaward Kaikoura Mountains did not exist at the time of deposition of these beds, then the fresh-water beds must have thinned out gradually from Quail Flat to Amuri Bluff, and must therefore be quite thin or non-existent at Cherwell Flats. If, on the other hand, the Kaikoura Mountains did then exist, the margin of the Amuri Bluff formation must have existed near Cherwell Flats, and the hope of finding fresh-water beds and coal-seams is greater.

It is therefore a case where a knowledge of the pure geology is not sufficiently advanced to deduce practical conclusions with certainty, and we must await the reconstruction of the old shore-lines based on extensive palæontological, stratigraphical, and physiographical studies. Meanwhile I should advise prospectors for coal to confine their attention to the neighbourhood of the junction of the sandstone-conglomerate series and the old greywacke rocks in the streams running to the Stag and the Spey. At the same time I would not hold out any great hope of success.

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6. POSSIBILITY OF OBTAINING GRANITE AND MARBLE SUITABLE FOR BUILDING-STONES IN THE SANDY BAY DISTRICT, NELSON.

By Dr. J. Allan Thomson, Palæontologist.

Sandy Bay lies on the eastern side of hilly country known as the Riwaka Range, which is a southern prolongation of the Pikikiruna Range. The locality at which it is proposed to work granite is in Holyoake's Valley, about three miles from the sea, while the locality for marble is in Marble Creek, a tributary of Holyoake's Creek, entering it on the south side about three miles from its mouth. Access to the district is by a road over the hills from Riwaka, but in the event of quarries being started it is proposed to build a jetty at the mouth of Sandy Bay, from which point a tramway up Holyoake's Valley can easily be constructed.

General Geological Structure of the Riwaka Range.*

The Riwaka Range consists of granite, marble, amphibolites, and mica-schists, which are met with in the order mentioned as the range is crossed from the sea-coast. The marble forms a band trending north-west, and is almost vertical, dipping steeply to the south-west. The marble, amphibolites, and mica-schists form an old sedimentary series, which has been strongly tilted, so that the beds are nearly vertical, and the granite is an igneous rock intrusive below and through the other rocks. The marble owes its crystalline character to the heating to which it has been subjected by the intrusion of the granite.

The Granites.

The dominant granites on the east side of the marble are coarse-grained, more or less porphyritic, rocks similar to those of Adele Island (used for harbour-works in Nelson) and Tonga Bay (used in the Public Trust and Post Office buildings, Wellington). These coarse rocks are veined by still coarser pegmatites and by finer and less weathered aplitic granites, which would make good building-stones if they could be obtained in quantity. The granite country is covered with a heavy overburden of sandy soil and loose boulders, so that until excavations have been commenced it is impossible to be assured of a sufficient supply of stone of given quality. With regard to the sample submitted to the Government Architect, it came from a bluff on the north side of Holyoake's Valley, just below the junction of Marble Creek. It is one of the finer-grained granites of the district, though not the freshest nor the most compact that could be obtained in the near vicinity. There can be no assurance that a sufficient quantity of the stone can be supplied, for the greater part of the bluff in which it occurs is composed of a stone of a different nature.

The Marble.

The marble is a coarsely crystalline banded rock, alternately bluish-white and white in colour. It is composed mainly of calcite, but contains a small amount of impurities in the shape of quartz, white mica, sphene, magnetite, pyrite, &c. The presence of the quartz tends, if anything, to strengthen the stone. The mica, sphene, and other metamorphic minerals do not materially affect its character for use in a temperate climate. The magnetite might in time give rise to brownish stains, but the amount of this mineral is so small, and the state of its subdivision so fine, that this effect may practically be ignored. The presence of pyrite is the greatest drawback to the stone. This mineral oxidizes to ferrous sulphate, which stains the rock, and to sulphuric acid, which corrodes the calcite. The following extracts from works on building-stones speak for themselves:—

G. P. Merrill: "Stones for Building and Decoration," p. 428 (New York, 1903): "In all other than sandstones, however, the presence of a readily oxidizable sulphide is a serious defect, since crystalline rocks require no such cement, and the change in colour can in very few cases be considered other than a blemish. More than this, the pyrite, in decomposing in contact with the gaseous atmosphere of cities, may give rise to small quantities of sulphurous and sulphuric acids, which by their corrosive action upon the various mineral constituents of the stone may give rise to efflorescent magnesian salts, besides rendering it porous and more liable to the destructive action of frost. The conversion by oxidation of a sulphide into a sulphate is moreover attended with an increase in volume; there is thus brought to bear a mechanical agency to aid in the work of disintegration."

J. A. Howe: "The Geology of Building-stones," p. 353 (London, 1910): "Crystals of pyrites are not common in good limestone building-stones; where they occur, however, as in some palæozoic limestones and in certain argillaceous limestones, they facilitate the decay of the stone, for they decompose, yielding sulphuric acid with moisture, and this attacks the surrounding carbonate of lime, forming small pits around the pyrites-grains."

The pyrite occurs in the Sandy Bay marble in very small crystals, which are not easily seen without a lens. Nevertheless, microscopic examination of the stone shows that the mineral is widespread in very minute crystals. An analysis made in the Dominion Laboratory of a typical sample from the quarry now being opened out gave the following result:—

Insoluble in hydrochloric acid	3·11
Alumina and iron oxides	0·20
Lime	53·10
Magnesia	0·64
Carbonic anhydride	42·50
Sulphur*	0·03
Alkalies and undetermined	0·42
	100·00
* Equivalent to pyrite (FeS_2)	0·06 per cent.

* The following reports contain useful information on the geology of the neighbourhood: Cox, S. H.: "On Certain Mines in the Nelson and Collingwood Districts, and the Geology of the Riwaka Range." Rep. Geol. Expl. during 1879–1880, pp. 1–12 (with map). 1881. Park, J.: "On the Geology of Collingwood County, Nelson." Rep. Geol. Expl. during 1889–1890, pp. 186–243 (with map). 1890. McKay, A.: "On the Crystalline Limestones and so-called Marble Deposits of the Pikikiruna Mountains, Nelson." Rep. Geol. Explor. during 1890–1891, pp. 38–43 (with plan). 1892. The northern continuation of the district is described in—Bell, J. M., Webb, E. J. H., and Clarke, E. de C.: "The Geology of the Parapara Subdivision, Karamea, Nelson." Bull. No. 3 (n.s.) N.Z. Geol. Surv. 1907.

The analysis shows that the pyrite is present in smaller quantity than the microscopical examination would suggest.

If the mode of weathering in the field could be taken as a guide to the behaviour of the rock as a building-stone, no trouble on account of the pyrite should ensue, for weathered surfaces of the rock are perfectly clean and free from staining. The pyrite appears to stand exposure without decomposing until the calcite in which it is embedded is dissolved away by rain-water (a very slow process) and apparently drops out. It occurs in well-shaped crystals, in which form it is likely to resist weathering longer than if it were massive. Authorities agree, however, that the natural conditions of weathering in the field are not necessarily a guide to the behaviour of a stone in the smoky atmospheres of towns. The only sure test is actual experiment. Merrill says (*loc. cit.* p. 451), "In opening a new quarry blocks should always be tested by allowing them to lie and season for at least a year before using. At the end of this time the presence of any readily oxidizable sulphide or carbonate will have made its presence known, and the amount of disintegration or induration, as the case may be, will furnish a slight clue regarding its future behaviour. Indeed, this seasoning of stone prior to its introduction into a building should always be insisted upon, whatever its character."

There are in the Sandy Bay marble occasional bands in which pyrite is much more common than usual, so as to be freely visible to the eye. If it is decided to use the stone, provision should certainly be made in the specifications to exclude stone with such bands.

As regards the amount of the stone that could be obtained, an ample supply is assured. The marble is well banded, parallel to its walls, and fortunately the main joints run parallel to the banding, so that the rock is easy to work. The joints are sufficiently distant to allow blocks of all necessary sizes to be obtained. The quality of the rock is fairly constant over the whole width of the outcrop, but in places the evenness of the banding is interrupted by thin dykes and veins of granite, along the walls of which the marble is impure. The total amount of rock that would have to be discarded from these causes is, however, very slight. The marble extends for many miles, averages over one-quarter of a mile in breadth, and rises into hills of 1,000 ft. in height. In the hills on each side of Marble Creek, where it is proposed to quarry it, it rises to over 200 ft. above the quarry-bottom. On a conservative estimate, 1,000,000 tons of rock could be quarried at this spot.

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7. THE GEOLOGY OF THE TE PUKE DISTRICT.

By J. A. Bartrum.

Introduction.

The Te Puke district is situated towards the north of the Bay of Plenty, and comprises an area of land well fitted for agriculture. It has a mild sea-coast climate, with moderate rainfall. The soil over a considerable area grows good grass and maize, and much of the present unworked poorer land may be made productive by judicious manuring. The greater portion of the district consisted originally of open fern land, the bush occupying the higher levels further from the coast, and it is only within the last few years that any extensive settlement of this bush land has taken place.

The land-tenure of the district is varied. Native owners hold considerable blocks, but seem usually to make little use of land that without question could be made highly productive. With the exception of perhaps 25 square miles of Crown land, the rest of the district is freehold. Of this Crown land, approximately 3,000 acres constitute a forest reserve, and of the remainder all but about 4,000 acres is held on lease-in-perpetuity tenure; in a few cases the right of purchase is added. The 4,000 acres noted above are leased under the system of renewable leases.

Representations had been continuously made by the Tauranga County Council to the Mines Department for some two or three years that the restrictions placed upon tenure of local Crown land by the operation of the Mining Act were seriously interfering with the progress of the district, and in consequence a geological survey was set in hand early in September, 1912, in order to determine what area was likely to be productive from a mining point of view and what portion could be safely released from the operation of the Mining Act.

There are several Crown tenants who desire to obtain the freehold of their sections, but the writer could not understand the disadvantages of the present conditions of tenure; and conversation with the late Mr. M'Ewen, then Chairman of the Tauranga County Council, made it appear that the removal of the mining restrictions was to a large degree desired in order that a small block of Crown land at Te Puke Township might be sold for building-sites.

The district examined in detail by the writer consists of a block bounded approximately by the Tauranga – Te Puke Road on the north, the county boundary on the south, an imaginary north-and-south line through Te Puke Township on the east, and a similar line, about three miles east of Tauranga, on the west.

To this district access is given by the main east-and-west coach-road between Tauranga and Te Puke, from which three roads branch off near Papamoa and run south for about three miles to junction separately with a second east-and-west road, crossing, from near the Waitao Stream, over the hills to Te Puke. The most westerly of these three roads continues south for about two miles to give access to some Crown and Native sections.

The western and south-western portion of the district has access to Tauranga by several rough dray-tracks through the Ohauiti Estate, which meet the Te Puke Road about three or four miles from Tauranga, and also by a rough track from Oropi, a sawmilling settlement on the Tauranga–Rotorua Road. Ready access is gained from Te Puke to the eastern portion of

the district by several south-west roads; two of these—Nos. 2 and 3 Roads—continue to a junction about eleven miles from Te Puke, whence a continuation leads south-west to join the Tauranga–Rotorua coach-road.

Several short branch roads—for example, No. 4 Road, leading to the Te Puke Reefs, Kirikiri Road, and Otawa Road—further open up the district.

A railway now in course of construction will shortly link Te Puke with deep water near the entrance of Tauranga Harbour, and at the present time frequent and efficient coach services connect with both Tauranga and Rotorua.

In addition, Te Puke Township is within three miles of landings up the Kaituna River, which are served by a steamer service from Tauranga. There is telegraph connection with outside districts, and a surprisingly good postal connection exists between these and Te Puke by way of Rotorua and Tauranga.

With the exception of the higher levels of the Te Puke Range, the district examined is closely settled and flourishing. Te Puke Township is the one centre of population, and when the railway connection with Tauranga and other districts is established must enlarge rapidly The various branches of agriculture, and of these particularly dairying and grazing, are the important industries. A little flax-milling is carried on, and not far from Te Puke, though outside the area examined, a sawmill is working. There are large dairy factories at Tauranga and Te Puke townships, and a creamery near Papamoa.

List of Literature.

The following list gives all publications known to the writer containing references to the geology or mining industry of the Te Puke district:—

1867. Von Hochstetter, F.: "New Zealand." (Hochstetter remarks on the general geology of the district between Rotorua and Tauranga.)
1905–6. Sollas, W. J., and McKay, Alex.: "Rocks of Cape Colville Peninsula," Vols. i and ii.
1906. Galvin, P.: "The New Zealand Mining Handbook," p. 59.

Papers and Reports relating to Minerals and Mining (New Zealand Mines Reports).—1896, pp. 78, 79. 1897, p. 99. 1898, p. 75: Extract from report by Mr. Alex. McKay on the geology of the Tauranga-Te Puke district. 1899, p. 70, and C.–9, p. 26: Report by Mr. Alex. McKay on the auriferous "cements" of Te Puke. 1900, p. 90. 1901, p. 57. 1902, p. 52. 1903, p. 92. 1904, pp. 4, 47. 1905, p. 90. 1906, p. 94.

New Zealand Mines Record.—Vol. i (1897–98), p. 13, pp. 389–90 and 394–95. (Pp. 394–95 contain report by Mr. Alex. McKay on the geology of the Tauranga-Te Puke district.) Vol. ii (1898–99), pp. 97–98. Vol. iv (1900–1), pp. 303, 387. (On p. 303 is mentioned the discovery of alluvial gold five miles south of Fleming's Freehold, Te Puke.) Vol. v (1901–2), pp. 124, 197, 287, 361. (On p. 197 is recorded the successful treatment of 5 tons of selected ore from the Te Puke Gold-reefs Company's property.) Vol. vi (1902–3), p. 8.

Physiography.

The main topographic features of the Te Puke district are briefly as follows:—

A coastal belt of sand-dunes and swamps extend inland for distances varying from one mile near the Tauranga Harbour to five miles at Te Puke itself. From this fringe a low plateau rises gradually inland, but is divided into two portions (an east and a west) by the Te Puke range of hills. This range, for about five miles eastwards from the Waitao Stream, rises with a particularly steep face edging the Tauranga–Te Puke Road, and steadily increasing in height narrows southwards to form a prominent bush-clad ridge culminating in Otawa (1,828 ft.), and thence maintaining a fairly uniform level until it imperceptibly coalesces with the main rhyolitic plateau of the district towards Rotorua.

The west flank of these hills is cut by the Waitao and other streams into long dropping ridges that merge gradually into the general lower level of the sandy and silty pumiceous beds further west. Tutaiwhata, or Mount Misery, however, a deforested, conical, andesitic hill, 1,350 ft. in height, stands out prominently from the surrounding slopes, and may owe its isolation to faulting, of which no direct evidence was observed.

On the east flank of the range the slope towards the extensive low seaward-dipping plateau on which are situated Te Puke and the neighbouring farms is abrupt, and is due to faulting that is evidenced by topography and by crush-country along the foothills. An explanation of the steep northern limits of the range is probably also to be found in faulting.

The uniform inland increase of elevation of the low plateau of Te Puke is disturbed by the rhyolites of Gibraltar Rocks and surrounding hills, but the general level is regained a few miles further inland, and the only further break to the general dead-level of the immense high-level plateau towards Rotorua is that caused by the cone-like mass of Otanewainuku, 2,088 ft. in height.

A noticeable feature of the streams on either flank of the Te Puke Range is that they follow fairly uniform general directions; those on the west flank follow a north-north-west trend, and those on the east a north-north-east. The reason for this is that they are to a large extent consequent.

It is probable that a fault-complex determines the Te Puke Range, but it is only on the east flank, where faulting has without doubt taken place, that any effect on the drainage-directions can be noticed.

The lower courses of all the streams have been aggraded during a recent movement of depression, but elevation preceding this depression caused the general entrenching of these streams in the softer rocks that is so noticeable within a few miles of Te Puke.

General Geology.

Previous geological reference to the Te Puke district is scarce. Hochstetter, during his trip to Tauranga, made note of the great rhyolitic plateau, and designated Otanewainuku a "trachytic cone," but the only comprehensive published descriptions of the geology, so far as the writer is aware, are those by Alex. McKay, who reported on the Te Puke reefs and on the so-called Te Puke "cements," and whose reports, or extracts therefrom, appear in Vol. i of the *New Zealand Mines Record*, New Zealand Mines Reports, 1898, and in parliamentary paper C.–9, 1899 (New Zealand Mines Reports, 1899). The work of the present writer will serve to elaborate that of Mr. McKay, but, as the survey was executed with the main object of determining the limits of the gold-bearing rocks, further work in the district may disclose formation relationships at present unrevealed.

There is no evidence of the age of the volcanic and fragmental rocks studied, and, although a remarkable field and petrographical similarity exists between the rocks of Te Puke and those of the main dividing range west of Katikati, correlation could only be made with hesitation. Hence little attempt will be made to link this report with that by Dr. Henderson on the Aroha Subdivision (Bulletin No. 16), now in the press.

The oldest rocks exposed are andesites, which preserve a general similarity and carry hypersthene as their dominant ferro-magnesian constituent; such form the core of the Te Puke Range and the country of the gold-bearing reefs. A little associated breccia is found up the north branch of the Raparapahoe Stream, but elsewhere only flow-rocks are seen. Apparently overlying these andesites on the west side of the Te Puke Range is a curious tufaceous andesitic rock showing a tendency to banding, caused by a flattening of glassy fragments up to 3 in. in length and 1 in. in depth; it is overlain by pumiceous breccia. The period of ejection of this rock is uncertain; it is readily weathered, and in the weathered state is difficult to distinguish from adjoining pumiceous breccias. Although probably of later age than the basal andesites, it has been provisionally included with them.

On the east side of the range, in the Kirikiri Creek, separated from the underlying andesite by a thin bed of breccia that consists mainly of rhyolitic and soft pumiceous material, is a series of hypersthene rhyolites which, on their eastern border, are silicified widely and mineralized locally. There is some doubt as to whether the unaltered rhyolites should not be separated out as a later flow than the rocks of the silicified zone.

Other rhyolites, a hornblende-hypersthene variety and spherulitic types, outcrop on the north face of the Te Puke Range, near the Tauranga – Te Puke Road. The spherulitic rhyolites are similar to and possibly the same as that of a small outcrop up the north branch of the Raparapahoe Stream, and of Mount Maunganui, near the entrance of Tauranga Harbour. The stratigraphic position of these various rhyolites is uncertain, but they seem to underlie the pumiceous breccias that cap the Te Puke Range and are continuous with those of the plateau. Otherwise these rocks must correspond to the microspherulitic rhyolite that forms Gibraltar Rocks and neighbouring hills and overlies the pumiceous breccias. These latter cover a vast extent of country both in the Te Puke - Tauranga district and on the plateau, mentioned above, that extends thence towards Rotorua; the overlying rhyolite occupies in comparison a very limited and unimportant area.

The rhyolite found on the plateau immediately north of Otanewainuku is classed provisionally with those of Te Puke Quarry and Kopukairoa, and most probably underlies the general pumiceous breccia.

A fine-grained andesite that outcrops in a large south-west branch of the Raparapahoe Stream divides the pumiceous breccia series into two portions, and is covered by pebble and lignite-bearing beds at the base of overlying silts.

In various localities pumice sands overlie the pumiceous breccia and their associated silts, and may be of later age than these. The uppermost, or Recent, beds are the aggraded valley-floors and coastal sand-dunes and swamps.

The scheme of formations may thus be tabulated :—

Recent	Sand-dunes and swamps.
Probably Pleistocene	Gibraltar Rocks (microspherulitic and spherulitic) rhyolite overlying a main series of rhyolitic breccias and silts, divided into two minor divisions by intercalated andesite and coaly bands, and covered, in places, by pumice sands.
Of uncertain position	Spherulitic rhyolites similar to those of Mount Maunganui, and a hornblende-hypersthene rhyolite; probably immediately below the pumiceous breccias.
Probably Middle Tertiary or later	Hypersthene-rhyolite. Tufaceous andesitic rock (of uncertain position). Older andesites—mainly lava rocks.

The later geological history of the Te Puke district is briefly this :—

The Te Puke Range was represented about middle or late Tertiary times by an andesitic and rhyolitic ridge of limited extent. Crustal disturbances caused fissuring, and formation of quartz lodes followed this. Subsequent faulting in a north-north-east and south-south-west direction modified the eastern flank of the range and caused disturbance of the reef-carrying country. Depression became general, and a tremendous sheet of rhyolitic material—all fragmental—was spread over the area, completely covering, so far as can be determined, the Te Puke ridge; a temporary cessation of depression allowed the formation of some lignitic bands in the basin of the Raparapahoe, and possibly also elsewhere. There was an unimportant extrusion of andesite immediately preceding the deposition of this lignite.

Elevation ensued, and after a short period, during which erosion had somewhat modified the surface of this breccia formation, rhyolitic lavas were extruded over a limited area near Gibraltar Rocks. A cessation in the movement of elevation occurred for sufficient time to allow terraces to be formed in the valley of the Raparapahoe and along the east flanks of the range, of which isolated remnants, such as Clark's Hill, remain. Since then, before the recent movement of depression commenced, elevation must have been again suspended temporarily in order to allow of the general levelling of the present low plateau near Te Puke Township. The final result of elevation was to entrench the streams in their present deep gutters before the final depression occurred. This latest movement caused wave-action to truncate the ends of the low spurs and widen the valley-mouths where now they meet the central swamps, and caused the formation of the present wide belt of sand-dunes and swamp.

It has already been suggested that the abrupt northern face of the Te Puke Range is due to faulting; if this is the case, then this movement probably post-dated the ejection of the breccias capping the range.

A fault zone, briefly mentioned above as having modified the eastern face of the range, is indicated by topographical and other more conclusive evidence in crush-country. It followed the middle part of the Raparapahoe Valley near its eastern border, and, trending thence north-north-east, passed about a quarter of a mile west of Fleming's Hill and of the isolated hill Otara, followed a portion of the Kirikiri Creek, and thence passed northwards into the low foothills. Topographical evidence suggests that a second fault with the same trend, about three-quarters of a mile west of the former, is responsible for the steep western borders of the middle Raparapahoe Valley, for the comparatively wide valley and straight course of the north branch of the Raparapahoe, and for the steep eastern face of Otawa. The period during which fault-movements were most in evidence is uncertain.

Economic Geology.

Deposits of possible economic value in the Te Puke district are—

(1.) Quartz lodes.
(2.) Alluvial gold deposits.
(3.) Lignite seams.
(4.) Rock suitable for roadmaking or for building-stone.

(1.) *Quartz Lodes.*

Owing to little local information being available the writer has had to depend for the history of mining at Te Puke on the *New Zealand Mines Record*, Vols. i–vi, and on the New Zealand Mines Reports for the years from 1896 to 1906.

The district was gazetted a mining area in 1895, but, although many claims were taken up, on few of these did operations extend beyond a little desultory prospecting. The old drives have been blocked by falls in most cases, consequently so little was seen of the reefs that the writer can merely quote information extracted from the *New Zealand Mines Records* and Reports. The only reefs located seem to have been on the following claims: Fleming's Freehold, afterwards called Te Puke Gold-reefs (Limited); Clark's Freehold; Ben Lomond; and The Sisters.

Fleming's Freehold (later called Te Puke Gold-reefs (Limited)).—The Mines Reports of 1896 state that five large reefs, averaging 15 ft. in width, existed and assayed £1 10s. From the *Mines Record* of 1897 and 1898 (Vols. i and ii) come the particulars that on the east slope of Fleming's Hill there were then three levels. In the uppermost (No. 1) the lode was 60 ft. wide, but included a 15 ft. "horse" of country; in the No. 2 level, 80 ft. lower, the reef was about 25 ft. wide and dipped east at 1 in 3. A low-level from the south side of the hill, 216 ft. below the top workings, extended 230 ft., and cut an oxidized 10 ft. lode, running 20° east of north.

The Mines Reports of 1900 and later years mention a low-level put in to cut the reef; a winze was sunk to this from the upper level, but work was stopped owing to lack of money.

In 1902 operations were very limited. One parcel of ore (5 tons) from the No. 1 level (60 ft. lode) is said to have been treated for a yield of bullion valued at £86 14s. 11d. Another 5 tons of selected stone from the same level, and apparently from a small leader, was treated at the Thames School of Mines and produced gold-silver bullion worth £171 10s. During prospecting-operations a 17 ft. lode is said to have been cut in this level west of the main 60 ft. one.

In 1903 three men were engaged in prospecting, and since that year mining operations have been suspended. At the present time the proprietory company leases the grazing-rights of the property.

In the No. 1 level, which is now accessible for little more than 1 chain, a 50 ft. lode of greyish fairly friable quartz is seen. Free gold is said to have occurred in this vein; none was there seen by the writer, although in rubble on the hillside above the drive there are occasional small flakes of gold. Sinterous banded quartz is plentiful in ore-heaps near the mouth of this level, but no such stone was seen within the limited length of level exposed. In the lowest level on this same northern slope of Fleming's Hill it is evident from the ore-heaps showing near the level-mouth that this type of quartz was there very plentiful. In a long level—that must be the No. 2 level mentioned above—the lode is 14 ft. wide in the portion exposed; manganese oxides abound, and give a blackish appearance to much of the quartz. Crumbling, flaky ore showing replacement of calcite is abundant, especially in cross-fractures. In many respects the vein-material resembles that of the upper levels of the Waihi Mine. The writer was told that, in the low-level below No. 2, the reef pinched considerably and was very vughy. The only mineralized stone seen was at the outcrop on the south side of the hill; the mineralization is promising, although the quartz itself is flinty.

From the facts mentioned above it will be evident that at least two lines of reef are present in Fleming's Hill. The country wherever seen in the walls of the veins was leached and characterless, but in the bed of the Raparapahoe Stream, on the line of reef, fresh propylitized andesite can be seen. The ferromagnesian minerals are replaced by widely spread chloritic material; other secondary materials present in the rock are silica, finely disseminated pyrite, and carbonates.

Feldspars exhibit all stages of silicification, the process advancing from the centre outwards in each crystal. Carbonates are usually associated with the granular silica. The original groundmass of the rock was hyalopilitic, with relatively sparse feldspar laths and irregular crystals and minute granules of magnetite surrounded by glass.

A series of samples for assay were taken from the 50 ft. reef, the 14 ft. reef, and from the outcrop on the south of Fleming's Hill. The results of the assays* are as follows:—

Number.	Gold per Ton.	Silver per Ton.	Value per Ton.
	Oz. dwt. gr.	Oz. dwt. gr.	£ s. d.
(1)	0 1 2	0 0 15	0 4 5
(2)	0 0 15	0 0 18	0 2 7
(3)	0 0 8	0 0 14·6	0 1 5
(4)	0 8 11	1 2 1	1 16 0

(1.) From an upper drive crosscutting reef, 33 ft. of quartz sampled.
(2.) From an upper drive crosscutting, 50 ft. of quartz (old No. 1 level).
(3.) Average of five samples taken at 30 ft. intervals along 120 ft. of 14 ft. reef exposed in what is probably the old No. 2 level.
(4.) Sample taken from outcrop on south slope of Fleming's Hill.

Clark's Freehold.—This claim on its south boundary adjoined the Te Puke Gold-reefs property, and on its west the Ben Lomond claim was situated. The old drives have collapsed, and therefore the information available is meagre.

One of the drives cut a 7 ft. reef, with a north-and-south strike and an easterly dip, and at 10 ft. distance from it a well-mineralized 18 in. leader, running 10° east of north. A pug band was associated with the reef. A 3 ft. reef was also discovered on the property, but no reliable data concerning it are available. Good stone showing free gold was obtained. It is probable that the reefs are a continuation of those in Fleming's Hill.

Ben Lomond Claim.—The exact location of this claim, which adjoined the Te Puke Gold-reefs on its southern and Clark's Freehold on its eastern boundary, is not known to the writer. A 4 ft. reef was discovered and driven on, but whether or not the reef was in solid country is doubtful.

The Sisters' Claim.—This claim adjoined the Ben Lomond on its eastern boundary. It is reported that several lodes were found, one of which was 4½ ft. in width, and assayed as high as £5 2s. 6d. per ton.

Prospects of Quartz-mining at Te Puke.—On the limited information available as to the Te Puke reefs it would be hazardous to base any conclusions. With regard to the Te Puke Gold-reefs property, nowhere apparently did the levels reach any notable depth below the land-surface, and consequently failed to explore the vein in any but oxidized portions. The main lode is known to pinch in depth, so far as yet explored, but there is a possibility that it may widen again, and the only means of deciding this point is by further work. If the reefs already opened out carried workable values this exploration would be warranted, but the results of assays of samples taken from the drives now accessible cast doubt upon this, and, furthermore, it is improbable that, if so large a lode as the main one of Fleming's Hill were as profitable as generally reported to be, the owners would have neglected to set about the recovery of the values.

In the opinion of the writer the quartz of the lower levels is most unfavourable so far as examined, but the property cannot be said to have been sufficiently prospected until conditions at a greater depth from the land-surface are ascertained. This could be done either by sinking from the existing low level, or by driving from the southern slope of Fleming's Hill—an undertaking that would involve considerable expense, but would, without doubt, explore the deeper portions of the reefs.

Part of a report by E. J. Dunn (until recently Victorian Government Geologist) in 1902 may be quoted: "The enormous reef at Te Puke has a marked resemblance, both in character of the stone and in the way it projects above the general surface, to the Martha reef at Waihi. . . . In the whole of my experience I have not met with a gold property offering greater inducements than this does for a vigorous and extensive development."†

(2.) *Alluvial Gold Deposits.*

Alluvial gold has been found in the Te Puke district, and the so-called Te Puke "cements" consist of a limited area of coarse stream-gravels, mainly rhyolite, divided into two bands by pumice sands. The maximum thickness determined appears to have been 8 ft., but lateral

* All analyses and assays quoted in this report were made in the Dominion Laboratory under the supervision of J. S. Maclaurin, D.Sc., F.C.S., Dominion Analyst.

† See "The New Zealand Mining Handbook," 1906, pp. 59–60.

thinning was rapid. The "cements" occur in an eastern head tributary of the Kirikiri Creek, near Te Puke, and were thoroughly prospected and driven on, about the year 1898, by the proprietors of the Te Puke Claim (amalgamation of the Belt and Butterfly holdings).

Mr. Alexander McKay visited and fully reported on these deposits (Mines Report, 1899, C.–9), and the present writer is unable materially to supplement his remarks upon them. McKay reports that none of the ground was payable, and little gold-bearing. He considers that the source of the gold is probably the same as that of gold said to exist in similar gravels between the south end of Lake Taupo and the Bay of Plenty.

Careful dish-prospects were made in the streams during the progress of the recent survey, but only in those creeks contiguous to the proved gold-occurrences on the east flank of the Te Puke Range could any "colours" of gold be obtained.

(3.) *Lignite.*

Some thin, patchy bands of impure lignite are found in creeks on the east side of the Te Puke Range. They vary in thickness from 4 in. to 18 in., and have no economic importance.

(4.) *Rock suitable for Roadmaking or Building-stone.*

In almost all parts of the district easily accessible rock can be obtained for roadmaking purposes. The pumiceous breccias, though not particularly hard, are easily quarried, and form a surface that is moderately durable for general traffic. The rhyolites, also easily accessible, make very durable smooth-surfaced roads, but are less easily quarried. The andesites are, as a general rule, out of easy reach of the main roads.

First-class stone for building purposes is not found in the district; it is, however, possible that portions of the pumiceous breccias and of an andesitic rock outcropping in the eastern branch of the Waitao Stream may furnish building-stone of a useful nature.

Petrography.

The rocks of the Te Puke district are classed by the writer under the headings:—

(A.) Rhyolites.
(B.) Andesites.
(C.) Pumiceous breccias, crystal-tuffs, &c.

(A.) *Rhyolites.*

These rocks outcrop widely in the district, and are of three main types:—

(i.) General mica-rhyolite—Gibraltar Rocks type.
(ii.) Hypersthene-rhyolite.
(iii.) Hornblende-hypersthene-rhyolite.

It is probable that there were at least two periods of eruption of rhyolites, for at Gibraltar Rocks, near Te Puke, a rhyolite overlies a pumiceous breccia which in turn is believed to overlie the rhyolite of Kopukairoa, near Papamoa.

(i.) General mica-rhyolite—Gibraltar Rocks type.

This rock covers a square mile and more of country on the east of the Raparapahoe Stream from Gibraltar Rocks southwards, where it invariably overlies the widespread pumiceous breccias. Isolated outcrops occur in the valley of the main north branch of the Raparapahoe Stream, at the Te Puke quarry, and again at the Kopukairoa trig. station near Papamoa.

Hand-specimens show a general similarity; mica, feldspar, and occasional quartz are recognizable, and spherulitic structure is commonly prominent. Microspherulitic and banded types do not, however, show these general characters. The rock forming Mount Maunganui at the entrance of Tauranga Harbour is precisely similar.

Under the microscope the phenocrysts seen are mainly feldspar, though in some sections, particularly those of the rock from Kopukairoa, where also a little hypersthene is present, biotite and quartz are very plentiful. The feldspar is idiomorphic; orthoclase is present, and a variety giving, with albite twins, extinction angles corresponding to a plagioclase varying between a basic oligoclase and an acid labradorite. Unfortunately it was found impossible to apply Becke's test of relative refractive indices to determine whether, as is indicated by a comparatively high soda-content, albite may not be present. Iron-ore and a little accessory zircon are also present in these rhyolites.

The structure of the groundmass varies widely; in the usual coarsely spherulitic type it is constituted by well-defined spherulites of moderate size, between which aggregates of minute secondary quartz grains exist. In the rhyolite from Gibraltar Rocks—a microspherulitic variety—there are few phenocrysts, but there are seen prominent, coarse, irregular brushes and spherulites of pseudopodal nature, with their irregular arms embracing a dense aggregate of exceedingly small microspherulites. Patches of brown glass are plentifully and regularly distributed throughout, being more or less associated with the brushes, and are surrounded by clearer patches containing microspherulites, in which, particularly near to the indistinct borders of the glass, margarites and trichites are common.

It is evident that the larger brush-like spherulites are original structures, and, whilst it is possible that the microspherulites are also original, there are reasons for thinking that they may be a result of "devitrification."

The following analyses represent a microspherulitic rhyolite from Gibraltar Rocks and a rock from Kopukairoa which approaches the hypersthene and hornblende-hypersthene types :—

	(A.)	(B.)
Silica (SiO_2)	71·88	69·93
Alumina (Al_2O_3)	13·75	15·28
Ferric oxide (Fe_2O_3)	2·32	2·96
Ferrous oxide (FeO)	0·61	0·65
Manganous oxide (MnO)	0·02	0·03
Lime (CaO)	1·25	2·30
Magnesia (MgO)	0·21	0·40
Potash (K_2O)	3·91	3·20
Soda (Na_2O)	3·02	3·26
Titanium dioxide (TiO_2)	0·18	0·33
Phosphoric anhydride (P_2O_5)	0·25	0·21
Carbonic anhydride (CO_2)	Nil	Nil
Combined water and organic matter	1·43	0·97
Water lost at 100° C.	0·73	0·70
	99·56	100·22

(A.) Gibraltar Rocks, Te Puke;
(B.) Kopukairoa, Papamoa.

A curious hornblende-bearing type is scattered in coarse rubble on the plateau immediately north of Otanewainuku, and in one place appeared to be *in situ;* it probably underlies the pumiceous breccias, but its relationships are doubtful.

Otanewainuku itself was not examined, but it is probable that it represents the centre of distribution of this type. In hand-specimen the rock is bluish-grey, showing spherulites and occasional feldspar-crystals. It breaks with a rough fracture, and weathers very readily. Under the microscope it exhibits some most peculiar features and structures. Phenocrysts are relatively scarce and comprise one or two corroded crystals of bright-green hornblende, crystals of hypersthene, comparatively plentiful orthoclase and oligoclase, a little iron-ore, a little accessory zircon, and what are evidently occasional xenocrysts of olivine. These show central unaltered granules that have a wide border and characteristic cracks occupied by hæmatite. The form, high refractive index, and birefringence are all typical of olivine. The groundmass is clouded by partial decomposition, and is remarkable by reason of the abundance of groups of closely crowded small globular forms, which probably arise from arrested spherulitic growth. Coarse well-defined spherulites abound, and are in places enwrapped by brown glass showing trichites and often good flow-lines indicated by crystallites that pass uninterruptedly through the spherulites.

(ii.) HYPERSTHENE-RHYOLITE.

The hypersthene and hornblende-hypersthene rhyolites are characterized by a comparative abundance of lime feldspars and correspond to the toscanites. Chemically the rock from Kopukairoa shows a close relationship to these neighbouring types, but mineralogically it is very similar to the Gibraltar Rocks rhyolite.

The separation of the hypersthene-rhyolite from the hornblende-hypersthene type depends on the preponderance in the latter of potash over soda, as shown by chemical analysis, and of amphibole over hypersthene. In addition, quartz phenocrysts are present in the hornblende-rich type and absent from the other.

The hypersthene-rhyolites are exposed in the Kirikiri Creek on the eastern flanks of Otawa, a high portion of the Te Puke Range, and form the lower slopes on the north and north-west of the prominent conical hill Otara ("The Boar's Head"). These foothills near Otara comprise a silicified zone in which pyritization is occasionally marked, and there is good evidence in crush-country and topography that this zone follows the line of an important north-north-east and south-south-west fault, coinciding with the strike of the quartz reefs of the district.

The silicification presents occasional interesting features, which will be noted later; the rhyolite so silicified generally exhibits in the hand-specimen a regular fine banding and a few feldspar crystals. Farther west, higher up the Kirikiri Creek, is a curious perlitic type which, near its contact with older basal andesite, shows a narrow band of obsidianitic character, with accompanying silicification of the andesite. A few feet of pumiceous breccia intervenes, and then, interbedded with occasional irregular breccia, the main rhyolite outcrops in a formation at least 200 ft. in thickness, which is capped by pumiceous silty beds.

The appearance of a weathered outcrop of this rock exactly simulates that of a well-bedded sandstone, but the fresh specimen has a banded crumbling nature and a translucent appearance, and shows occasional spherulites and crystals of hypersthene and feldspar. Under the microscope the differences exhibited in hand-specimen by these rhyolites are seen to be those of structure, for a uniform mineralogical character is well maintained. The phenocrysts are orthoclase, andesine, or acid labradorite, hypersthene, a little brownish-green hornblende, apatite in stout prisms, and a little iron-ore. The feldspar and hypersthene are sharply idiomorphic; in some cases the former has preceded the latter in order of crystallization.

The groundmass is a glass in which perlitic cracks, globulites, and crystallites abound: in the banded types there is remarkable flow-structure evidenced by the crystallites. Spherulitic structures are uncommon in most of the sections examined, but in the uppermost portion of the rhyolite flow exposed in Kirikiri Creek axiolites and spherulites with microspherulites are abundant, and with some small laths of feldspar are enclosed in a matrix that resembles the "micropœcillitic" type of groundmass, as the term is employed by Sollas.* It seems certain, however, that in this rock the structure is secondary.

* "The Rocks of Cape Colville Peninsula," Vol. i, 1905, pp. 117–18.

In the silicified rhyolites secondary quartz replaces spherulites in spherulites types, particularly in an interesting rock from the foothills on the north bank of Kirikiri Creek, in which are numerous quartz-lined cavities ¼ in. and more in diameter. Peripheral remnants of large spherulites remain around many of these, and indicate probably the solution from the centre outwards of original spherulites and subsequent lining by secondary quartz. It is possible, however, that these spherulites may have been hollow originally.*

An analysis of a fresh perlitic sample of rhyolite from Kirikiri Creek is appended :—

Silica (SiO_2)	67·15
Alumina (Al_2O_3)	15·03
Ferric oxide (Fe_2O_3)	1·86
Ferrous oxide (FeO)	1·73
Manganous oxide (MnO)	0·05
Lime (CaO)	2·85
Magnesia (MgO)	0·33
Potash (K_2O)	3·34
Soda (Na_2O)	3·00
Titanium dioxide (TiO_2)	0·30
Phosphoric anhydride (P_2O_5)	0·16
Carbonic anhydride (CO_2)	Nil
Combined water and organic matter	3·85
Water lost at 100° C.	0·47
	100·12

(iii.) HORNBLENDE-HYPERSTHENE-RHYOLITE.

One outcrop only of this type was noted—a prominent crag on the hillside south of Papamoa School. Macroscopically the appearance is that of a coarse-grained, light-coloured dacite, for prominent crystals of idiomorphic feldspar and ferromagnesian mineral, with occasional quartz, are visible in a stony greyish-blue matrix. Zeolites that, from their curious sheaf arrangement, appear to be stilbite are occasionally seen.

In section the phenocrysts are very frequent, and consist of plentiful acid labradorite and orthoclase, both idiomorphic, a little quartz, idiomorphic hypersthene, and deep brownish-green to golden-yellow hornblende in about equal abundance, a small amount of iron-ore, and a few prisms of subsidiary apatite. The quartz contains inclusions of plagioclase, hornblende, and magnetite. The hornblende in one or two cases is clearly moulded on the hypersthene, and therefore crystallized later than the latter mineral, but no definite conclusion with respect to the relative order of crystallization of the feldspar and of the ferromagnesian minerals could be reached.

Notwithstanding the large size and frequency of the phenocrysts, a hyalopilitic groundmass is conspicuous, and in the general glassy matrix numerous minute granules which appear to be feldspar show up as faint dots under moderate magnification and crossed nicols. Large well-defined brushes of parallel fibres are frequent, indicating a similar phase of crystallization to that obtaining in the allied rocks of the district. It is evident that the predominance of potash over soda shown by chemical analysis is due to an abundance of potash-feldspar in the hyalopilitic groundmass and spherulitic growths.

An analysis of this rock is as follows :—

Silica (SiO_2)	68·95
Alumina (Al_2O_3)	15·58
Ferric oxide (Fe_2O_3)	2·52
Ferrous oxide (FeO)	1·30
Manganous oxide (MnO)	0·04
Lime (CaO)	3·07
Magnesia (MgO)	0·80
Potash (K_2O)	4·79
Soda (Na_2O)	1·59
Titanium dioxide (TiO_2)	0·40
Phosphoric anhydride (P_2O_5)	0·20
Carbonic anhydride (CO_2)	Nil
Combined water and organic matter	0·81
Water lost at 100° C.	0·34
	100·39

(B.) *Andesites.*

The andesites of Te Puke district in most exposures are lava rocks, though fragmentals of coarse nature outcrop in the main north branch of the Raparapahoe Stream, and a peculiar rock, apparently of fragmental nature, has a moderately extensive development on the west slopes of the main Te Puke Range. There are present three types :—

(i.) Hypersthene-augite-andesite.
(ii.) Hypersthene-augite-olivine-andesite.
(iii.) Fine-grained feldspathic andesite.

* See Iddings : "Geology of Yellowstone National Park," U.S.G.S. Monographs, Vol. xxxii, Pt. II, 1899, p. 363.

(i.) HYPERSTHENE-AUGITE-ANDESITE.

This andesite, outcropping on the east flanks of the Te Puke Range, seems to be the oldest rock of the district, and forms the country of the Te Puke quartz reefs.

In hand-specimen it is usually moderately fine-grained, bluish-black and fresh, with few conspicuous crystals. Under the microscope it appears as a porphyritic type, with comparative abundance of phenocrysts and an unusually dense but apparently holocrystalline groundmass.

The phenocrysts observed are hypersthene and augite (both sharply idiomorphic), feldspar, iron-ore, and accessory apatite.

The pyroxene constituents vary within moderately wide limits in their mutual proportions and in respect to their importance. In cases the augite is unimportant; always it is subsidiary to hypersthene; it is a very pale green variety.

In general the augite was preceded by the hypersthene, and forms outgrowths to the earlier mineral. This hypersthene shows distinct pale-green to faint-pink pleochroism, and often contains laths of feldspar in true pœcilitic fashion; in a few cases the feldspar has preceded the pyroxene in the order of crystallization, but this order seems unusual. The feldspar varies between acid andesine and acid labradorite. It is the most abundant phenocryst, and is commonly in idiomorphic tabular crystals.

The decomposition products exhibited are chloritic matter, carbonates and occasional epidote.

The groundmass in all cases is excessively fine, but is generally pilotaxitic, consisting of a dense web of minute feldspar laths enclosing moderately plentiful minute needles and grains of hypersthene and granules of iron-ore. Good flow arrangement of the feldspar laths is often evident. Occasionally a residuum of glass is present in the groundmass, which then exhibits hyalopilitic structure.

The country of the Te Puke reefs, though now devoid of ferromagnesian minerals, was undoubtedly originally this same hypersthene-andesite which, in addition, is practically identical with the hypersthene-andesites of the main dividing range west of Katikati.

An analysis of the andesite from Kirikiri Creek is appended:—

Silica (SiO_2)	58·83
Alumina (Al_2O_3)	19·51
Ferric oxide (Fe_2O_3)	3·28
Ferrous oxide (FeO)	3·67
Manganous oxide (MnO)	0·08
Lime (CaO)	5·38
Magnesia (MgO)	1·64
Potash (K_2O)	2·22
Soda (Na_2O)	2·49
Titanium dioxide (TiO_2)	0·82
Phosphoric anhydride (P_2O_5)	0·32
Carbonic anhydride (CO_2)	Nil
Loss on ignition between 100° C. and red heat	0·56
Moisture lost at 100° C.	1·24
	100·04

(ii.) HYPERSTHENE-AUGITE-OLIVINE-ANDESITES.

These andesites probably show more variation than was evidenced in the sections examined, but a proneness to rapid weathering has made it a difficult matter to obtain fresh specimens. They outcrop over a comparatively extensive area on the western flanks of the Te Puke Range, notably in the main west and other branches of the Waitao Stream and in some of the other westward-flowing streams.

In hand-specimen the usual type is a bluish-black readily weathered rock, with hackly fracture and moderately abundant and conspicuous feldspar crystals.

In section the only noteworthy difference from the hypersthene-augite-andesites already described is the occurrence of olivine, which mineral is represented by numerous pseudomorphs of secondary material—mainly chlorites and serpentine. Hypersthene is very plentiful and always precedes the feldspar in order of crystallization.

Augite is present both as phenocrysts and as minute granules, in addition to hypersthene and feldspar, in the groundmass, which possesses sufficient glassy residuum to be undoubtedly hyalopilitic in structure.

A local glassy phase of this rock was met with in one locality; the groundmass proved to be of an almost irresolvable nature, consisting of a dense aggregate of minute granules of feldspar, hypersthene, and a little iron-ore.

(iii.) FINE-GRAINED FELDSPATHIC ANDESITE.

This rock outcrops in one of the main south-west branches of the Raparapahoe Stream, and was nowhere found elsewhere *in situ*, though plentiful boulders, found towards the head of the main north branch of the Raparapahoe, indicate its probable occurrence on the southern slopes of Otawa, where closer search may reveal its outcrop.

Macroscopically it is a black, very fine-grained basaltic rock. Under the microscope are seen comparatively plentiful crystals of a basic andesine, in large lath-shaped forms, and a very few grains of irregularly shaped augite. There are also plentiful small resorption pseudomorphs of iron-ore that appear from their shapes to be after hornblende.

The groundmass is finely holocrystalline, and carries minute granules of iron-ore, and acicular crystals of a pyroxene that is apparently hypersthene, in a mesh of laths and irregular plates of plagioclase.

Clastic Andesitic Rock.

A curious mottled rock, of brownish-black colour, showing macroscopically a parallel flattening and arrangement of large glassy fragments and andesite particles, outcrops at and below the ford of the east branch of the Waitao Stream, where it is crossed by the hill road to Te Puke, and also in the headwaters of both branches of the Waitao towards Otawa. Advanced weathering prohibits an exact determination of its relationships, but it is probable that it overlies the basement andesite of the district, and is itself overlain by the younger rhyolite fragmentals. The microscope shows phenocrysts of hypersthene, basic andesine, a little deep-green hornblende, iron-ore, probable orthoclase, and some doubtful quartz. Apatite is an occasional accessory mineral. The hypersthene and feldspar are both idiomorphic. The matrix of the rock is a dense brown glass, with more or less patchy flow-banding present, and enclosing frequent fragments of augite-andesite and glass. This rock is very similar to a widespread rock forming the higher-level plateau at the heads of the Wairere and Waiteariki Streams, near Matamata, although this latter rock shows more distinct tufaceous character and more plentiful orthoclase, quartz, and deep-green hornblende.

(C.) *Pumiceous Breccias, Crystal-tuffs, &c.*

Pumiceous breccias cover the greater portion of the Te Puke district. They exhibit considerable variety in character, and grade upwards so indefinitely into evident subaqueous silts that it is practically impossible to differentiate these latter from the subaerial breccias.

Breccias that appear largely subaerial lie, with a gentle dip to the coast, over a considerable area on the main Te Puke Range north of Otawa. Lithologically these breccias are precisely similar to those covering so wide an area in the district between Tauranga and Katikati, and seem to belong to the same period of ejection, and, like them, to pass upwards into typical subaqueous silts. A temporary lull in the deposition of such beds at Te Puke is evidenced by an unimportant extrusion of fine-grained feldspathic andesite, which was covered by coaly beds, containing one or two seams, from a few inches to one and a half feet in thickness, of impure lignite, and passing upwards into silts and sandstones.

It is probable that certain well-consolidated mudstone beds, associated with gritty material, and enclosing some fireclay bands and a few thin seams of impure lignite, which outcrop in a small eastward-flowing creek immediately south of Otara Trig., represent the base of the series of rhyolitic fragmentals, for, though no actual contacts are seen, close above the coal-bearing beds are the general pumiceous breccias. These latter show up along the Tauranga–Te Puke Road as blackish-grey, soft, pumiceous rocks, but the general type closely resembles the so-called "Wilsonite" of the Waihi district—a light-grey or whitish rock, in hand-specimen showing usually black roughly banded glassy fragments or portions, plentiful pumice, and occasional small andesite fragments.

Microscopically, in the Te Puke rocks, the clastic character is conclusively evident. Numerous feldspar phenocrysts are present, commonly with idiomorphic outline, in a glassy matrix in which apparent flow-structures are prominent. By some observers, however, this supposed flow-banding is ascribed to compression during the final cooling of viscous vesicular fragments. Besides feldspar, which consists of oligoclase, orthoclase, and one or two crystals of microperthite, deep-green pleochroic hornblende and hypersthene are present in large phenocrysts, the hypersthene, in cases, being clearly an outgrowth of the hornblende; iron-ore and a little quartz also occur. The glassy matrix generally shows the well-known characteristics of pumice and clearly enwraps the included fragments.

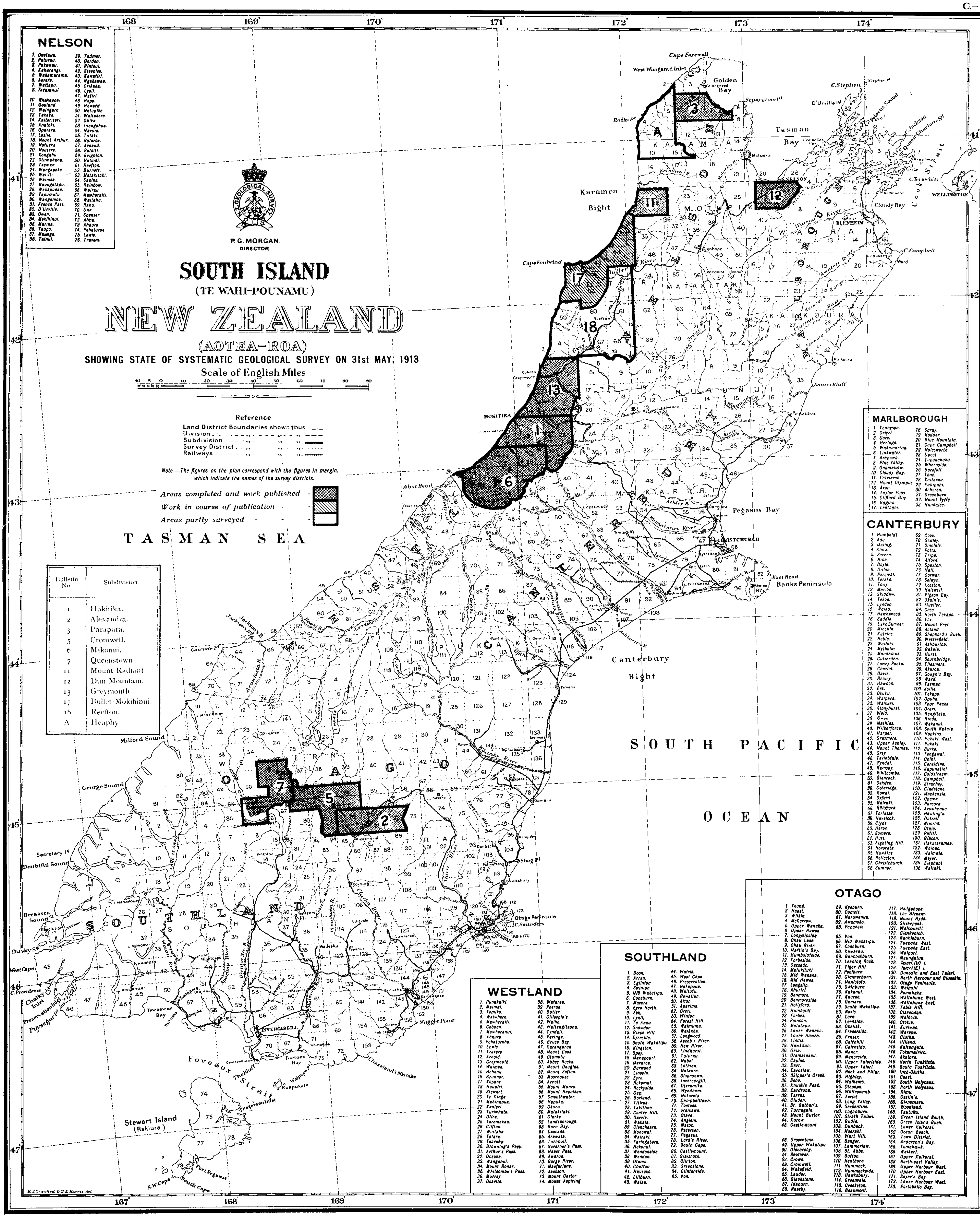
A rock that outcrops along Otawa Road, about half a mile west of Gibraltar Rocks, is a clastic rock of doubtful character; its ejection probably preceded the extrusion of the Gibraltar Rocks rhyolite. It contains fragments of various types—in particular those of a spherulitic rock with the groundmass for which Sollas has applied Williams's term "micropœcillitic"—enclosed in a matrix that appears to be an altered glass, and throughout which are found orbicular structures of a low-polarizing material that is doubtfully referred to chlorite. Orthoclase, andesine, and hypersthene, with a little subsidiary apatite, are the phenocrysts. In hand-specimen the appearance of this rock is the same as that of a weathered fine-grained andesite.

Conclusion.

A map is subjoined to this report, and on it, within the area enclosed by the rectangle *a*, *b*, *c*, *d* shown thereon, is included all the land of the Te Puke district that, in the opinion of the writer, is likely to contain minerals of economic value, and should therefore be retained as a mining-area.

The formation boundaries shown upon the plan of the district are necessarily approximate, for only sufficient work was carried out by the writer to delineate the probable limits of the gold-bearing rocks. The hypersthene-augite-andesite carrying the reefs and the hypersthene-rhyolites, showing mineralization and silicification that probably accompanied reef-formation, do not exhibit alteration far from the line of the fault shown on the plan, and the quartz-bearing zone is therefore probably narrow. To the south the reef country disappears at the Raparapahoe Stream, near Gibraltar Rocks—probably downfaulted by an east-and-west fault—and, if it persists, will be deeply covered by the pumiceous breccias. North of the Kirikiri Creek the silicified country similarly shortly disappears, and there seems little hope of workable reefs existing beyond the portion of the goldfield already more or less explored. Concerning this the opinion has already been expressed that, although little or no workable ore has been discovered, there is still a possibility of finding payable stone in the deeper untried portions of the lodes.

[Here follow map of Te Puke district, geologically coloured, and two maps of the North and South Islands of New Zealand.]


NELSON
1. Onetaua.
2. Paturau.
3. Pakawau.
4. Kahurangi.
5. Wakamarama.
6. Aorere.
7. Waitapu.
8. Totaranui.
10. Whakapoai.
11. Gouland.
12. Waingaro.
13. Takaka.
14. Kaiteriteri.
15. Anatoki.
16. Oparara.
17. Leslie.
18. Mount Arthur.
19. Motueka.
20. Moutere.
21. Kongahu.
22. Otumahana.
23. Tasman.
24. Wangapeka.
25. Wai-iti.
26. Waimea.
27. Maungatapu.
28. Wakapuaka.
29. Tapumutu.
30. Wangamoa.
31. French Pass.
32. D'Urville.
33. Owen.
34. Mokihinui.
35. Marina.
36. Taupo.
37. Maunga.
38. Tainui.
39. Tadmor.
40. Gordon.
41. Rintoul.
42. Steeples.
43. Kawatiri.
44. Ngakawau.
45. Orikaka.
46. Lyell.
47. Matiri.
48. Hope.
49. Howard.
50. Motupiko.
51. Waitakere.
52. Ohika.
53. Inangahua.
54. Maruia.
55. Tutaki.
56. Rotoroa.
57. Arnaud.
58. Rotoiti.
59. Brighton.
60. Maimai.
61. Reefton.
62. Burnett.
63. Matakitaki.
64. Sabine.
65. Rainbow.
66. Wairau.
67. Mawheraiti.
68. Waitahu.
69. Rahu.
70. Unn
71. Spenser.
72. Alma.
73. Ahaura.
74. Pohaturoa
75. Lewis.
76. Travers.
N.Z. GEOLOGICAL SURVEY
P. G. MORGAN. DIRECTOR.
SOUTH ISLAND
(TE WAHI-POUNAMU)
NEW ZEALAND
(AOTEA-ROA)
SHOWING STATE OF SYSTEMATIC GEOLOGICAL SURVEY ON 31st MAY, 1913.
Scale of English Miles
10 5 0 10 20 30 40 50 60 70 80 90
Reference
Land District Boundaries shown thus
Division
Subdivision
Survey District
Railways
Note.—The figures on the plan correspond with the figures in margin, which indicate the names of the survey districts.
Areas completed and work published
Work in course of publication
Areas partly surveyed
TASMAN SEA
Bulletin No. | Subdivision
1 Hokitika.
2 Alexandra.
3 Parapara.
5 Cromwell.
6 Mikonui.
7 Queenstown.
11 Mount Radiant.
12 Dun Mountain.
13 Greymouth.
17 Buller-Mokihinui.
18 Reefton.
A Heaphy.
Cape Farewell
West Wanganui Inlet
Golden Bay
Collingwood
Separation Pt
Rocks Pt
Tasman Bay
Motueka
NELSON
Karamea Bight
Karamea R.
Cape Foulwind
Buller River
Reefton
Grey River
Cobden
Greymouth
HOKITIKA
Abut Head
C. Stephen
Stephen Id
D'Urville Id
Pelorus Sound
C. Jackson
Queen Charlotte Sd
Picton
Havelock
Cloudy Bay
C. Terawhiti
WELLINGTON
Cook Strait
BLENHEIM
Wairau River
Awatere River
C. Campbell
Ward
Kaikoura Ranges
Kaikoura
Amuri Bluff
Clarence River
Seaward Kaikoura
Waiau-uha R.
Culverden
Parnassus
Hurunui River
Ashley R.
Waimakariri River
Rangiora
Kaiapoi
Oxford
Pegasus Bay
CHRISTCHURCH
Lyttelton
Springston
L. Ellesmere
Little River
Akaroa
East Head
Banks Peninsula
Rakaia River
Ashburton
Ashburton R.
Rangitata River
Canterbury Bight
Temuka
Timaru
Fairlie
Opihi R.
L. Tekapo
L. Pukaki
L. Ohau
Waitaki River
Oamaru
Hampden
Shag Pt
Palmerston
Dunback
Hawksbury
Otago Peninsula
C. Saunders
DUNEDIN
SOUTH PACIFIC
OCEAN
Jackson's B.
Jackson's Hd.
Cascade Pt
Haast R.
Landsborough R.
Southern Alps
Arawhata R.
L. Wanaka
L. Hawea
L. McKerrow
Milford Sound
George Sound
Secretary Id
Doubtful Sound
Breaksea Sound
Resolution Id
Dusky Sd
West Cape
C. Providence
Chalky Inlet
Preservation Inlet
Puysegur Pt
L. Manapouri
L. Monowai
L. Hauroko
L. Poteriteri
Lake Te Anau
Waiau River
Eyre Mts
Kingston
Lumsden
Riversdale
Waikaka
Gore
Mataura River
Clutha River
Roxburgh
Alexandria
Lawrence
Balclutha
Kaitangata
Nugget Point
Tewaewae Bay
Riverton
Winton
INVERCARGILL
Campbelltown
The Bluff
Toetoes Bay
Waipapa Pt
Chaseland's Mistake
Foveaux Strait
Ruapuke Id
Paterson Inlet
Stewart Island (Rakiura)
Port Pegasus
S.W. Cape
South Cape
MARLBOROUGH
1. Tennyson.
2. Orieri.
3. Gore.
4. Heringa.
5. Wakamarina.
6. Linkwater.
7. Arapawa.
8. Pine Valley.
9. Onamalutu.
10. Cloudy Bay.
11. Patriarch.
12. Mount Olympus.
13. Avon.
14. Taylor Pass.
15. Clifford Bay.
16. Raglan.
17. Leatham.
18. Spray.
19. Hodder.
20. Blue Mountain.
21. Cape Campbell.
22. Molesworth.
28. Upcot.
24. Tapuaenuku.
25. Whernside.
26. Barefell.
27. Tone.
28. Kaitarau.
29. Puhipuhi.
30. Acheron.
31. Greenburn.
32. Mount Fyffe.
33. Hundalee.
CANTERBURY
1. Humboldt.
2. Ada.
3. Maling.
4. Aima.
5. Severn.
6. Nina.
7. Boyle.
8. Dillon.
9. Percival.
10. Terako.
11. Towy.
12. Marion.
13. Skiddaw.
14. Tekoa.
15. Lyndon.
16. Waiau.
17. Hawkswood.
18. Saddle.
19. Lake Sumner.
20. Minchin.
21. Katrine.
22. Noble.
23. Waitohi.
24. Mytholm.
25. Mandamus.
26. Culverden.
27. Lowry Peaks.
28. Cheviot.
29. Davie.
30. Bealey.
31. Hawdon.
32. Esk.
33. Okuku.
34. Waipara.
35. Waikari.
36. Stonyhurst.
37. Weld.
38. Owen.
39. Mathias.
40. Wilberforce.
41. Harper.
42. Grasmere.
43. Upper Ashley.
44. Mount Thomas.
45. Grey.
46. Teviotdale.
47. Tyndal.
48. Ramsay.
49. Whitcombe.
50. Glenrock.
51. Oakden.
52. Coleridge.
53. Kowai.
54. Oxford.
55. Mairaki.
56. Rangiora.
57. Torlesse.
58. Havelock.
59. Clyde.
60. Heron.
61. Somers.
62. Hutt.
63. Fighting Hill.
64. Hororata.
65. Hawkins.
66. Rolleston.
67. Christchurch.
68. Sumner.
69. Cook.
70. Godley.
71. Sinclair.
72. Potts.
73. Tripp.
74. Alford.
75. Spaxton.
76. Hall.
77. Corwar.
78. Selwyn.
79. Leeston.
80. Halswell.
81. Pigeon Bay.
82. Okain's.
83. Mueller.
84. Cass.
85. North Tekapo.
86. Fox.
87. Mount Peel.
88. Acland.
89. Shepherd's Bush.
90. Westerfield.
91. Ashburton.
92. Rakaia.
93. Hurst.
94. Southbridge.
95. Ellesmere.
96. Akaroa.
97. Gough's Bay.
98. Ward.
99. Tasman.
100. Jollie.
101. Tekapo.
102. Opuha.
103. Four Peaks.
104. Orari.
105. Rangitata.
106. Hinds.
107. Wakanui.
108. South Rakaia.
109. Hopkins.
110. Pukaki West.
111. Pukaki.
112. Burke.
113. Tengawai.
114. Opihi.
115. Geraldine.
116. Kapunatiki
117. Coldstream.
118. Campbell.
119. Strachey.
120. Gladstone.
121. Mackenzie.
122. Opawa.
123. Pareora.
124. Arowhenua.
125. Hewling's.
126. Dalzell.
127. Nimrod.
128. Otaio.
129. Patiti.
130. Gibson.
131. Hakataramea.
132. Waihao.
133. Waimate.
134. Meyer.
135. Elephant.
136. Waitaki.
OTAGO
1. Young.
2. Haast.
3. Wilkin.
4. McKerrow.
5. Upper Wanaka.
6. Upper Hawea.
7. Longslipside.
8. Ohau Lake.
9. Ohau River.
10. Martin's Bay.
11. Humboldtside.
12. Forbeside.
13. Cascade.
14. Matukituki.
15. Mid Wanaka.
16. Mid Hawea.
17. Longslip.
18. Ahuriri.
19. Benmore.
20. Benmoreside.
21. Hollyford.
22. Humboldt.
23. Forbes.
24. Poincon.
25. Motatapu.
26. Lower Wanaka.
27. Lower Hawea.
28. Lindis.
29. Hawkdun.
30. Gala.
31. Otamatakau.
32. Caples.
33. Dart.
34. Earnslaw.
35. Skipper's Creek.
36. Soho.
37. Knuckle Peak.
38. Cardrona.
39. Tarras.
40. Cluden.
41. St. Bathan's.
42. Turnagain.
43. Mount Buster.
44. Kurow.
45. Castlemount.
48. Greenstone.
49. Upper Wakatipu.
50. Glenorchy.
51. Shotover.
52. Crown.
53. Cromwell.
54. Wakefield.
55. Lauder.
56. Blackstone.
57. Idaburn.
58. Naseby.
59. Kyeburn.
60. Domett.
61. Maruwenua.
62. Awamoko.
63. Papakaio.
65. Von.
66. Mid Wakatipu.
67. Coneburn.
68. Kawarau.
69. Bannockburn.
70. Leaning Rock.
71. Tiger Hill.
72. Poolburn.
73. Gimmerburn.
74. Maniototo.
75. Swinburn.
76. Kakanui.
77. Kauroo.
78. Oamaru.
79. South Wakatipu.
80. Nevis.
81. Lorn.
82. Lornside.
83. Obelisk.
84. Fraserside.
85. Fraser.
86. Cairnhill.
87. Cairnside.
88. Manor.
89. Manorside.
90. Upper Taieriside.
91. Upper Taieri.
92. Rock and Pillar.
93. Highlay.
94. Waihemo.
95. Otepopo.
96. Whitecoomb.
97. Teviot.
98. Long Valley.
99. Serpentine.
100. Loganburn.
101. Strath Taieri.
102. Budle.
103. Dunback.
104. Moeraki.
105. Wart Hill.
106. Benger.
107. Lammerlaw.
108. St. Abbs.
109. Sutton.
110. Nenthorn.
111. Hummock.
112. Hummockside.
113. Hawksbury.
114. Greenvale.
115. Crookston.
116. Beaumont.
117. Hedgehope.
118. Lee Stream.
119. Mount Hyde.
120. Silverpeak.
121. Waikouaiti.
122. Glenkenich.
123. Rankleburn.
124. Tuapeka West.
125. Tuapeka East.
126. Waipori.
127. Maungatua.
128. Taieri (W) I.
129. Taieri (E) I.
130. Dunedin and East Taieri.
131. North Harbour and Blueskin.
132. Otago Peninsula.
133. Waipahi.
134. Pomahaka.
135. Waitahuna West.
136. Waitahuna East.
137. Table Hill.
138. Clarendon.
139. Waihola.
140. Otokia.
141. Kuriwao.
142. Warepa.
143. Clutha.
144. Hillend.
145. Kaitangata.
146. Tokomairiro.
147. Akatore.
148. North Tuakitoto.
149. South Tuakitoto.
150. Inch-Clutha.
151. Coast.
152. South Molyneux.
153. North Molyneux.
154. Rimu.
155. Catlin's.
156. Glenomaru.
157. Woodland.
158. Tautuku.
159. Green Island South.
160. Green Island Bush.
161. Lower Kaikorai.
162. Ocean Beach.
163. Town District.
164. Anderson's Bay.
165. Tomahawk.
166. Waikari.
167. Upper Kaikorai.
168. North-east Valley.
169. Upper Harbour West.
170. Upper Harbour East.
171. Sayer's Bay.
172. Lower Harbour West.
173. Portobello Bay.
SOUTHLAND
1. Doon.
2. Arran.
3. Eglinton.
4. Swinton.
5. Mid Wakatipu.
6. Coneburn.
7. Mavora
8. Eyre North.
9. Esk.
10. Lyall.
11. Te Anau.
12. Snowdon.
13. Black Hill.
14. Eyreside.
15. South Wakatipu
16. Kingston.
17. Spey.
18. Manapouri.
19. Mararoa.
20. Burwood.
21. Lincoln.
22. Eyre.
23. Nokomai.
24. Rockyside.
25. Gap.
26. Borland.
27. Titiroa.
28. Takitimo.
29. Centre Hill.
30. Garvie.
31. Wakaia.
32. Clenshearn.
33. Monowai.
34. Wairaki.
35. Taringatura.
36. Hokonui.
37. Wendonside.
38. Wendon.
39. Otama.
40. Chatton.
41. Hauroko.
42. Lillburn.
43. Waiau.
44. Wairio.
45. West Cape.
46. Preservation.
47. Hakapoua.
48. Waitutu.
49. Rowallan.
50. Alton.
51. Aparima.
52. Oreti.
53. Winton.
54. Forest Hill.
55. Waimumu.
56. Waikaka.
57. Longwood.
58. Jacob's River.
59. New River.
60. Lindhurst.
61. Tuturau.
62. Mabel.
63. Lothian.
64. Mataura.
65. Slopedown.
66. Invercargill.
67. Oteramika.
68. Wyndham.
69. Mokoreta.
70. Campbelltown.
71. Toetoes.
72. Waikawa.
73. Otara.
74. Anglem.
75. Mason.
76. Paterson.
77. Pegasus.
78. Lord's River.
79. South Cape.
80. Castlemount.
81. Glaisnock.
82. Clinton.
83. Greenstone.
84. Clintonside.
85. Von.
WESTLAND
1. Punakaiki.
2. Maimai.
3. Temiko.
4. Waiwhero.
5. Mawheraiti.
6. Cobden.
7. Mawheranui.
8. Ahaura.
9. Pohaturoha.
10. Lewis.
11. Travers.
12. Arnold.
13. Greymouth.
14. Waimea.
15. Hohonu.
16. Brunner.
17. Kopara.
18. Haupiri.
19. Stewart.
20. Te Kinga.
21. Mahinapua.
22. Kanieri.
23. Turiwhate.
24. Otira.
25. Teremakau.
26. Clifton.
27. Waitaha.
28. Totara.
29. Toaroha
30. Browning's Pass.
31. Arthur's Pass.
32. Oneone.
33. Wanganui.
34. Mount Bonar.
35. Whitcombe's Pass.
36. Murray.
37. Okarito.
38. Wataroa.
39. Poerua.
40. Butler.
41. Gillespie's.
42. Waiho.
43. Waitangitaona.
44. Tyndall.
45. Paringa.
46. Bruce Bay.
47. Karangarua.
48. Mount Cook.
49. Otumotu.
50. Abbey Rocks.
51. Mount Douglas.
52. Mount Sefton.
53. Moorhouse.
54. Arnott.
55. Mount Munro.
56. Mount Napoleon.
57. Smoothwater.
58. Hapuka.
59. Okuru.
60. Matakitaki.
61. Clarke.
62. Landsborough.
63. Barn Bay.
64. Cascade.
65. Arawata.
66. Turnbull.
67. Governor's Pass.
68. Haast Pass.
69. Awarua.
70. Gorge River.
71. Macfarlane.
72. Jackson.
73. Mount Castor.
74. Mount Aspiring.
R. J. Crawford & G. E. Harris del.

1775.8.13.606.

Tauranga Harbour

EAST COAST RAILWAY

N.Z. GEOLOGICAL SURVEY

P. G. MORGAN. DIRECTOR.

Kowhararahi

Native School

Papamoa School

PAPAMOA RLY. STN.

505 Ranginu

Hairini

Owhauwhina Pa

Ti Kopukaipoa

Pa

507 Kaiwha Hill

Kaitemako Stm.

TAURANGA

Waitao Stream

Stream

TE TUMU

Homestead

Survey District Boundary

Low Downs

High Downs

Swampy flat

31 1063'

Te Puke Quarry

Kaiate

Kirikiri

Low Downs

Stream

Range

Kirikiri Creek

Atuarua Stm.

RLY. STN.

TE PUKE

506 Otawa 1828'

Mt. Misery (Otaiwriata)

Brickyard

Otara

Fault

Old drives Clarke's Freehold

No 4 ROAD

Flats

Te Puke

Waimapu River

Te Puke Reefs

Flemings Hill

No 3 ROAD

No 1 ROAD

No 2 ROAD

Raparapahoe Stream

OTANEWAINUKU

MAKETU

Flats

OTAWA

Diprose's

Ellis's

Gibraltar Rocks

ROAD

Whataroa Stm.

Otui Stream

791 Takarangi 1089'

Waiorohi Stream

High level plateau

1440'

1470'

Tautau Stm.

Survey District Boundary

1039 Otanewainuku 2088'

TAURANGA COUNTY

ROTORUA "

GEOLOGICAL SKETCH MAP OF COUNTRY IN VICINITY OF TE PUKE.

(Hauraki Division, Auckland Land District.)

Reference

Roads ——— shown thus

Tracks ——— " — — " —

Trigonometrical Stations — " — — " — C ◎ 1841'

Edges of Bush ——— " — — " —

Swamp ——— " — — " —

Water Races ——— " — — " —

Railways ——— " — — " —

Waterfalls ——— " — — " —

Drives ——— " — — " —

Scale of Chains

80 40 0 80 160

1 : 63360

Reference to Geological Colours and Signs

RECENT	I	Sand dunes, swamps &c.
PROBABLY PLEISTOCENE	II	Gibraltar Rocks rhyolites
	III	Pumiceous breccias & silts &c.
	IV	(Fine grained felspathic andesite (intercalated in formation III above)
UNCERTAIN POSITION PROBABLY UNDERLIES III	V	Spherulitic rhyolites of Te Puke Quarry &c.
	VI	Hornblende hypersthene rhyolite
PROBABLY LATE TERTIARY	VII	Older hypersthene rhyolite
	VIII	Basal hypersthene augite andesite
	IX	Basal hypersthene augite olivine andesite
	X	Clastic andesitic rock

Outcrops with observed strike and dip

" " no " " " Breccias

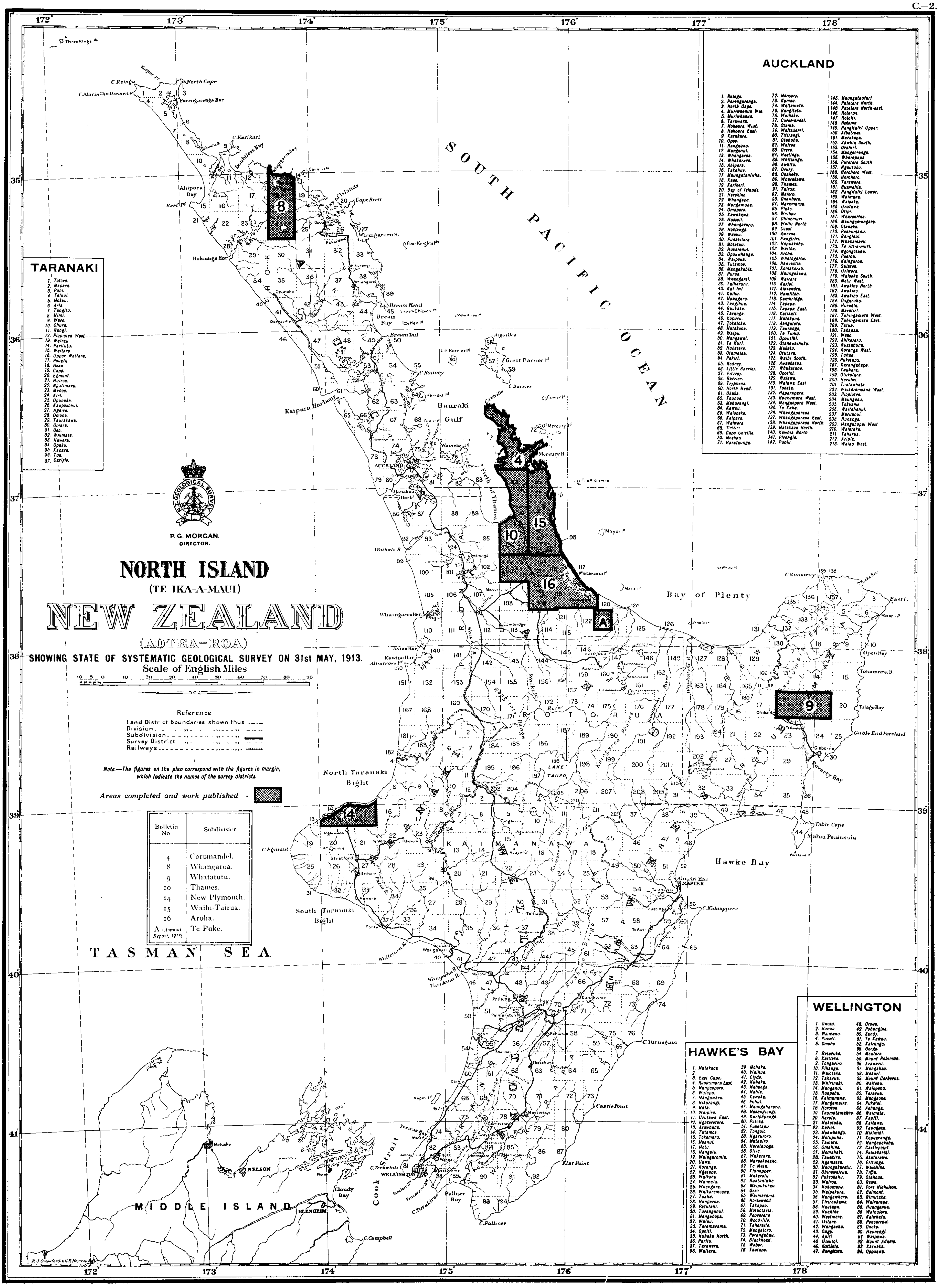
Quartz veins

Compiled from data obtained from the Lands and Survey Dept, and from additional surveys by J.A.Bartrum of the Geological Survey Branch of the Mines Department. Geology by J.A.Bartrum.

Drawn by G.E.Harris

By Authority. John Mackay, Government Printer.

1775. 7. 13. 603.



NORTH ISLAND
(TE IKA-A-MAUI)
NEW ZEALAND
(AOTEA-ROA)
SHOWING STATE OF SYSTEMATIC GEOLOGICAL SURVEY ON 31st MAY, 1913.
Scale of English Miles
N.Z. GEOLOGICAL SURVEY
P. G. MORGAN.
DIRECTOR.
Reference
Land District Boundaries shown thus
Division
Subdivision
Survey District
Railways
Note.—The figures on the plan correspond with the figures in margin, which indicate the names of the survey districts.
Areas completed and work published
Bulletin No | Subdivision.
4 Coromandel.
8 Whangaroa.
9 Whatatutu.
10 Thames.
14 New Plymouth.
15 Waihi-Tairua.
16 Aroha.
A (Annual Report, 1913) Te Puke.
TARANAKI
1. Totoro. 2. Mapara. 3. Pahi. 4. Tainui. 5. Mokau. 6. Aria. 7. Tangitu. 8. Mimi. 9. Waro. 10. Ohura. 11. Rangi. 12. Piopiotea West. 13. Wairau. 14. Paritutu. 15. Waitara. 16. Upper Waitara. 17. Pouatu. 18. Heao. 19. Cape. 20. Egmont. 21. Huiroa. 22. Ngatimaru. 23. Mahoe. 24. Kiri. 25. Opunake. 26. Kaupokonui. 27. Ngaire. 28. Omona. 29. Taurakawa. 30. Omara. 31. Oeo. 32. Waimate. 33. Hawera. 34. Opaku. 35. Kapara. 36. Tua. 37. Carlyle.
AUCKLAND
1. Reinga. 2. Parengarenga. 3. North Cape. 4. Muriwhenua Wes. 5. Muriwhenua. 6. Tarawera. 7. Hohoura West. 8. Hohoura East. 9. Karakara. 10. Opoe. 11. Rangaunu. 12. Mangonui. 13. Whangaroa. 14. Whakarara. 15. Ahipara. 16. Takahue. 17. Maungataniwha. 18. Kaeo. 19. Kerikeri. 20. Bay of Islands. 21. Herekino. 22. Whangape. 23. Mangamuka. 24. Omapere. 25. Kawakawa. 26. Russell. 27. Whangaruru. 28. Hokianga. 29. Waoku. 30. Punakitere. 31. Motatau. 32. Hukerenui. 33. Opuawhanga. 34. Waipoua. 35. Tutamoe. 36. Mangakahia. 37. Purua. 38. Whangarei. 39. Taiharuru. 40. Kai Iwi. 41. Kaihu. 42. Maungaru. 43. Tangihua. 44. Ruakaka. 45. Taranga. 46. Kopuru. 47. Tokatoka. 48. Matakohe. 49. Waipu. 50. Mangawai. 51. Te Kuri. 52. Hukatere. 53. Otamatea. 54. Pakiri. 55. Rodney. 56. Little Barrier. 57. Fitzroy. 58. Barrier. 59. Tryphena. 60. North Head. 61. Okaka. 62. Tauhoa. 63. Mahurangi. 64. Kawau. 65. Waioneke. 66. Kaipara. 67. Waiwera. 68. Tiritiri. 69. Cape Colville. 70. Moehau. 71. Harataunga.
72. Mercury. 73. Kumeu. 74. Waitemata. 75. Rangitoto. 76. Waiheke. 77. Coromandel. 78. Otama. 79. Waitakerei. 80. Titirangi. 81. Otahuhu. 82. Wairoa. 83. Orere. 84. Hastings. 85. Whitianga. 86. Awhitu. 87. Drury. 88. Opaheke. 89. Wharekawa. 90. Thames. 91. Tairua. 92. Maioro. 93. Onewhero. 94. Maramarua. 95. Piako. 96. Waihou. 97. Ohinemuri. 98. Waihi North. 99. Coast. 100. Aweroa. 101. Pangiriri. 102. Hapuakohe. 103. Waitoa. 104. Aroha. 105. Whaingaroa. 106. Newcastle. 107. Komakorau. 108. Maungakawa. 109. Wairere. 110. Karioi. 111. Alexandra. 112. Hamilton. 113. Cambridge. 114. Tapapa. 115. Tapapa East. 116. Katikati. 117. Matakana. 118. Aongatete. 119. Tauranga. 120. Te Tumu. 121. Opoutihi. 122. Otanewainuku. 123. Maketu. 124. Otutara. 125. Waihi South. 126. Awaokatua. 127. Whakatane. 128. Opotiki. 129. Waiawa. 130. Waiawa East. 131. Tokata. 132. Haparapara. 133. Raukumara West. 134. Mangaoporo West. 135. Te Kaha. 136. Whangaparaoa. 137. Whangaparaoa East. 138. Whangaparaoa North. 139. Matakaoa North. 140. Kawhia North 141. Pirongia. 142. Puniu.
143. Maungatautari. 144. Patetere North. 145. Patetere North-east. 146. Rotorua. 147. Rotoiti. 148. Rotoma. 149. Rangitaiki Upper. 150. Albatross. 151. Marakopa. 152. Kawhia South. 153. Orahiri. 154. Mangaorongo. 155. Wharepapa. 156. Patetere South 157. Ngautuku. 158. Horohoro West. 159. Horohoro. 160. Tarawera. 161. Ruawahia. 162. Rangitaiki Lower. 163. Waimana. 164. Waioeka. 165. Urutawa 166. Otipi. 167. Whareorino. 168. Maungamangero. 169. Otanake. 170. Pakaumanu. 171. Ranginui. 172. Whakamaru. 173. Te Ati-a-muri. 174. Ngongotaha. 175. Paeroa. 176. Kaingaroa. 177. Galatea. 178. Uriwera. 179. Waioeka South 180. Motu West. 181. Awakino North. 182. Awakino. 183. Awakino East. 184. Ongaruhe. 185. Hurakia. 186. Marotiri. 187. Tuhingamata West. 188. Tuhingamata East. 189. Tatua. 190. Takapau. 191. Waao. 192. Ahikereru. 193. Ruatahuna. 194. Koranga West. 195. Tuhua. 196. Puketapu. 197. Karangahape. 198. Tauhara. 199. Otukotara. 200. Heruiwi. 201. Tuatawhata. 202. Waikaremoana West. 203. Piopiotea. 204. Maungaku. 205. Tokaanu. 206. Waitahanui. 207. Maruanui. 208. Runanga. 209. Mangahopai West. 210. Waiotaka. 211. Taharua. 212. Aripia. 213. Waiau West.
HAWKE'S BAY
1. Matakaoa 2. 3. East Cape. 4. Raukumara East. 5. Mangaoporo. 6. Waiapu. 7. Mangawaru. 8. Hikurangi. 9. Mata. 10. Waipiro. 11. Urutawa East. 12. Ngaterotere. 13. Arowhana. 14. Tutamoe. 15. Tokomaru. 16. Moanui. 17. Motu. 18. Mangatu. 19. Waingaromia. 20. Uawa. 21. Koranga. 22. Ngatapa. 23. Waikohu. 24. Waimata. 25. Whangara. 26. Waikaremoana. 27. Tuahu. 28. Hangaroa. 29. Patutahi. 30. Turanganui. 31. Mangahopa. 32. Waiau. 33. Taramarama. 34. Opoiti. 35. Nuhaka North. 36. Paritu. 37. Tarawera. 38. Waitara. 39. Mohaka. 40. Waihua. 41. Clyde. 42. Nuhaka. 43. Mahanga. 44. Mahia. 45. Kaweka. 46. Pohui. 47. Maungaharuru. 48. Moeangiangi. 49. Kuripapanga. 50. Patoka. 51. Puketapu. 52. Tongoio. 53. Ngaruroro. 54. Matapiro. 55. Heretaunga. 56. Clive. 57. Wakarara. 58. Maraekakaho. 59. Te Mata. 60. Kidnapper. 61. Makaretu. 62. Ruataniwha. 63. Waipukurau. 64. Ocro. 65. Waimarama. 66. Norsewood 67. Takapau. 68. Motuotaria. 69. Pourerere 70. Woodville. 71. Tahoraite. 72. Mangatoro. 73. Porangahau. 74. Blackhead. 75. Weber. 76. Tautane.
WELLINGTON
1. Owatu. 2. Hunua. 3. Waimanu. 4. Puketi. 5. Omoho 7. Retaruke. 8. Kaitieke. 9. Tongariro. 10. Pihanga. 11. Waiotaka. 12. Taharua. 13. Whirinaki. 14. Manganui. 15. Ruapehu. 16. Kaimanawa. 17. Mangamaire. 18. Horotea. 19. Taumatamahoe. 20. Rarete. 21. Maketuku. 22. Karioi. 23. Moawhango. 24. Motupuhe. 25. Tamata. 26. Omahine. 27. Momahaki. 28. Tauakira. 29. Ngamatea. 30. Maungakaretu. 31. Ohinewairua. 32. Pukeokahu. 33. Wairoa. 34. Mukumaru. 35. Waipakura. 36. Mangawhero. 37. Tiriraukawa. 38. Hautapu. 39. Ruahine. 40. Westmere. 41. Ikitara. 42. Wangaehu. 43. Ongo. 44. Apiti 45. Umutoi. 46. Kaitiata. 47. Rangitoto. 48. Oroua. 49. Pohangina. 50. Sandy. 51. Te Kawau. 52. Kairanga. 53. Gorge. 54. Moutere. 55. Mount Robinson. 56. Araweru. 57. Mangahao. 58. Makuri. 59. Mount Cerberus. 60. Waitohu. 61. Waiopehu. 62. Tararua. 63. Mangaone. 64. Puketoi. 65. Aohanga. 66. Waimata. 67. Kapiti. 68. Kaitawa. 69. Taungata. 70. Mikimiki. 71. Kopuaranga. 72. Mangapakeha. 73. Castlepoint. 74. Paikakariki. 75. Akatarawa. 76. Eritonga. 77. Waiohine. 78. Tiffin. 79. Otahoua. 80. Rewa. 81. Port Nicholson. 82. Belmont. 83. Rimutaka. 84. Wairarapa. 85. Huangarua. 86. Wainuioru. 87. Kaiwhata. 88. Pencarrow. 89. Onoke. 90. Haurangi. 91. Waipawa. 92. Mount Adams. 93. Kaiwaka. 94. Opouawa.
SOUTH PACIFIC OCEAN
TASMAN SEA
MIDDLE ISLAND
Bay of Plenty
Hawke Bay
Hauraki Gulf
Cook Strait
North Taranaki Bight
South Taranaki Bight
AUCKLAND
WELLINGTON
NAPIER
NELSON
BLENHEIM
LAKE TAUPO
R. J. Crawford & G.E. Harris del.

1775.6.13.604.

APPENDIX D.

STATE COAL-MINES

REPORT ON THE WORKING OF) FOR THE YEAR ENDED 31ST MARCH, 1913.

Prepared in accordance with the requirements of Section 118 of the Coal-mines Act, 1908.

The GENERAL MANAGER, State Coal-mines, to the UNDER-SECRETARY, Mines Department, Wellington.

SIR,— New Zealand State Coal-mines Office, Wellington, 31st May, 1913.

I have to submit the annual report and balance-sheet of the New Zealand State Coal-mines for the year ended 31st March, 1913.

The gross output of the mines was 247,200 tons, which, after allowing for mine consumption and waste, left 227,034 tons for disposal, and when compared with the figures of last year shows a decrease of 17,444 tons.

The Point Elizabeth Mine produced 160,084 tons of marketable coal of the following grades: Screened, 38,903 tons; unscreened, 64,857 tons; bunker, 22,710 tons; small, 33,614 tons.

The following table shows the quantity disposed of:—

To whom.	Screened.	Unscreened.	Bunker.	Small.	Totals.
	Tons.	Tons.	Tons.	Tons.	Tons.
Depots	24,636	32,377	..	9,444	66,457
Railways	7,905	13,963	..	..	21,868
Other Government Departments	1,040	2,463	597	317	4,417
Private consumers	6,014	16,218	22,318	24,052	68,602
Totals	39,595	65,021	22,915	33,813	161,344

The sales of coal from this mine are therefore 27,192 tons less than last year. This reduction in the output is due to various reasons set out in the Manager's report attached. The demand for coal from Point Elizabeth has always exceeded the capacity of the mine. It is hoped, if the coal from No. 2 Colliery proves as suitable for household purposes as No. 1, to be able to meet all demands. Regular shipments from the new mine should be made by the end of June.

The Seddonville Mine produced 66,950 tons of marketable coal of the following grades: Screened, 13,206 tons; unscreened, 29,476 tons; nuts, 3,719 tons; small, 20,549 tons.

The following table shows the quantity disposed of:—

To whom.	Screened.	Unscreened.	Nuts.	Small.	Totals.
	Tons.	Tons.	Tons.	Tons.	Tons.
Depots	1,225	25	581	2,124	3,955
Railways	11,306	7,658	1,889	..	20,853
Other Government Departments ..	143	87	40	259	528
Private consumers, including shipping companies	175	22,037	1,036	18,085	41,334
Totals	12,849	29,807	3,546	20,468	66,670

The sales from this mine are in excess of those of last year by 10,047 tons, and are due to the demand for steam-coal, a considerable quantity being the "run of the mine."

Owing to the exhaustion of hard coal, and the poor quality of the soft coal rendering it unsaleable, operations at Seddonville must shortly be abandoned.

The operations at the briquette-works, which proved so expensive, were discontinued, and the plant has now been dismantled.

It was found necessary during the year, owing to the increase in cost of production, steamer freights, &c., to increase the selling-price of our coal. The full benefit of this increase will not be felt until next year, and when taken into consideration with the mine-manager's prognostication of reduction in cost and enlarged output, the mines should show a good surplus over working-expenses.

The haulage-ropes are now being laid on the incline at Point Elizabeth No. 2 Mine, and, provided the Railway Department can arrange haulage, regular shipments of coal can be made early in June. From samples supplied to gasworks and tramways this coal has been found to give first-class results, both as a gas-producer and a steam fuel.

The ways, working plant, &c., in and about the mines have been maintained in good order.

It gives me pleasure to be able to state that the officers and men connected with the various branches of the State coal-mines have worked well, and with the welfare of the Department at heart.

Attached are the reports of the Managers at Point Elizabeth and Seddonville, which give detailed information in reference to the working of each mine.

I have, &c.,
W. C. Gasquoine,
General Manager.

The Manager, Point Elizabeth State Coal-mine, to the General Manager, State Coal-mines.

Sir,— Greymouth, 7th May, 1913.

I have the honour to submit my annual report on the Point Elizabeth State Collieries for the year ended 31st March, 1913.

No. 1 Colliery.

Coal-winning.

The gross total output for the year was 179,472 tons, of which the No. 1 section of the colliery produced 53,647 tons, and the No. 2 section 125,825 tons, and after deducting mine-consumtion there remained for disposal 160,084 tons.

The colliery worked 260 days, making an average of five days per week, which is the best time made during any year since the opening of the colliery. The average daily output was 690·27 tons, and the gross output since the production of coal started in 1904 amounts to 1,692,899 tons.

The underground employees averaged during the year 110 coal-hewers; 114 in other branches, including truckers, shiftmen, deputies, &c., and 1 boy; on the surface there were 65 men and 20 boys, in connection with haulage of coal, screens, engines and boilers, and mechanics: in all 289 men and 21 boys.

The disbursements on wages account, and exclusive of stores and compensation, were £62,662 2s. 6d. The coal-hewers' average daily earnings were—in the No. 1 section, 16s. 3·39d.; and in No. 2, 20s. 2·8d.; or a general average of 18s. 9·99d.

Underground Exploration.

Excepting the workings in steep coal in No. 1 section and some of the work done in the thin coal, or what is known as the bottom seam in No. 2 section, the bulk of the year's output has been obtained from pillar-extraction. The workings in the steep coal just mentioned are very limited, and owing to the high angle of inclination, from 40° to 50° from the horizontal, haulage and other details of working are rendered more expensive than where the coal is found at its normal grade. From the thin-coal workings in No. 2 section over 50,000 tons of the year's output were obtained, and a good proportion of this was from coal very much below the average thickness, some of the places being as low as 3 ft.

Surface Exploration.

In order to test the ground towards the south-east and some distance ahead of the point to which the dip workings in No. 1 section have been extended, a diamond bore was sunk to a depth of 894 ft., which passed through 6 in. of coal at 672 ft., and a seam 2 ft. thick at 675 ft. A second bore is in progress nearer the line of main dip incline in the same section of the field. (See plan, showing position of bores.)

At the end of last year (1912), boring, with the object of finding coal in position suitable for working by the present machinery, &c., totalling 8,027 ft., had been done, and with the additional bore mentioned above the aggregate is now 8,921 ft. In addition, the surface of the reserve west of the present mine-workings has been examined during the year, and surveys made to connect outcrops near the Nine-mile Bluff and other points, and indications are such as to warrant the putting-down of one or two bores on this part of the field.

In the outcrop of coal at Nine-mile Bluff, near the sea-coast, work on a limited scale has been carried on for some years by a Mr. Kane, of Greymouth, who, without any title (so far as is known), has been conveying the coal by cart for disposal in Greymouth. The working of this coal began long prior to the Government reserve being formed. The amount of coal worked, as ascertained by survey, does not exceed 2,500 tons.

Additions to Plant.

In my last year's report reference was made to a projected addition to plant. This applied to the proposal for the installation of electrical machinery and turbine pump for the more efficient and economical drainage of the water from the No. 1 section of the colliery workings, this plant to take the place of the compressed-air machinery which has been in use for some years, but which is under power and inefficient for this class of work. Much of the electrical machinery, including motor cables, accessories, and pumps, is now on the ground, and much work in preparation for the installation has been done. The result of this change will be increased output at reduced cost, also reduced consumption of coal for mine purposes.

POINT ELIZABETH NO. 2 COLLIERY.

This colliery, the development of which has been in progress since April, 1908, and from which the raising of coal for market is now being started, was prospected for the exploitation of the coal-seams found on about 4,000 acres of the northern portion of the Dominion's State Coal Reserve, which forms a very important part of the Grey Coalfield.

Topographical Features.

The surface of the reserve is very irregular in contour (as are all the coalfields on the west coast of the South Island), and it varies greatly in elevation, as shown by the fact that in the southern end of the field the coal-seams are being worked below sea-level, whereas on the area now under consideration they are found ranging from 500 ft. to nearly 2,000 ft. above sea-level.

The country, owing to erosion and faulting, is intersected by numerous ravines, where excellent sections of the country rocks and coal-seams are exposed.

Synclinal and anticlinal folds are very marked towards the centre and south of the coal reserve.

Contents of the Area.

To make an accurate calculation of the contents of the field is a work of much difficulty, but from the evidence found in the course of the examination of the country the existence of five workable seams is assured, three of which will be almost wholly above water-level, and it has been calculated that there is available on a safe estimate at least 66,000,000 tons of coal, of which probably 75 per cent. will be found workable.

Location of Mine.

After careful examination of the seams it was decided to open the mine by a tunnel in the third seam, numbering them in consecutive order from the top downwards. The point at which the tunnels were being laid off involved the construction of three miles of railway, being an extension of the line constructed for the conveyance of coal from the Point Elizabeth State Colliery No. 1: thus both collieries are connected with the town and port of Greymouth, the distance in the case of the No. 2 Colliery being eight miles to the point where coal will be delivered on railway-trucks. Pending the extension of the railway it was deemed necessary, in order to expedite the opening of the mine, to construct a service tram from the terminus of the No. 1 Colliery line to the site of the development-works, or as near thereto as possible. On survey the distance was found to be approximately seven miles; and, starting at about 150 ft. above sea-level, it terminates at a height of 1,600 ft. The formation was made to take a 3 ft. 6 in. gauge line, the rails being of wood on the straight, with steel rails at the curves. The grades varied considerably, owing to the character of the country; the heaviest does not, however, exceed 1 in 10. There are two important bridges, one at the crossing of the Seven-mile and the other crossing Spring Creek. The small creeks were crossed by felling logs from the bush through which the line is constructed. The completion of this tram-line gave access to the field, enabling supplies of material and plant to be transported to the seat of the principal operations.

Development-works.

Including (*a*) tunnels and formation-work required in the construction of the two miles of tram-line (endless rope) in two sections, required for the conveyance of coal from the mine to the coal-storage bins and screens. In this work there are 6,289 ft. of tunnel, of which 5,989 ft. was driven under contract; the balance, 300 ft., was constructed by men employed under the Manager. Trestle bridges totalled a length of 1,855 ft., with height varying from 20 ft. to 60 ft., the balance of the line being earthwork.

(*b.*) The clearing and excavating sites for hydraulic brakes (two). In consequence of the steepness of the country it was found difficult in some cases to get foundations into position, especially for the upper brake, where substantial concrete walls were found necessary to secure the plant from injury.

(*c.*) Sawmill: This enabled much of the timber required in the earlier stages of the works to be supplied from the bush surrounding the locality where construction-work was in progress.

(*d.*) The work of driving in the coal and mining-out working-places in readiness for placing coal on the market as soon as permanent plant and railway are in readiness. The work done at the upper end of haulage-line starts in the bluff adjacent to Tararu Creek, where the outcrop is 22 ft. thick. From this opening a straight tunnel connects with the outcrops on the east side of the Seven-mile Creek, and it is in block east of this last-named creek that the principal work has been done, and the seam so far operated on is the third of the series, but it is proposed to connect with No. 2 seam also, by means of a cross-measure drift.

Near the bottom end of haulage incline there is a seam of coal on which some development-work has been done, and which it is anticipated will yield a very considerable output under conditions very favourable for economical working, the tunnel-opening being in close proximity to the bins.

The plant and general equipment may be described as under, and in this connection it may be noted that until the railway was in a position to convey goods to the bin-site the heavier portion of the plant could not, excepting at excessive cost, be delivered to the works.

(*a.*) Hydraulic brakes of the four-cylinder type, the rope-wheel being 12 ft. diameter of the surging-drum form, the whole being of massive construction and capable of controlling a load sufficient to provide for an output of 2,000 tons daily at a speed of two miles per hour. The brakes are set on concrete foundations. The ropes for these inclines are of best plough steel.

(*b.*) Coal-storage bins and screens: The coal-storage bins, capacity of which is 4,000 tons, entailed piling in order to secure a good foundation, and over the piles a heavy concrete bed is laid to support the structure. The understructure carrying the storage-bin proper consists of steel stanchions surmounted by longitudinal wall-plates and cross-girders all securely riveted together, knees and brackets being provided for the purpose. The storage-bin resting on the steel frame is of timber. In connection with this work very substantial concrete walls were found necessary in order to prevent injury to the bins by slips from the adjacent slopes. The screens are to be of the vibratory type.

The coal-tubs, on being detached from the endless rope, gravitate to the weighbridge, and from thence to the gravity tipping-machines, by which the contents are emptied on to distributing-belts, from which it may be put into the storage-bins or be conveyed to the screens as required. The screened coal to be delivered on to a travelling-belt, and from thence to the railway-trucks through an anti-breaking chute.

The emptied mine-tubs, on leaving the tipping-machine, run by gravity to the foot of a creeper chain, which elevates them to a suitable height for returning by gravity, to be again attached to the endless rope.

(*c.*) Mine-tubs, 1,000 of which were ordered as a commencement, are made of galvanized steel plates mounted on 12 in. diameter steel wheels and 1½ in. axle, the carrying-capacity of tub being 10 cwt. when filled level.

(*d.*) Ventilating-fans: These are of the Sirocco type, the main fan having a capacity of 112,000 cubic feet per minute when driven at full speed. The driving, owing to the difficulty of transporting steam machinery to the site of erection, must of necessity be electricity, which is now being erected. For the purpose of assisting and keeping same in advance of requirements two small auxiliary fans have been provided.

In addition to the principal portions of plant referred to above, mention may be made of rails, ropes, jig-wheels, flat-sheets, and other appliances; and, apart from what may be termed the actual mine-development and its requirements, reference may be made to the provision for the conveyance of workmen to and from work, the erection of workmen's homes and sites for same, and the proposal put forward by the miners for the establishment of baths.

Dealing with the conveyance of workmen, as it is almost certain that more men will be required at this mine than can be conveniently accommodated with dwellings near the works, and that there will be men in excess of requirements at the No. 1 Colliery as time goes on, the work necessary for the establishment of a means of conveyance is now in hand, and consists of the construction of a road starting from the terminus of the railway, and is carried along the west bank of the Seven-mile Creek for a distance of 20 chains, where a bluff is encountered, through which a tunnel has to be driven, and is now in progress, the length being 660 ft.; following which there is 1,591 ft. of opencut and filling. The grade of the portion starting with the tunnel is 1 in 3·4, the elevation being 640 ft. in the distance of 34 chains. From the railway to the foot of the incline the men will be required to walk; on arrival at the tunnel they will be taken up the incline in cars to the high-level tram to be equipped for running on a line to be laid on the formation of the old service tram.

The Housing of Workmen.

The areas of land suitable for building-sites are very limited, but surveys have been made with the result that seventy-eight sites can be obtained within 40 chains of the upper-mine workings, twenty-one more almost midway between the bins and upper mine, and again there are eighty-one sites adjacent to the sawmill. The first two groups can be utilized for workers employed at the upper works or on the endless rope, or at the changing-station, and the third will be suitable for workers employed at the bins, the sawmill, or in the underground workings at the bin seam. To reach the various groups of building-sites, roading as on plans will be required. In connection with the housing scheme, it has been considered advisable for the Department to build a limited number of cottages and also huts for single men, with a boarding-house on a convenient site, also a

Cottage Hospital.

Plans have been prepared for a cottage hospital and quarters for nurse and for medical dispensary, and room where the medical officer can see patients requiring to consult him.

Workers' Baths.

The establishment of baths where the men can change clothes and have a bath when leaving the mine for their homes has been recommended by the Dominion Royal Commission on Mines, and how best to give effect to the proposal is now under consideration. In continental Europe such establishments are quite common, made compulsory because of the serious state of ill health

into which the mining population had fallen. In Great Britain the same conditions do not exist, and baths are just being introduced, under arrangements which make the workers responsible for a portion of the cost of running the establishments.

General.

The colliery to which the preceding notes apply, as already mentioned, is being laid out and equipped to handle an output of 2,000 tons per day. The quality of the coal, as proved by analysis and practical use, is such as to meet the requirements of all lines of trade for which coal is in demand, such as steam-raising, the manufacture of gas, for smithy purposes, and for the production of coke of highest quality and almost entirely free from sulphur, for household consumption, &c.

Harbour and Shipping Facilities.

In connection with the harbour, the principal work bearing on the depth of water on the bar is that of extending, or rather rebuilding, a portion of the north breakwater. This work has been in hand for some time, and it is believed that the result will be a permanent increase in the scouring-force of the river and consequent increase in the depth of water on the bar.

No very serious inconvenience has been experienced owing to non-arrival or scarcity of shipping during the year; doubtless this is to some extent due to the smaller quantity of coal produced. At the same time it may be stated that the general tendency in connection with the loading of steamers is in the direction of giving more rapid despatch than formerly, as instance a case (quite recent) when 3,700 tons of coal were placed on board vessels in sixteen hours, meaning that, if maintained, loading could be done to the extent of 30,000 tons per week.

ACCIDENTS.

It is to be regretted that two fatalities occurred during the year, on account of which special reports were forwarded.

GENERAL.

Under this head reference may be made to the increased cost of production and reduced output, especially in the No. 1 section. As already shown, the output for the year is about one-half of that formerly obtained, and, as many standing charges cannot be reduced, and the drainage of the mine must be continued whether the output is large or otherwise, the costs from this section have become abnormal, the remedy for which is increased output and a reduction of costs for pumping.

In the No. 2 section the output has been fairly well maintained, and as the charges for pumping, &c., are not so great as in No. 1 the costs are lower, and would have been much more so but for the fact that almost one-half of the output has been obtained from the thin seam, for the working of which higher rates are paid to the miners.

Accompanying will be found copy of the working-plan of the colliery, plan showing the position of the bores put down in prospecting for coal, and also result of special survey west of the present workings, on which the position of Kane's mine is shown.

Accompanying are plans, sections, and photos illustrating—

(*a.*) General plan showing the position of the mine-workings, haulage-lines, coal-storage bins, railway-sidings, &c., also location of sites for workers' dwellings.
(*b.*) Section of strata and coal-seams.
(*c.*) Photo showing general aspect of country above the opening to the upper mine.
(*d.*) Photos of hydraulic brakes, also of coal-bins.

The officers in all branches of the works have carried out their duties to my satisfaction, and at times valuable assistance has been rendered by the Consulting Engineer.

I have, &c.,
JAMES BISHOP, Manager.

The MANAGER, Seddonville State Coal-mine, to the GENERAL MANAGER, State Coal-mines, Seddonville.

SIR,— 7th April, 1913.

I have the honour to submit my annual report on the working of the Seddonville Colliery for the year ended 31st March, 1913.

OUTPUT.

The total output from the mine during the year amounted to 66,754 tons, and after deducting mine consumption and waste there was left 66,950 tons for disposal.

DAYS WORKED.

The mine during the period worked 227½ days, thus the average output was a little over 297½ tons per working shift.

The time worked averaged 4·37 days per week, and the miners' average daily earnings works out to 18s. 9·47d. per shift, which is an increase of 1s. 1·47d. per shift over the previous year.

The total number of men and boys employed in and about the mine during the period averaged ninety-nine.

Accidents.

There were a few minor accidents during the year, but not any of a serious nature.

Plant.

The plant and machinery in and about the mine has been maintained in good working-order and condition.

Underground Exploration.

During the year the principal work done in connection with coal-winning has been the development of a small area in the West section, where for the greater part of the year fifteen pairs of miners have been employed, the coal won therefrom being of excellent quality and thickness.

There are at the present time in this section headings advancing in a northerly direction, but as the area is somewhat limited the prospects are not very encouraging, and to find employment in hard-coal places for the number of miners employed at the mine, a commencement has been made to split the pillars in this section; and, as the cover over this area is thin and of a swampy nature, it will not permit of the taking out of the pillars entirely, but merely splitting them and bringing back the top coal.

Pillar-extraction has been going on for some time from a low level in the South workings, and in the course of a few weeks all available pillars will have been won from this level, after which the terminal wheel will be brought back a convenient distance to enable all available pillars on the haulage-road to be extracted.

The Cave section was abandoned in September last owing to a heavy creep taking place and rendering it unsafe for further working. The plant and machinery was taken therefrom.

General.

For a great part of the year there was keen demand for all classes of coal, thus enabling a large number of soft-coal places to be worked, but during the latter part there has been more demand for screened coal, the consequence being that the soft-coal places, of which there are many in this mine, had to be stopped.

Having in view the near exhaustion of the mine, it would not be out of place to mention that, if only hard-coal places are to be worked in the future, the time is fast approaching when operations will have to be abandoned.

In conclusion, permit me to say that all the officers in connection with the working of the mine have performed their duties in a creditable manner, and the Consulting Engineer has rendered valuable assistance in connection with the working of the mine.

I have, &c.,
I. A. James, Manager.

Balance-sheet of the New Zealand State Coal-mines.

Statement of Liabilities and Assets at 31st March, 1913.

Liabilities.	£ s. d.	£ s. d.
Debenture loan	175,000 0 0	
Loan under Appropriation Act, 1912, instalment	34,404 0 0	
		209,404 0 0
Accrued interest	3,229 7 10	
Debenture sinking fund	13,200 0 0	
Reserve for bad debts	150 0 0	
Sundry creditors	18,960 5 5	
		35,539 13 3
Reserve fund	10,226 8 6	
Less: To General Profit and Loss	4,341 17 4	
		5,884 11 2
General Profit and Loss Account—		
Balance of profit at 31st March, 1912	50,648 11 1	
Reserve fund: Amount transferred	4,341 17 4	
	54,990 8 5	
Less: Special depreciation £45,000 18 4		
Loss for year 9,989 10 1		
	54,990 8 5	

Assets.	£ s. d.	£ s. d.	£ s. d.
Point Elizabeth Colliery No. 1 and Development Property Account—			
Cost at 31st March, 1912	19,177 5 8		
Additional outlay during the year	1,765 2 1		
	20,942 7 9		
Special depreciation	20,942 7 9		
Machinery, plant, ropes, and rolling-stock—			
Cost at 31st March, 1912	34,383 7 0		
Additional outlay during the year	3,726 15 5		
		38,110 2 5	
Special depreciation	4,057 12 3		
Depreciation (annual)	8,807 10 0		
		12,865 2 3	
		25,245 0 2	
Buildings at mine—			
Cost at 31st March, 1912	2,673 16 5		
Additional outlay during the year	150 0 0		
	2,823 16 5		
Depreciation (annual)	475 1 10		
		2,348 14 7	
Cottages—			
Cost at 31st March, 1912	2,536 12 1		
Depreciation (annual)	340 11 3		
		2,196 0 10	
Stores (stock on hand)	1,788 2 7		
Timber (stock on hand)	21 11 2		
Coal (stock on hand at mine and wharf)	204 1 0		
Coal (stock on hand, afloat)	1,672 5 1		
		3,685 19 10	
Point Elizabeth Colliery No. 2 and Development Property Account—			
Cost at 31st March, 1912	65,019 2 8		
Additional outlay during the year	21,676 16 8		
		86,695 19 4	
Machinery, plant, and rolling-stock—			
Cost at 31st March, 1912	23,815 4 10		
Additional outlay during the year	15,938 8 4		
		39,753 13 2	
Buildings at mine—			
Cost at 31st March, 1912	1,126 19 8		
Additional outlay during the year	396 16 4		
		1,523 16 0	
Cottages at mine		175 4 11	
			161,624 8 10

Balance-sheet of the New Zealand State Coal-mines—*continued.*

Statement of Liabilities and Assets at 31st March, 1913—continued.

Liabilities.				*Assets.*	£ s. d.	£ s. d.	£ s. d.
				Seddonville Colliery and Development Property Account—			
				Cost at 31st March, 1912	..	10,559 4 4	
				Special depreciation	10,000 0 0		
				Depreciation (annual) (portion)	559 4 4		
						10,559 4 4	
				Machinery, plant, ropes, and rolling-stock—			
				Cost at 31st March, 1912	10,562 18 8		
				Depreciation (annual)	3,159 14 5		
						7,403 4 3	
				Buildings at mine—			
				Cost at 31st March, 1912	360 16 8		
				Depreciation (annual)	63 15 11		
						297 0 9	
				Cottages—			
				Cost at 31st March, 1912	191 16 11		
				Depreciation (annual)	36 0 0		
						155 16 11	
				Stores (stock on hand)	219 12 2		
				Coal (stock on hand at mine and wharf)	729 9 0		
				Coal (stock on hand, afloat)	65 16 6		
						1,014 17 8	
							8,870 19 7
				Charming Creek—			
				Cost at 31st March, 1912	2,965 17 8		
				Additional outlay during the year	35 0 8		
					3,000 18 4		
				Special depreciation	3,000 18 4		
				Briquette plant—			
				Cost at 31st March, 1912	13,110 19 2		
				Less plant sold and transferred	1,866 13 6		
						11,244 5 8	
				Special depreciation	6,000 0 0		
				Depreciation (annual)	1,613 10 3		
						7,613 10 3	
							3,630 15 5
				Hulks Property Account—			
				Cost at 31st March, 1912	..	1,385 11 8	
				Depreciation (annual)	..	130 0 0	
							1,255 11 8
				Wellington Depot Property Account—			
				Cost at 31st March, 1912	2,615 12 4		
				Additional outlay during the year	34 0 0		
						2,649 12 4	
				Special depreciation	600 0 0		
				Depreciation (annual)	174 7 7		
						774 7 7	
						1,875 4 9	
				Stocks on hand	..	1,279 6 9	
							3,154 11 6

BALANCE-SHEET OF THE NEW ZEALAND STATE COAL-MINES—*continued.*

Statement of Liabilities and Assets at 31st March, 1913—continued.

Liabilities.	*Assets.*		£ s. d.	£ s. d.	£ s. d.
	Christchurch Depot Property Account—				
	Cost at 31st March, 1912		5,282 7 1		
	Additions during the year		9 17 6		
			5,292 4 7		
	Depreciation (annual)		342 6 11		
			4,949 17 8		
	Stocks on hand		1,292 4 2		
				6,242 1 10	
	Wanganui Depot Property Account—				
	Cost at 31st March, 1912		1,477 13 8		
	Additional outlay during the year		30 0 0		
			1,507 13 8		
	Depreciation (annual)		94 0 7		
			1,413 13 1		
	Stocks on hand		1,702 4 10		
				3,115 17 11	
	Dunedin Depot Property Account—				
	Cost at 31st March, 1912		1,800 8 4		
	Special depreciation	£400 0 0			
	Depreciation (annual)	100 7 10			
			500 7 10		
			1,300 0 6		
	Stocks on hand		1,565 16 6		
				2,865 17 0	
	Wellington Office Furniture Account—				
	Cost at 31st March, 1912		77 7 5		
	Depreciation (annual)		8 14 8		
				68 12 9	
					12,292 9 6
	Sundry debtors			14,225 2 7	
	Suspense Account, Premiums, Deposits, &c.			212 14 6	
					14,437 17 1
	Cash in hand and in Public Account at 31st March, 1913			51,067 8 6	
	Less vouchers outstanding			5,505 17 8	
					45,561 10 10
£250,828 4 5					£250,828 4 5

NOTE.—With regard to the loss for the year, it must be stated that £10,130 has been written off to depreciation in excess of last year's amount, this being based on a 10-per-cent. gross capital expenditure as against 5 per cent. on a reduced capital.

State Coal-mines Office, Wellington, 31st May, 1913.
LOUIS H. EILERS, F.R.A., N.Z., Accountant.

W. FRASER,
Minister of Mines.

Examined and found correct.
ROBERT J. COLLINS, Controller and Auditor-General.

Statement of General Profit and Loss Account for the Year ended 31st March, 1913.

Dr.	£ s. d.	£ s. d.	*Cr.*	£ s. d.	£ s. d.
To Point Elizabeth Colliery Trade Expenses Account ..	74,056 3 2		By Point Elizabeth Colliery Working Account—Gross profit ..	66,626 13 7	
Seddonville Colliery " " ..	27,373 10 8		Seddonville Colliery " " ..	27,517 19 4	
Wellington Depot " " ..	10,111 3 10		Wellington Depot Trading Account—Gross profit ..	9,614 14 5	
Christchurch Depot " " ..	6,198 18 8		Christchurch Depot " " ..	6,516 12 9	
Wanganui Depot " " ..	2,885 16 9		Wanganui Depot " " ..	3,019 1 4	
Dunedin Depot " " ..	2,014 17 8		Dunedin Depot " " ..	1,796 15 7	
		122,640 10 9			115,091 17 0
Wellington office furniture depreciation	..	8 14 8	Point Elizabeth Colliery rents	..	52 3 6
Briquette-works—			Balance: Loss for year	..	9,989 10 1
Depreciation and interest	1,901 12 6				
Dismantling and other charges	582 12 8				
		2,484 5 2			
		£125,133 10 7			£125,133 10 7
Balance down	9,989 10 1				
Special depreciation	45,000 18 4				
		£54,990 8 5			

Statement of Point Elizabeth Colliery Working Account for the Year ended 31st March, 1913.

Dr.	£ s. d.	£ s. d.	*Cr.*	£ s. d.	£ s. d.
To Stock of coal on hand at 31st March, 1912	2,152 5 0		By Sales of coal	134,341 9 2	
Stock of timber on hand at 31st March, 1912	198 11 10		Sales of timber	336 17 4	
		2,350 16 10	Sales of stores	1,021 9 5	
Coal-winning—					135,699 15 11
Wages	59,272 9 10		Stock of coal on hand at 31st March, 1913—		
Materials used	4,519 3 9		At mine and wharf	204 1 0	
Stores used	2,374 16 10		Afloat	1,672 5 1	
		66,166 10 5			1,876 6 1
Timber cut	120 9 0		Stock of timber on hand at 31st March, 1913	..	21 11 2
Stores sold	887 0 4				
		1,007 9 4			
Special rate	..	1,446 3 0			
Balance: Gross profit at mine	..	66,626 13 7			
		£137,597 13 2			£137,597 13 2

Statement of Point Elizabeth Colliery Profit and Loss Account for the Year ended 31st March, 1913.

Dr.	£ s. d.	£ s. d.	*Cr.*	£ s. d.	£ s. d.
To Management and office salaries	2,211 14 5		By Balance of Working Account—		
Interest and exchange	1,656 6 6		Gross profits at mine	66,626 13 7	
Travelling-expenses	130 14 3		Rents	52 3 6	
Printing and stationery	125 12 1				66,678 17 1
Repairs and maintenance	1,936 10 5		Balance: Loss		7,377 6 1
Telegrams and postages	122 19 11				
Railway haulage	14,282 15 4				
Insurances	18 16 8				
Compensation for accidents and fund	2,239 16 1				
Railway freights	980 18 9				
General expenses	142 3 5				
Marine freights	36,493 8 2				
Hulks Working Account (proportion)	1,888 10 3				
Wharfages, &c.	2,036 6 3				
Audit fees	10 0 0				
Bad debts	126 7 7				
Doubtful debts	30 0 0				
Depreciation: Mine, buildings, plant, and machinery	9,623 3 1				
		74,056 3 2			
		£74,056 3 2			£74,056 3 2

Statement of Seddonville Colliery Working Account for the Year ended 31st March, 1913.

Dr.	£ s. d.	£ s. d.	*Cr.*	£ s. d.	£ s. d.
To Stock of coal on hand at 31st March, 1912		692 19 10	By Sales of coal		45,120 11 7
Coal-winning—			Stock of coal on hand at 31st March, 1913—		
Wages	16,298 16 10		At mine and wharf	729 9 0	
Materials used	697 18 5		Afloat	65 16 6	
Stores used	708 2 8				795 5 6
		17,704 17 11			
Balance: Gross profits at mine		27,517 19 4			
		£45,915 17 1			£45,915 17 1

Statement of Seddonville Colliery Profit and Loss Account for the Year ended 31st March, 1913.

Dr.	£ s. d.	£ s. d.	*Cr.*	£ s. d.	£ s. d.
To Management and office salaries	852 1 8		By Balance of Working Account—		
Rents	70 8 0		Gross profits at mine	27,517 19 4	
Interest and exchange	556 10 4				
Travelling-expenses	67 11 3				
Printing and stationery	35 2 8				
Telegrams and postages	68 1 8				
Repairs and maintenance	374 12 7				
Railway haulage	10,405 18 7				
Insurances	5 0 6				
Compensation for accidents and fund	260 15 0				
General expenses	112 4 9				
Marine freights	10,279 15 5				
Hulks Working Account (proportion)	231 8 4				
Wharfages, &c.	66 5 8				
Railway freights	147 11 2				
Audit fees	6 0 0				
Bad debts	15 8 5				
Depreciation: Mine, buildings, plant, and machinery	3,818 14 8				
		27,373 10 8			
Balance: Net profits for the year		144 8 8			
		£27,517 19 4			£27,517 19 4

Wellington Depot Trading Account for the Year ended 31st March, 1913.

Dr.	£ s. d.	£ s. d.	*Cr.*	£ s. d.	£ s. d.
To Stocks on hand at 31st March, 1912		1,259 1 2	By Sales of coal	37,624 19 11	
Purchases, Point Elizabeth coal	26,249 2 1		Sales of firewood, coke, &c.	1,246 16 6	
Purchases, Seddonville coal	1,072 13 6				38,871 16 5
Purchases, firewood, coke, &c.	917 14 3		Stocks on hand at 31st March, 1913—		
		28,239 9 10	Coal	1,047 16 10	
Cartage to depot		1,037 17 9	Firewood, &c.	231 9 11	
Balance: Gross profits		9,614 14 5			1,279 6 9
		£40,151 3 2			£40,151 3 2

Wellington Depot Profit and Loss Account for the Year ended 31st March, 1913.

Dr.	£ s. d.	£ s. d.	*Cr.*	£ s. d.
To Wages	2,750 16 11		By Balance of Trading Account	9,614 14 5
Salaries	718 12 0		Balance: Loss	496 9 5
Rents	654 0 0			
Rates	58 12 8			
Interest	68 0 6			
Travelling-expenses	5 8 0			
Repairs and maintenance	655 3 11			
Telegrams and postages	20 0 0			
Printing and stationery	91 11 3			
Insurances	10 5 0			
Cartage	4,223 0 5			
Sacks	188 8 1			
Freights, &c.	81 11 10			
General expenses	98 6 11			
Alterations	29 0 0			
Audit fees	47 10 0			
Bad debts written off	116 8 9			
Doubtful debts	120 0 0			
Depreciation	174 7 7			
		10,111 3 10		
		£10,111 3 10		£10,111 3 10

Christchurch Depot Trading Account for the Year ended 31st March, 1913.

Dr.	£ s. d.	£ s. d.	*Cr.*	£ s. d.	£ s. d.
To Stocks on hand, 31st March, 1912		1,695 3 10	By Sales of coal	33,124 3 10	
Purchases, Point Elizabeth coal	22,821 11 4		Sales of firewood, coke, &c.	892 17 10	
Purchases, Seddonville coal	1,367 18 7				34,017 1 8
Purchases, firewood, coke, &c.	717 17 9		Stocks on hand, 31st March, 1913—		
		24,907 7 8	Coal	1,026 2 2	
Haulage to depot		2,190 1 7	Firewood, coke, &c.	266 2 0	
Gross profit		6,516 12 9			1,292 4 2
		£35,309 5 10			£35,309 5 10

Christchurch Depot Profit and Loss Account for the Year ended 31st March, 1913.

Dr.	£ s. d.	£ s. d.	*Cr.*	£ s. d.
To Wages	1,681 2 6		By Balance of Trading Account	6,516 12 9
Salaries	848 15 9			
Rents	45 0 6			
Interest and exchange	135 17 5			
Repairs and maintenance	69 9 7			
Telegrams and postages	18 0 0			
Printing and stationery	83 5 2			
Insurances	10 16 2			
Travelling-expenses	24 7 9			
Cartage	2,005 15 2			
Sacks	95 13 0			
Freights	695 0 4			
General expenses	74 10 11			
Audit fees	35 13 4			
Bad debts	33 4 2			
Depreciation	342 6 11			
		6,198 18 8		
Balance: Net profit for year		317 14 1		
		£6,516 12 9		£6,516 12 9

Wanganui Depot Trading Account for the Year ended 31st March, 1913.

Dr.	£ s. d.	£ s. d.	*Cr.*	£ s. d.	£ s. d.
To Stocks on hand, 31st March, 1912		802 9 5	By Sales of coal	12,531 1 10	
Purchases, Point Elizabeth coal	9,549 3 1		Sales of firewood, coke, &c.	1,020 7 6	
Purchases, Seddonville coal	291 3 11				13,551 9 4
Purchases, firewood, coke, &c.	620 10 5		Stocks on hand, 31st March, 1913—		
		10,460 17 5	Coal	1,288 12 6	
Haulage to depot		971 6 0	Firewood, coke, &c.	413 12 4	
Gross profit		3,019 1 4			1,702 4 10
		£15,253 14 2			£15,253 14 2

Wanganui Depot Profit and Loss Account for the Year ended 31st March, 1913.

Dr.	£ s. d.	£ s. d.	*Cr.*	£ s. d.	£ s. d.
To Wages	763 13 6		By Balance of Trading Account		3,019 1 4
Salaries	418 10 4				
Rents	101 6 8				
Interest and exchange	38 18 8				
Repairs and maintenance	165 15 1				
Telegrams and postages	9 0 2				
Printing and stationery	25 17 9				
Travelling-expenses	1 5 3				
Insurance	6 5 0				
Cartage	956 17 8				
Sacks	78 0 7				
Freights, &c.	129 10 2				
General expenses	43 8 11				
Compensation	5 8 4				
Audit fees	16 0 0				
Bad debts	31 18 1				
Depreciation	94 0 7				
		2,885 16 9			
Balance: Net profit		133 4 7			
		£3,019 1 4			£3,019 1 4

Dunedin Depot Trading Account for the Year ended 31st March, 1913.

Dr.	£ s. d.	£ s. d.	*Cr.*	£ s. d.	£ s. d.
To Stocks on hand, 31st March, 1912		1,033 12 4	By Sales of coal	7,995 1 10	
Purchases, Point Elizabeth coal	5,486 2 8		Sales of firewood, coke, &c.	74 14 0	
Purchases, Seddonville coal	470 18 4				8,069 15 10
Purchases, firewood, coke, &c.	115 10 9		Stocks on hand, 31st March, 1913—		
		6,072 11 9	Coal	1,471 18 0	
Wharfages, &c.	556 7 3		Firewood, coke, &c.	93 18 6	
Cartage to depot	176 5 5				1,565 16 6
		732 12 8			
Balance: Gross profit		1,796 15 7			
		£9,635 12 4			£9,635 12 4

Dunedin Depot Profit and Loss Account for the Year ended 31st March, 1913.

Dr.	£ s. d.	£ s. d.	*Cr.*	£ s. d.	£ s. d.
To Wages	473 15 2		By Balance of Trading Account		1,796 15 7
Salaries	370 0 7		Balance: Loss		218 2 1
Rents	200 0 0				
Rates	21 11 6				
Interest	46 4 4				
Repairs and maintenance	121 13 2				
Telegrams and postages	7 3 0				
Printing and stationery	25 14 3				
Insurances	6 5 0				
Travelling-expenses	2 11 7				
Cartage	552 5 5				
Freights, &c.	8 5 9				
General expenses	47 11 5				
Sacks	24 8 8				
Audit fees	7 0 0				
Depreciation	100 7 10				
		2,014 17 8			
		£2,014 17 8			£2,014 17 8

Statement of the Receipts and Expenditure of the N.Z. State Coal-mines for the Year ended 31st March, 1913.

Receipts.	£ s. d.	£ s. d.
To Cash in hand and in Public Account at 31st March, 1912		13,971 8 8
Debentures issued	25,000 0 0	
Loan authorized (instalment)	34,404 0 0	
		59,404 0 0
Sales of coal, Point Elizabeth	158,422 14 11	
Sales of coal and briquettes, Seddonville	49,590 19 8	
Sales of timber, stores, &c.	6,563 11 6	
Refunds, &c.	28 0 2	
		214,605 6 3
		£287,980 14 11

Expenditure.	£ s. d.	£ s. d.
By Point Elizabeth Collieries—		
No. 1—Property and development	1,906 12 10	
Machinery, plant, and rolling-stock	2,243 15 0	
Buildings	150 0 0	
Stores and materials	9,393 6 8	
Wages	59,963 2 6	
Timber	430 18 9	
Special rate	1,533 16 9	
No. 2—Property and development	17,753 14 8	
Machinery, plant, and rolling-stock	10,118 19 2	
Buildings	338 14 6	
Timber	0 10 5	
Wages	24 15 10	
		103,858 7 1
Seddonville Colliery—		
Stores and materials	1,355 12 11	
Wages	16,487 5 10	
Briquette materials and stores	3 14 10	
Briquette wages	113 2 10	
Charming Creek—Prospecting, &c.	71 5 2	
		18,031 1 7
Hulks Working Account	2,015 7 3	
Wellington Depot, property	34 0 0	
" " working	9,269 19 11	
Christchurch Depot, property	9 17 6	
" " working	5,425 14 10	
Wanganui Depot, property	30 0 0	
" " working	2,558 6 4	
Dunedin Depot "	1,394 15 4	
		20,738 1 2
Management and office salaries	5,563 19 9	
Rents	1,379 7 6	
Rates	80 4 2	
Interest and exchange	5,154 15 1	
Marine freights	47,618 15 10	
Travelling-expenses	243 13 2	
Printing and stationery	381 19 4	
Telegrams and postages	245 9 4	
Repairs and maintenance	2,712 8 8	
Railway haulage	28,604 0 0	
Insurance	54 16 10	
Compensation for accidents and fund	2,949 12 0	
General expenses	510 4 0	
Wharfages, &c.	3,041 5 9	
Railway freights	1,214 3 3	
Refunds	15 19 7	
Audit fees	21 0 0	
		99,791 14 3
Cash in hand and in Public Account at 31st March, 1913	51,067 8 6	
Less vouchers passed	5,505 17 8	
		45,561 10 10
		£287,980 14 11

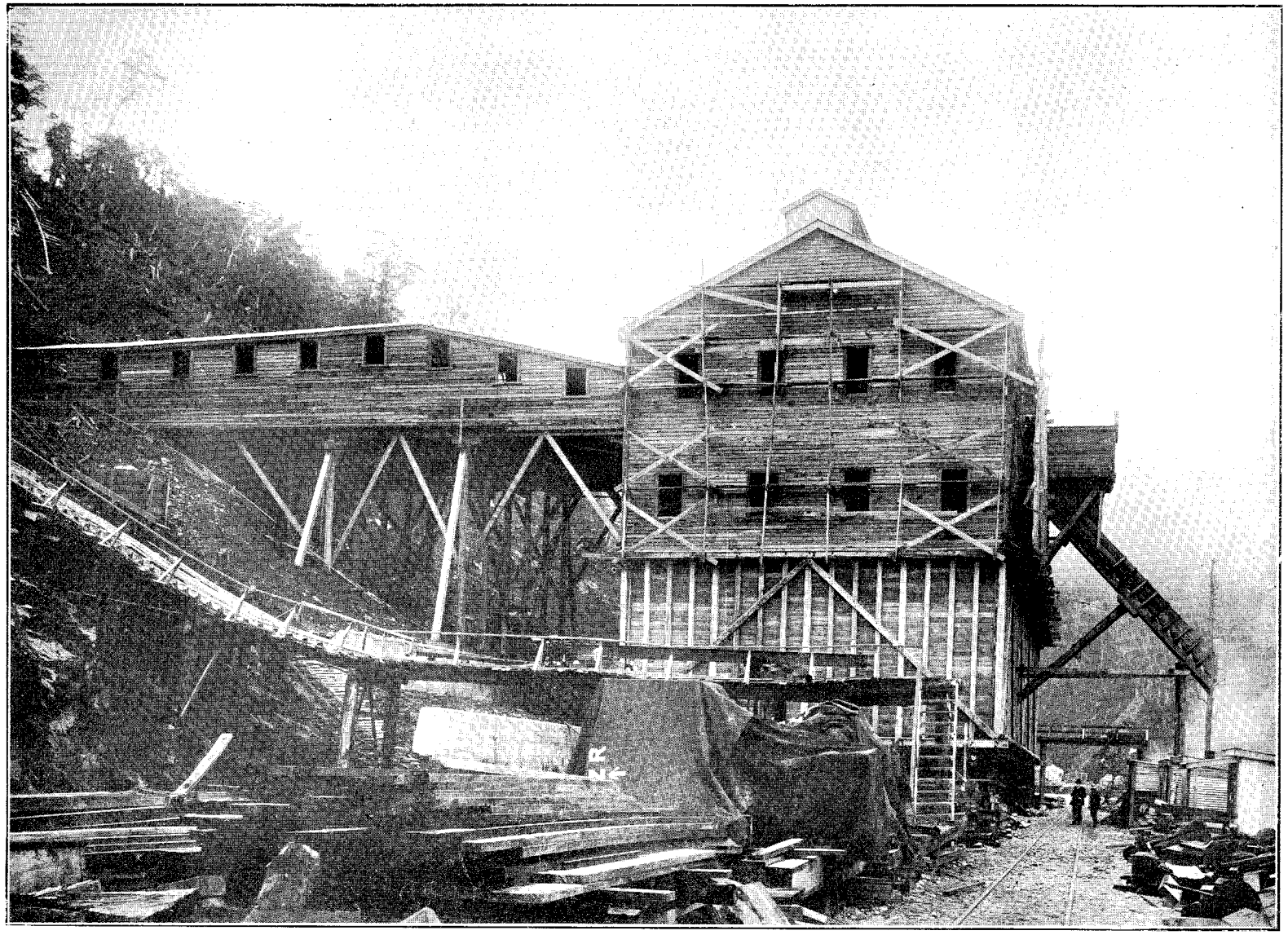
State Coal-mines Office, Wellington, 31st May, 1913.
LEWIS H. EILERS, F.R.A., N.Z., Accountant.

W. FRASER,
Minister of Mines.

Approximate Cost of Paper.—Preparation, not given; printing (1,750 copies, including maps, plans, diagrams, and illustrations), £235.

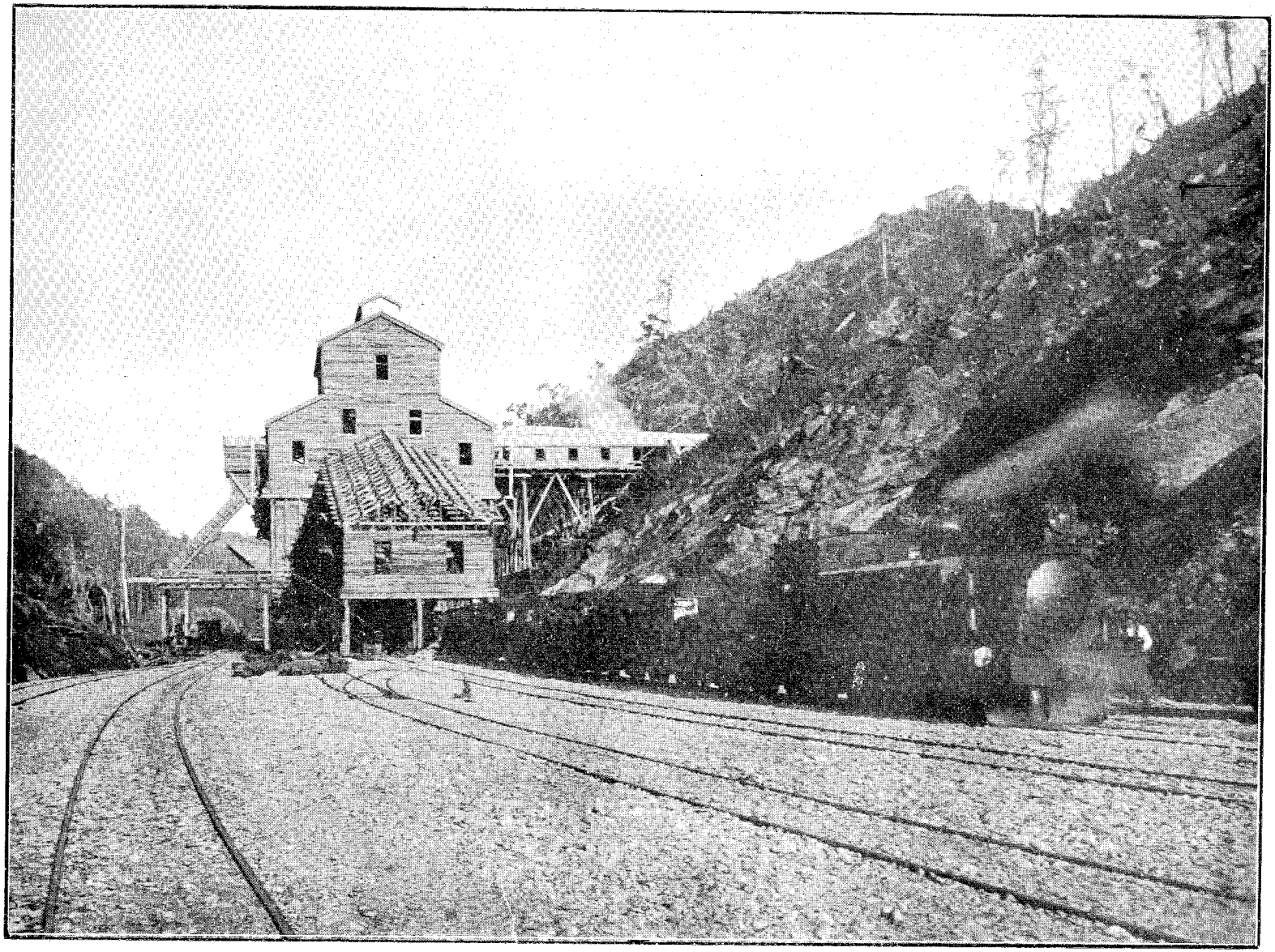
Price 4s.] By Authority: JOHN MACKAY, Government Printer, Wellington.—1913.

Point Elizabeth (Liverpool) Colliery.—View of Coal-storage Bins, 4,000 Tons Capacity.

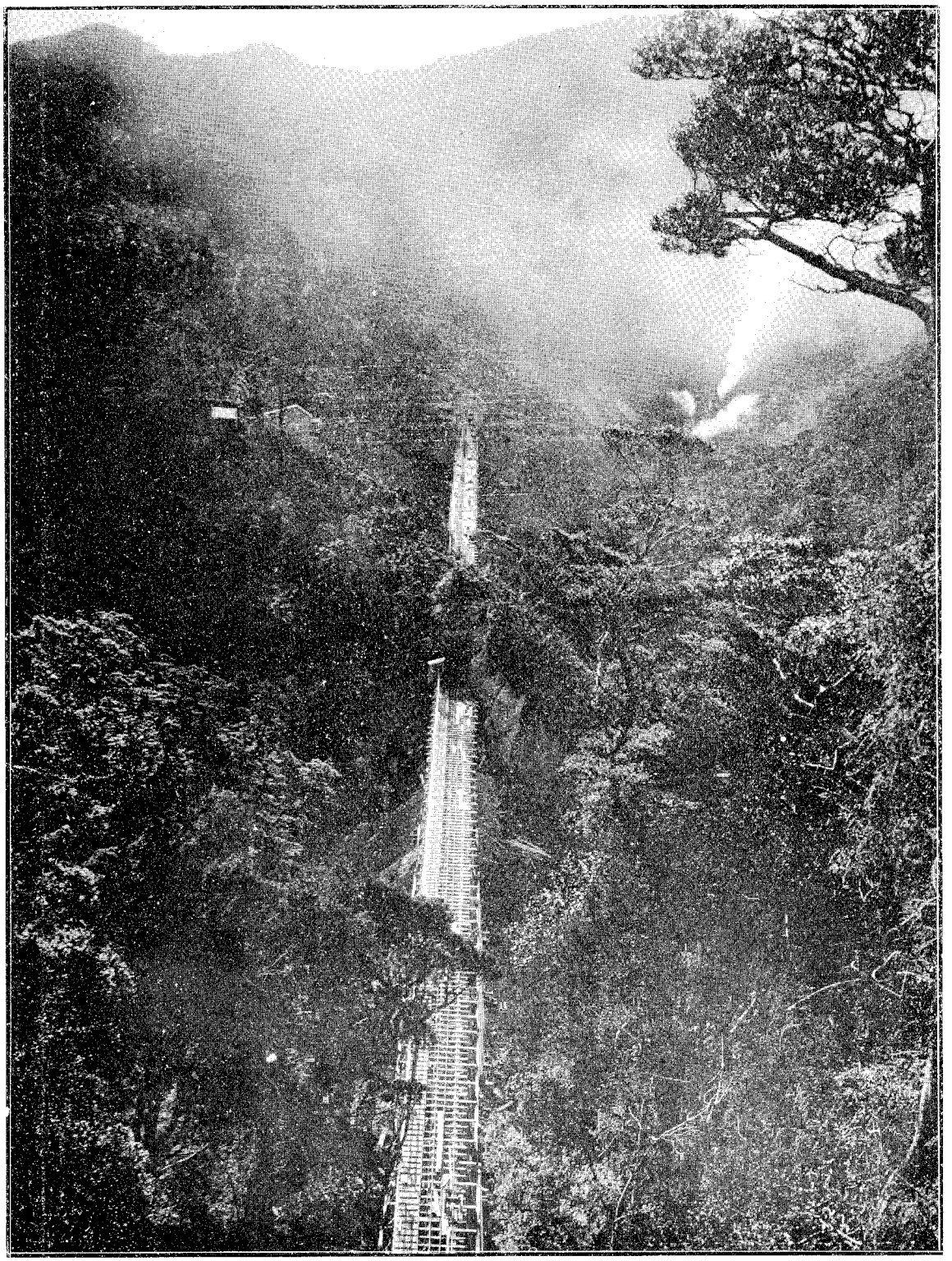


Point Elizabeth (Liverpool) Colliery.—Coal-storage Bins, South End.

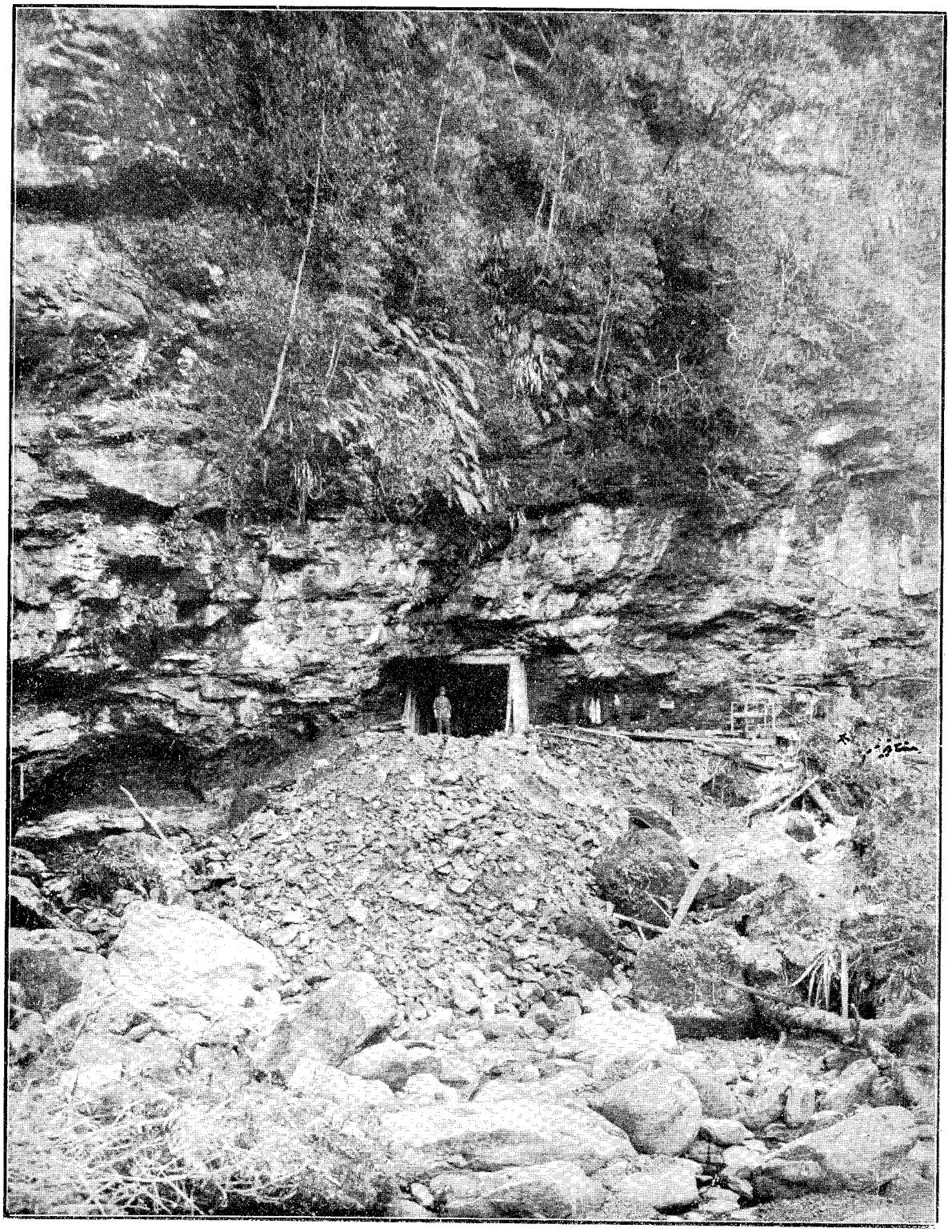
Liverpool State Colliery, Greymouth.—Viaduct approaching Middle Hydraulic Brake on Main Endless-rope Gravitation-haulage Incline.



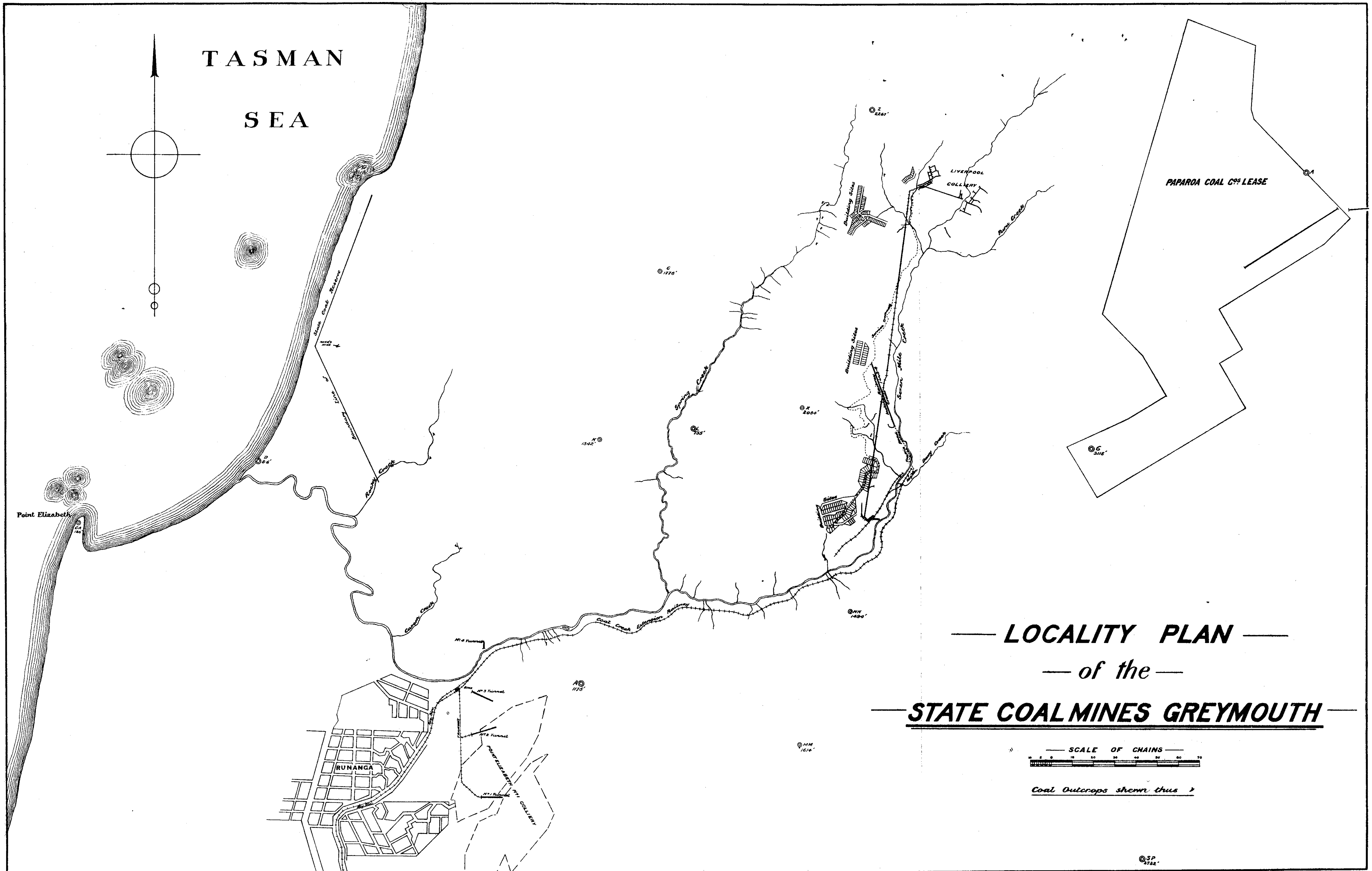
Liverpool State Colliery, near Greymouth. Screens and Storage-bins during Construction. Capacity, 1,000 Tons.



Liverpool State Colliery, near Greymouth.—Viaduct approaching Upper Hydraulic Brake near Mine-mouth on Main Endless-rope Gravitation-haulage Incline.



Liverpool State Colliery, near Greymouth.—Tunnel being driven for Electric-tramway Line for Conveyance of Workers.


TASMAN
SEA
State Coal Reserve
Boundary Line of
Rocky Creek
Point Elizabeth
D 8·6'
CA 126'
C 1776'
Z 2261'
K 1342'
L 735'
X 2084'
NN 1494'
A 1175'
MM 1614'
G 3115'
SP 2732'
Spring Creek
Coal Creek Extension Railway
Building Sites
Seven Mile Creek
LIVERPOOL
COLLIERY
PAPAROA COAL C^os LEASE
No 4 Tunnel
No 3 Tunnel
No 2 Tunnel
No 1 Tunnel
TRAMWAY
POINT ELIZABETH No 1 COLLIERY
RUNANGA
LOCALITY PLAN
of the
STATE COALMINES GREYMOUTH
SCALE OF CHAINS
10 5 0 10 20 30 40 50 60 70
Coal Outcrops shewn thus

1750.7.13.559.

STATE MINES OF NEW ZEALAND

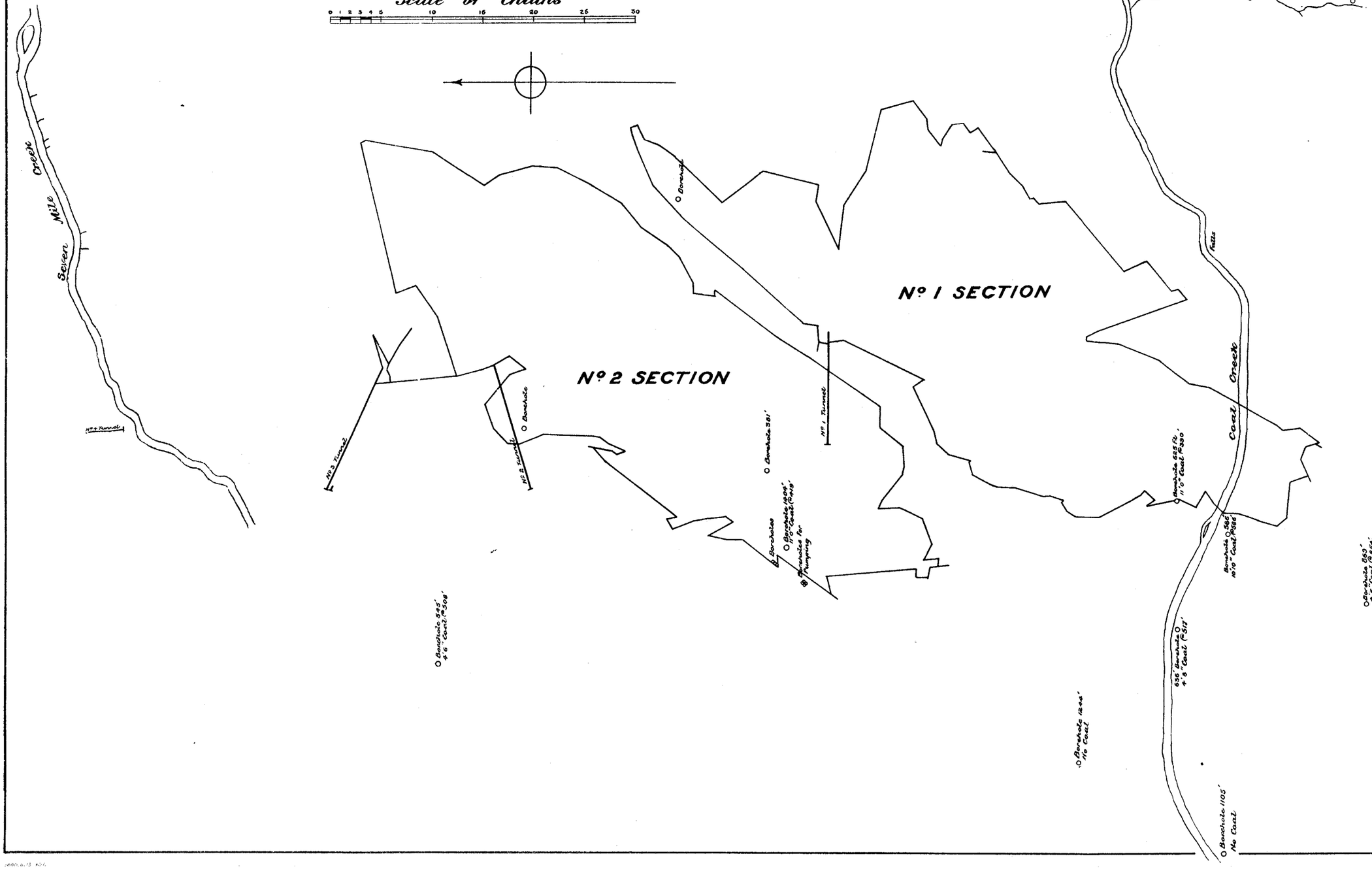
PLAN

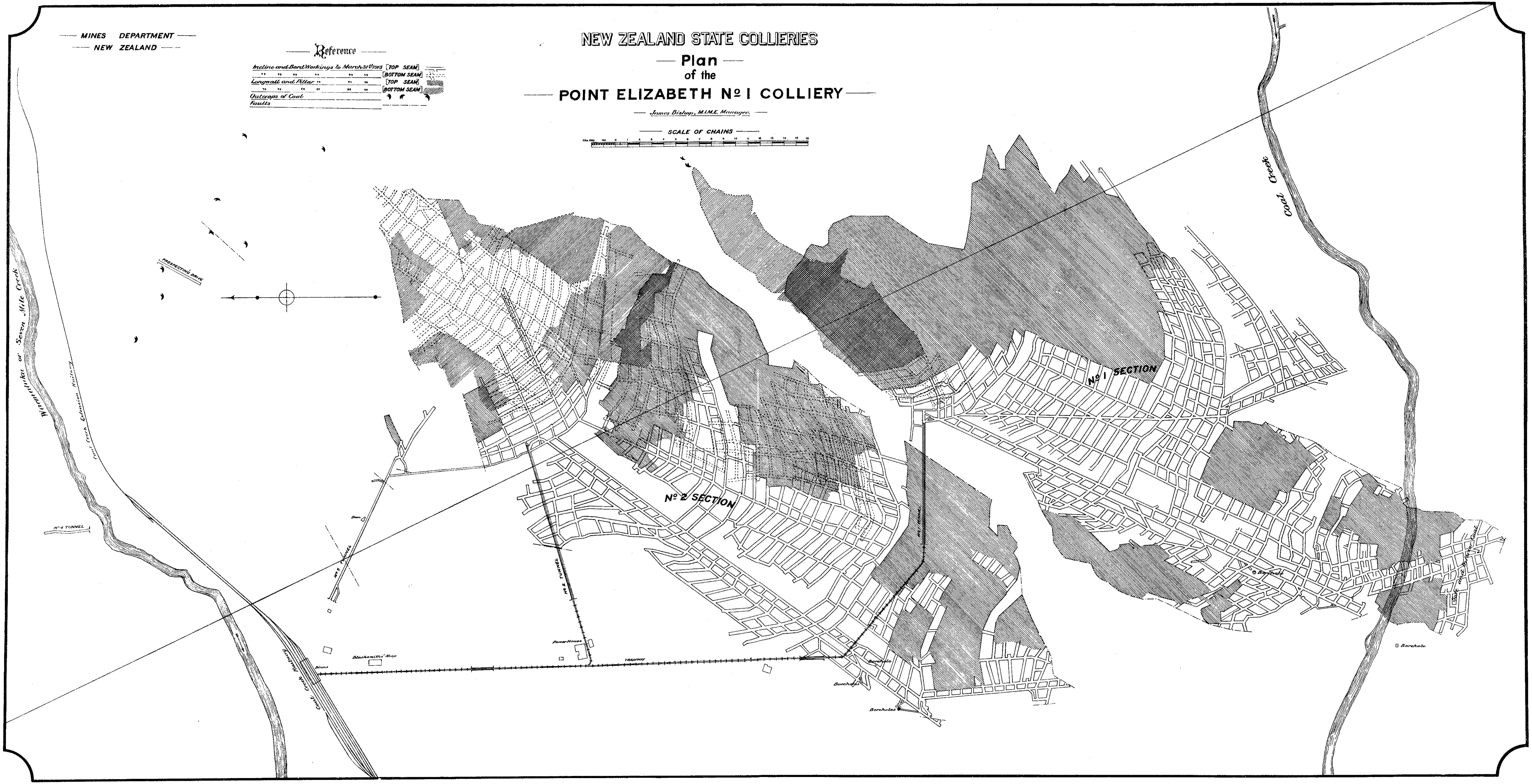
shewing positions of Boreholes around

Nº 1 COLLIERY

Scale of Chains

0 1 2 3 4 5 10 15 20 25 30




MINES DEPARTMENT
NEW ZEALAND
NEW ZEALAND STATE COLLIERIES
Plan
of the
POINT ELIZABETH Nº I COLLIERY
James Bishop, M.I.M.E. Manager.
SCALE OF CHAINS
Reference
Incline and Bord Workings to March 31st 1913 [TOP SEAM]
" " " " " " [BOTTOM SEAM]
Longwall and Pillar " " " [TOP SEAM]
" " " " " " [BOTTOM SEAM]
Outcrops of Coal
Faults
PROSPECTING DRIVE
Waimatuku or Seven Mile Creek
Coal Creek Extension Railway
Nº 4 TUNNEL
Nº 3 TUNNEL
Dam
Nº 2 TUNNEL
Nº 2 SECTION
Nº I SECTION
Coal Creek
Power House
Blacksmiths' Shop
Binns
Coal Creek Railway
TRAMWAY
Borehole
Boreholes
Borehole
Borehole

NEW ZEALAND STATE COLLIERIES

— Plan of the —

— SEDDONVILLE STATE COLLIERY —

(I.A. James Manager)

— Scale of Chains —

1 Ks. 100 50 0 5 10 15 Chs.

— Reference —

Incline and Bord Workings to March 31st 1913

Pillar – – – do – – – – do – – –

Outcrops of coal – – – – – – – –

Stoppings to seal off heated portions

Borehole No 10

No 5 bore

No 9 bore

West Workings

No 2 bore

Shaft

No 8 bore

No 3 bore

Borehole

Shaft

Main West Level

Main haulage Road

Cave

Cave Workings

Granite Area

Fault Line

South Workings

Chasm Creek

Lowe's Ck

Dove's Section

Fault

Grants face

Bridge

Bridge Section

H.C. North 26/5/13

1750-6.13.461.

—— POINT ELIZABETH Nº 2 COLLIERY. ——

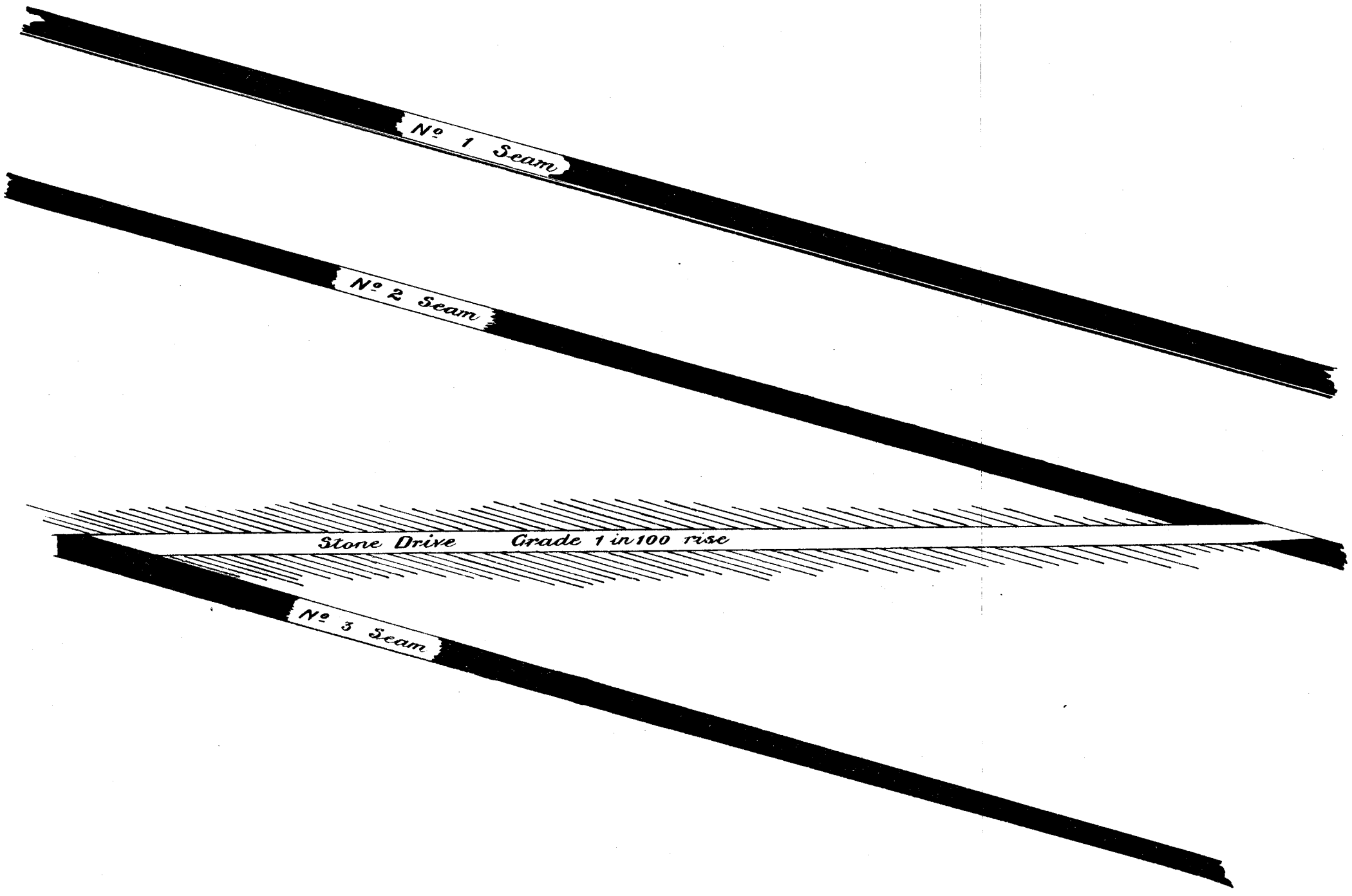
—— IDEAL SECTION OF ——

—— Proposed Cross-Measures Drive from ——

—— Nº 3 Seam to Nº 2 Seam. ——

SCALE OF FEET

0 10 20 30 40 50 60 70 80 90 100



1800.6.13.438

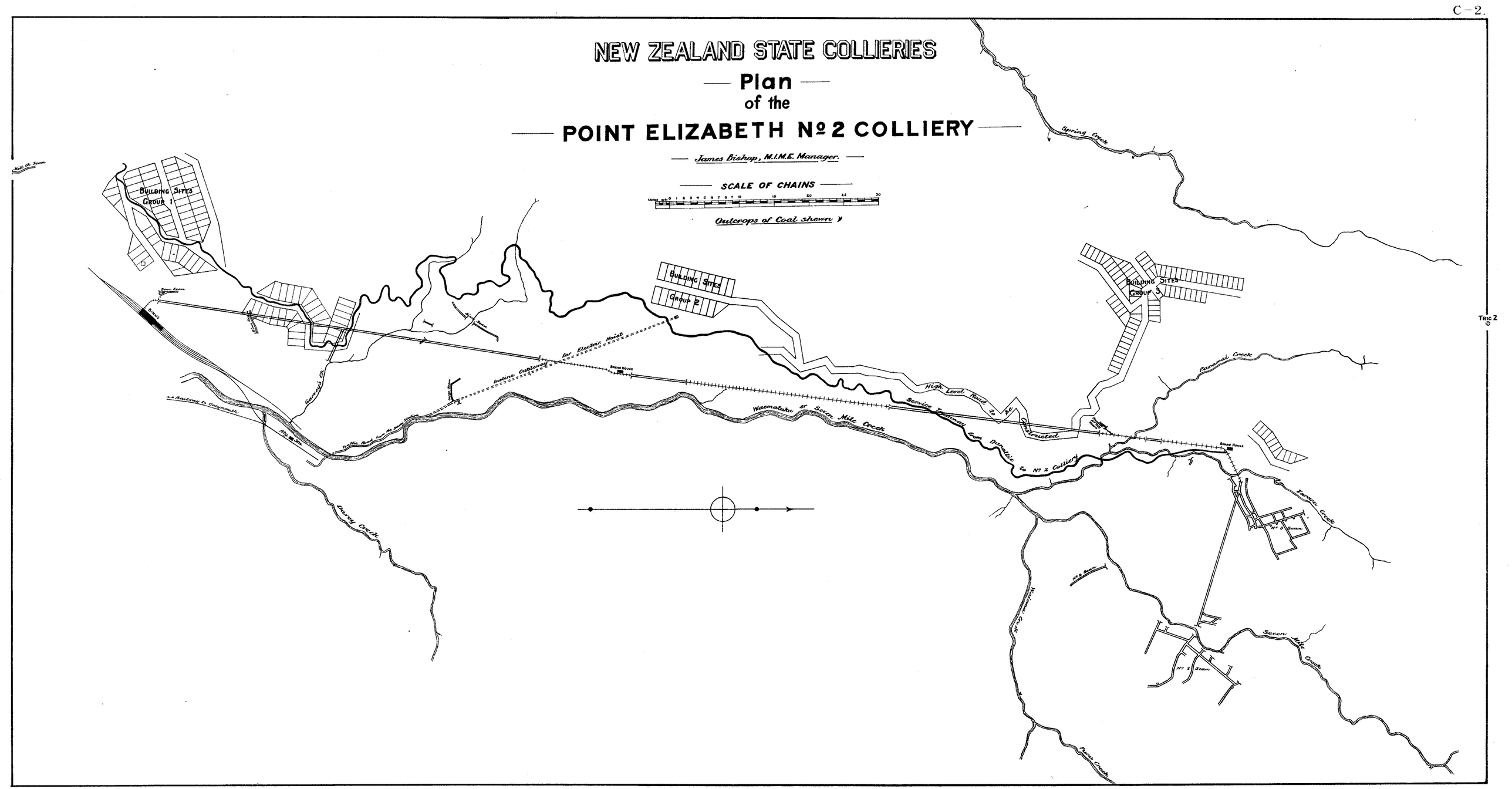
NEW ZEALAND STATE COLLIERIES

— Plan —
of the
— POINT ELIZABETH Nº 2 COLLIERY —

— James Bishop, M.I.M.E. Manager. —

SCALE OF CHAINS

Outcrops of Coal shewn



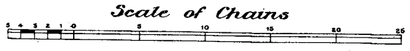
1800-C.12.633

STATE MINES OF NEW ZEALAND.

— PLAN OF —

N.W. CORNER OF STATE COAL RESERVE

Shewing Position of Kane's Workings



STATE COAL RESERVE

Kane's Workings

Coal Outcrop

Coal Outcrop

BOUNDARY LINE

Rocky Creek

TASMAN SEA

Cascade Creek

Seven Mile Creek

No.4 Tunnel

No.3 Tunnel

COAL CREEK RAILWAY

Tramway to Mine

DUNOLLIE

1750-9.13.434.