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1917.

NEW ZEALAND.

MINES STATEMENT

BY THE HON. W. D. S. MacDONALD, MINISTER OF MINES.

MR. SPEAKER,—

I have the honour to present to Parliament the Mines Statement for the year ended the 31st December, 1916.

The value of minerals exported, together with that of the coal-output for 1916, amounted to £2,978,436, as compared with £3,374,523 for 1915, being a decrease of £396,087 (or 11·7 per cent.). It is satisfactory, however, to state that the decrease is more apparent than real, and is confined almost wholly to gold, the export of which during 1915 was inflated by the shipment of gold accumulated during the latter part of 1914, but prohibited from export by statute.

The production of coal, kauri-gum, tungsten-ore, and other mineral substances, including the output from our stone-quarries, has considerably increased, notwithstanding the abnormal conditions caused by the Great War and the shortage of labour.

The output of coal amounted to 2,257,135 tons, being an increase of 48,511 tons above that of the previous year, and, with the exception of that of 1914, constitutes a record for the Dominion. The output per person employed underground amounted to 750 tons, which is the highest attained in New Zealand, and has been exceeded on only one occasion in Australasia, and then only by 1 ton.

The value of tungsten-ore exported during the year, which also constituted a record, amounted to £49,070, as against £27,784 for the previous year. Though this increase must be attributed partly to the increased price paid by the Imperial Government for this commandeered mineral, it is in the main due to greater production.

MINERAL-PRODUCTION.

The following table shows the quantity and value of gold, silver, and other minerals, coal, and kauri-gum exported during the years 1915 and 1916, also the quantity of native coal consumed in the Dominion during the same periods :—

Product.	Year ended 31st December, 1915.		Year ended 31st December, 1916.	
	Quantity.	Value.	Quantity.	Value.
		£		£
Gold	422,825 oz.*	1,694,553*	292,620 oz.	1,199,212
Silver	957,541 „ *	95,583*	787,053 „	85,111
Tungsten-ore	194 tons	27,784	266 tons	49,070
Mixed minerals	3,450 „	5,377	7,335 „	14,614
New Zealand coal exported	323,992 „	329,731	328,183 „	326,553
New Zealand coal used in New Zealand	1,884,632 „	942,316	1,928,952 „	964,476
Kauri-gum	4,575 „	279,133	5,448 „	339,343
Coke	23 „	46	33 „	57

	£
Total value for 1916	2,978,436*
„ 1915	3,374,523

* The value of the bullion produced as stated in the official returns from the mines amounted to £1,192,197.

AURIFEROUS-QUARTZ MINING.

The value of bullion obtained from our quartz-mines during 1916 amounted to £944,188, as a result of treating 442,362 statute tons of quartz.

The dividends distributed by gold-quartz mining companies amounted to £185,065.

The following is a statement of the quantity of quartz treated, the value of bullion obtained, and the amount of dividends paid by the more important quartz-mining companies during 1916 :—

Name of Company.	Quantity of Quartz treated.	Value of Bullion.	Dividends paid.	
			1916.	Total to End of December, 1916.
	Statute Tons.	£	£	£
Waihi Gold-mining Company (Limited)	173,420	363,612	99,181	4,776,083
Waihi Grand Junction Gold-mining Company (Limited)	112,203	211,108	38,438	190,188
Talisman Consolidated (Limited)	16,935	81,454	17,250	1,047,472
Blackwater Mines (Limited)	40,247	78,590	24,999	162,445
Other quartz-mines	99,557	209,424	5,197	*
Totals	**442,362**	**944,188**	**185,065**	*

* Unknown.

The average value per ton of ore treated amounted to £2 2s. 8d.

ALLUVIAL AND DREDGE MINING.

The value of the production from alluvial claims amounted to £123,492, as compared with £153,360 during the previous year, a decline of £29,868, which was chiefly confined to West Coast claims. During 1916 there was a revival of interest in West Coast alluvial mining, the result of payable prospects being obtained by Government Keystone drills operated at Rimu Flat, near Hokitika, by an Australian company. A number of dredging and sluicing claims have been taken up by strong companies, and a dredge and a sluicing plant have been installed thereon. The gold-production from alluvial claims for the current year may therefore show an improvement over that of 1916.

The Howard goldfield, which was discovered early in 1915, and is situated on a tributary of the upper Buller River, has not proved extensive or rich, and the number of miners thereon has declined during the past year.

The gold-dredging industry continues to decline, the number of bucket-dredges in commission having decreased from fifty-two during 1915 to forty-five during 1916, and the gold-production from £164,605 to £125,317.

COAL-MINING.

The output of coal during 1916 amounted to 2,257,135 tons, as compared with 2,208,624 tons during 1915, being an increase of 48,511 tons.

The principal activity in the coal-mining industry occurred in the Westport, Greymouth, and Huntly districts.

The following is a comparative statement of the coal and lignite raised during the years 1914, 1915, and 1916 :—

Inspection District.	Output for 1915.	Output for 1916.	Increase 1916.	Output for 1914.	Increase or Decrease, between Years 1915 and 1914.
	Tons.	Tons.	Tons.	Tons.	Tons.
Northern (North Island) ..	460,415	486,114	25,699	440,453	*Inc.* 19,962
West Coast (South Island) ..	1,278,994	1,295,635	16,641	1,351,182	*Dec.* 72,188
Southern (Canterbury, Otago, and Southland)	469,215	475,386	6,171	483,958	,, 14,743
Totals	**2,208,624**	**2,257,135**	**48,511**	**2,275,593**	**Dec. 66,969**

The comparative tonnage of the various classes of coal for the years 1915 and 1916 is summarized as follows :—

Class.	Output for 1916.	Output for 1915.	Increase or Decrease for 1916.
	Tons.	Tons.	Tons.
Bituminous and semi-bituminous coal ..	1,422,074	1,404,400	*Increase* 17,674
Brown coal	653,898	725,001	*Decrease* 71,103
Lignite	181,163	79,223	*Increase* 101,940
Totals	**2,257,135**	**2,208,624**	**Increase 48,511**

The coal-production, satisfactory as it is, would have been greater had the coal-miners continued to maintain the maximum output, but unfortunately the output was considerably curtailed during November and December in several of the mines.

This restriction, which became more general during February and March of the current year, culminated in strikes lasting a fortnight or more in several coal-mining districts. I am glad to be able to say, however, that since the resumption of work no trace of the go-slow policy has been seen, and the output of all the mines has been normal.

TUNGSTEN-ORE (SCHEELITE).

The quantity and value of tungsten-ore exported during 1916 constitutes a record, amounting to 266 tons, value £49,070, as compared with 194 tons, value £27,784, during 1915. Owing to the commandeering by the Imperial Government at a fixed import price of £2 15s. per unit (1 per cent.) of tungstic acid—an increase of about 80 per cent. above the average *ante bellum* price—there has been increased activity in mining and prospecting for scheelite and other tungsten minerals during the year. The principal operations have been carried out in the locality of Glenorchy, where scheelite-quartz lodes have been found to extend from Mount Judah, in the Richardson Range, which flanks Lake Wakatipu, to the eastward to the Dart River, westward of Paradise, a distance of about twelve miles, and to occur at varying altitudes up to 5,000 ft. above the lake. The known ore-deposits are, however, too small and intermittent to warrant any large capital expenditure for their exploitation, and the present method of operation by small and economically managed mines may be commended.

SULPHUR.

During the year inquiries were made on behalf of the Imperial Government as to the price at which sulphur could be shipped from New Zealand; as a result of such inquiries an inspection was made, and a report was supplied to me, of which the following is a brief summary :—

Native sulphur in sufficient quantity to be profitably worked is known to occur only in the thermal districts of the North Island (near Rotorua and Lake Taupo), and at White Island. The most extensive deposits occur at Tauhara North, near Taupo. With the exception of the small lake deposit on White Island, all the known native sulphur is reported to occur in the form of pockets in pumice or sinter around fumaroles or thermal springs.

These deposits, although of high grade generally, are small in comparison with those of massive form in seams or veins as extensively worked in Japan, Sicily, and North America. Owing to the nature of the deposits and to transport difficulties it is unlikely that sulphur can, under normal conditions, be exported from New Zealand to compete with the supplies of the above-mentioned countries. Since the beginning of the present year, however, sulphur has risen to very high prices in the London market.

Prior to 1898 there was no separate record kept of the quantity of native sulphur exported from New Zealand; between 1898 and 1902, however, 4,727 tons, value

£13,239, were exported to Australia. Since 1902 the small quantity of sulphur produced has been used at chemical-works in the Dominion.

During 1916 a lease was granted by the Department of Tourist and Health Resorts to Messrs. Kempthorne, Prosser, and Co's. New Zealand Drug Company of portion of the Rotorua Sanatorium Reserve for the purpose of obtaining sulphur therefrom, a royalty of 15s. per ton being charged. Prior to 1916 the company obtained from that land 3,204 tons of sulphur for refinement at its Auckland works, a royalty of 5s. per ton being charged. During 1916, after the lease was granted, 466 tons were obtained.

PETROLEUM.

Operations in search of petroleum have been confined almost wholly to the Taranaki District, and these have been uneventful. The Blenheim well of the Taranaki Oil Lands Acquisition and Development Company (Limited) on the 2nd July, 1917, had attained a depth of 5,014 ft. At 2,200 ft. a small flow of petroleum occurred.

The Huiroa bore of the Consolidated Oilfields on the 2nd May, 1917, was 4,921 ft. deep, and had tapped a small amount of gas, but nothing more than a trace of oil.

The operations of the Taranaki Oil-wells (Limited), at Moturoa, were confined to recasing its No. 2 well and to the separation of benzine from the crude oil yielded by its Nos. 3 and 5 wells.

KAURI-GUM.

The quantity of kauri-gum exported during 1916 amounted to 5,448 tons, value £339,343, as compared with 4,575 tons, value £279,133, during 1915, an increase of 873 tons and £60,210. The total value of kauri-gum exported to the end of the year amounted to £17,875,483.

The European market for this fossil resin—used in the manufacture of varnish and linoleum—being greatly restricted by the present war, new but smaller markets have been obtained.

During the year the distillation of kauri-gum oil from peat in North Auckland was resuscitated after a lapse of years. The peat yields from 20 to 30 gallons of oil per ton. About 25 per cent. of the product is stated to resemble petrol, and it is being used to propel motor-cars and launches.

STONE-QUARRIES.

For the closer inspection of those 283 quarries and places which come under the operations of the Stone-quarries Act, 1910, at which about 1,648 persons were employed during the year, the whole of the statutory inspection has been transferred to the Inspectors of Mines, and an additional Inspector has been appointed for the North Island quarries.

During 1916 the output of crude stone from the above quarries amounted to 1,331,003 tons.

The quarrying industry of the Dominion is increasing in magnitude rapidly, and promises to become of considerable importance, this being due to the great variety and excellence of our building-stone and to the quantity, high quality, and general distribution of limestone for agriculture and cement-manufacture.

At the recent Panama-Pacific Exposition held at San Francisco an exhibit of New Zealand building-stone by the Mines Department in open competition was awarded a gold medal.

PERSONS ENGAGED IN MINING.

The number of persons employed in and about the mines of the Dominion during 1916 is estimated at 7,701, or 660 less than the number employed during the previous year. The number employed at metalliferous mines was 3,713, and at coal-mines 3,988. The number of gum-diggers is not known.

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.			Totals.		
	Northern.	West Coast.	Southern.	1916.	1915.	Decrease.
Gold, silver, and tungsten ore	1,693	1,144	866	3,703	4,193	490
Coal	838	2,221	929	3,988	4,156	168
Other minerals	5	..	5	10	12	2
Totals	**2,536**	**3,365**	**1,800**	**7,701**	**8,361**	**660**

MINING ACCIDENTS.

The number of lives lost at metalliferous mines during 1916 was nine, the proportion of deaths per 1,000 persons employed being 2·42.

At collieries six lives were lost, being at the rate of 1·5 per 1,000 persons employed, or an output of 376,189 tons per life lost.

At the North Island collieries no fatal accident happened during the year, and at the collieries of Canterbury, Otago, and Southland none has occurred during the past three years and a half—a remarkable record.

At those operations which are regulated by the Stone-quarries Act, 1910, two lives were accidentally lost, being at the rate of 1·24 per 1,000 persons ordinarily employed.

At Government quarries, which do not come under the operations of the Act, and are therefore not inspected by officers of the Mines Department, seven lives were accidentally lost during the year, and four during 1915. It appears to be desirable that Government quarries should be brought under the operations of the Stone-quarries Act. No difficulties have hitherto arisen through Government machinery being under the provisions of the Inspection of Machinery Act and State collieries being under the provisions of the Coal-mines Act.

GEOLOGICAL SURVEY.

Owing to reductions in the regular staff, caused by war conditions and by resignations, detailed field-work was done only in Taranaki. Officers of the Survey, however, visited a large number of localities in order to furnish reports on coal, limestone, phosphate-deposits, &c. The publications during the year ended the 31st May included only the Annual Report and Bulletin No. 18, which deals with the geology and mineral resources of the Reefton district. Three elaborate palæontological reports are about to be issued, and several bulletins dealing with areal geology are in various stages of preparation and publication. Data for a fairly complete report on the limestone and phosphate deposits of the Dominion have been obtained, and are being assembled for publication as rapidly as the small staff and other work on hand will permit.

STATE COLLIERIES.

The output from State collieries during 1916 was 277,845 tons, of which 140,917 tons was produced from the Point Elizabeth Colliery, and 136,928 tons from the Liverpool Colliery. The output from the two collieries exceeded that of the previous year by 39,645 tons. The State coal business during the year ended the 31st March last resulted in a profit of £18,521 5s. 9d., as compared with a profit of £2,515 during the previous year. The average price realized for State coal during the twelve months was 19s. 4·76d. per ton, as compared with 16s. 8·71d. per ton for the preceding year.

The Point Elizabeth Colliery will probably be worked out within the next twelve months, and thereafter considerable difficulty will be experienced in supplying coal to meet the demand, especially for railway and household requirements. Investigations have been made during the past eighteen months with a view to discovering a locality where a new State mine could be successfully established. The reports obtained were not sufficiently encouraging to enable any decided opinion as to the advisability of embarking on a new colliery to be formed.

SCHOOLS OF MINES.

The expenditure by the Department on the schools of mines situated at Coromandel, Thames, Karangahake, Waihi, and Huntly, in the North Island, and at Westport and Reefton in the South Island, amounted during the year ended the 31st March, 1917, to £3,792 13s. 6d. The total expenditures on these schools, exclusive of subsidies paid to the University of Otago School of Mines, amounted on the 31st March, 1917, to £70,390 9s. 1d. At the annual Government examinations at these schools no student competed for any of the six scholarships offered annually by the Government. It is now several years since a scholarship has been gained, notwithstanding that the conditions have been considerably relaxed.

SUBSIDIZED PROSPECTING.

During the year ended 31st March, 1917, seventeen approved prospecting parties were granted subsidies amounting to £6,506 13s. 4d., of which £5,353 13s. 4d. was expended during that period. Upon these subsidized operations and those subsidized previously twenty-two parties, employing sixty-seven persons, were during 1916 engaged in prospecting. The results as yet attained have been unimportant.

ROADS AND TRACKS.

The expenditure on roads and tracks by subsidies and direct grants during the financial year ended 31st March, 1917, amounted to £17,098 6s. 3d.

GOVERNMENT WATER-RACES.

The Waimea–Kumara and Mount Ida water-races, which render possible hydraulic mining in the Kumara district, Westland, and the Naseby district, Central Otago, have during 1916 supplied seventy miners with water for sluicing, by which gold to the approximate value of £14,683 was obtained. The cash received for water sold amounted to £2,609, and the expenditure on the upkeep of the races was £3,462. These races are therefore not self-supporting, and no allowance for interest on capital expenditure or depreciation has been made. During 1916 the average annual earnings per miner using Government water, after deducting the amount paid for the same, was £170, being £10 less than during the previous year. From these earnings must be subtracted all expenditure on plant and material, also rent and other incidental expenses; it will thus be seen that the alluvial miners using Government water appear to be satisfied to work for less than the current rate of wages in other arduous occupations.

COAL-MINERS' RELIEF FUND.

As required by the Coal-mines Act, 1908, the owner of every coal-mine contributes ½d. per ton on all coal sold, for the relief of coal-miners who may be injured whilst working, and for the relief of families of coal-miners who may be killed or injured.

The following is a statement of the accounts of the fund during the two last financial years:—

	Year ended 31st March, 1916.	Year ended 31st March, 1917.
	£	£
Contributions	1,966	1,980
Allowances on account of accidents, &c.	1,526	1,427
Balance	7,303	8,172

PROVISION FOR PERSONS TOTALLY INCAPACITATED BY MINERS' PHTHISIS.

By the passing of the Miners' Phthisis Act, 1915, the Gold-miners' Relief Fund was abolished; and provision is now made in the new Act for a pension of £1 per week being paid to a married man or a widower with young children, and 15s. per week to a single man who is or becomes totally incapacitated for work owing to miners' phthisis contracted while working as a miner in New Zealand. In addition to this, the widow of any pensioner under the Act who dies from that disease is entitled to a pension of 12s. 6d. per week for two years. Funeral expenses to the extent of £20 are also provided for. Duty of 3d. per ounce on all gold exported is reserved for these pensions, and the Act is administered by the Commissioner under the Pensions Act, 1913.

TABLES TO ACCOMPANY THE MINES STATEMENT.

No. 1.

TABLE SHOWING THE QUANTITY AND VALUE OF GOLD AND OTHER MINERALS ENTERED FOR EXPORTATION DURING THE YEARS ENDED THE 31ST DECEMBER, 1915 AND 1916, AND THE TOTAL VALUE SINCE THE 1ST JANUARY, 1853. THE COAL-OUTPUT IS ALSO INCLUDED.

Name of Metal or Mineral.	For Year ended the 31st December, 1916.		For Year ended the 31st December, 1915.		Total from the 1st January, 1853, to the 31st December, 1916.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Precious metals—	Oz.	£	Oz.	£	Oz.	£
Gold	292,620	1,199,212	422,825	1,694,553	21,827,711	85,847,675
Silver	787,053	85,111	957,541	95,583	20,127,377	2,181,493
Total gold and silver	1,079,673	1,284,323	1,380,366	1,790,136	41,955,088	88,029,168
Mineral produce, including kauri-gum—	Tons.	£	Tons.	£	Tons.	£
Copper-ore	..	..	..	..	1,498	19,209
Chrome-ore	..	..	..	..	5,869	38,002
Antimony-ore	..	..	..	..	3,768	54,941
Manganese-ore	..	..	..	..	19,364	61,905
Hæmatite ore	..	..	..	..	77	469
Tungsten-ore	266	49,070	194	27,784	1,833	201,550
Sulphur (crude)	..	..	..	..	4,927	13,239
Mixed minerals*	7,335	14,614	3,450	5,377	51,322	224,877
Coal (New Zealand) exported	328,183	326,553	323,992	329,731	4,491,115	4,193,379
Coke exported	33	57	23	46	16,564	25,126
Coal, output of mines in Dominion (less exports)	1,928,952	964,476	1,684,632	942,316	39,599,056	19,707,717
Oil-shale	..	..	..	..	14,444	7,236
Kauri-gum	5,448	339,343	4,575	279,133	349,271	17,875,483
Total quantity and value of minerals	2,270,217	1,694,113	2,216,866	1,584,387	44,559,108	42,423,133
Value of gold and silver, as above ..	..	1,284,323	1,380,366	1,790,136	..	88,029,168
Total value of minerals produced, including gold and silver	..	2,978,436	3,597,232	3,374,523	..	130,452,301

* Including concentrates, slimes, and tailings, 2,646 tons; jewellers' sweepings, 1$\frac{3}{20}$ tons; greenstone, 35$\frac{1}{20}$ tons; marble 20 tons; pumice-sand, 4,064 tons; pumice-stone, 152 tons; pyrites, 4 tons; building-stone, 24 tons; stone (rough), 8 tons; and lime, 391 tons.

No. 2.

TABLE SHOWING THE QUANTITY AND VALUE OF GOLD ENTERED FOR EXPORTATION FROM NEW ZEALAND DURING THE YEARS ENDED THE 31ST DECEMBER, 1915 AND 1916, AND THE TOTAL QUANTITY AND VALUE FROM 1857 TO THE 31ST DECEMBER, 1916.

District and County or Borough.	Year ended 31st December, 1916.		Year ended 31st December, 1915.		Increase or Decrease for Year ended 31st December, 1916.		Total Quantity and Value from January, 1857, to 31st December, 1916.	
	Quantity.	Value.	Quantity.	Value.	Increase.	Decrease.		
AUCKLAND—	Oz.	£	Oz.	£	Oz.	Oz.	Oz.	£
County of Coromandel ..	2,745	11,441	1,428	5,849	1,317	..	..	..
County of Thames ..	10,456	42,903	7,581	30,996	2,875	..	..	..
County of Ohinemuri ..	43,638	182,663	58,675	240,779	..	15,037	..	..
County of Piako	131	550	409	1,697	..	278	..	..
Borough of Thames ..	1,939	7,511	1,710	6,592	229	..	..	..
Borough of Paeroa ..	2,633	11,175	..	..	2,633	..	..	..
Borough of Waihi ..	127,043	537,724	144,969	577,643	..	17,926	..	..
	188,585	**793,967**	214,772	863,556	..	26,187	**6,343,012**	**24,316,939**
WELLINGTON	..	..	..	..	..	..	**188**	**706**
MARLBOROUGH—								
County of Marlborough ..	**2,319**	**9,012**	3,568	13,864	..	1,249	**99,301**	**386,676**
NELSON—								
County of Waimea ..	4	16	5	21	..	1	..	..
County of Collingwood ..	310	1,241	446	1,805	..	136	..	..
County of Takaka ..	4	16	..	..	4	..	..	..
County of Murchison ..	1,856	7,425	46	184	1,810	..	..	..
	2,174	**8,698**	497	2,010	1,677	..	**1,733,968**	**6,874,704**
WEST COAST—								
County of Buller	2,030	7,566	5,421	20,299	..	3,391	..	..
County of Inangahua ..	51,716	195,386	92,415	365,555	..	40,699	..	..
County of Grey	4,361	17,348	7,989	32,573	..	3,628	..	..
County of Westland ..	6,116	24,821	9,321	37,788	..	3,205	..	..
Ross Borough	623	2,492	3,191	12,768	..	2,568	..	..
Kumara	346	1,384	1,830	7,320	..	1,484	..	..
Hokitika	..	..	915	3,662	..	915	..	..
	65,192	**248,997**	121,082	479,965	..	55,890	**6,088,047**	**24,175,377**
CANTERBURY—								
County of Selwyn ..	**4**	**19**	13	52	..	9	**116**	**458**
OTAGO—								
County of Taieri	202	830	397	1,617	..	195	..	..
County of Tuapeka ..	8,804	35,359	16,809	68,021	..	8,005	..	..
County of Vincent ..	8,724	35,275	24,199	97,996	..	15,475	..	..
County of Maniototo ..	3,304	13,158	3,882	15,479	..	578	..	..
County of Waihemo ..	97	386	551	2,096	..	454	..	..
County of Waitaki ..	820	3,238	1,140	4,569	..	320	..	..
County of Bruce	416	1,662	1,962	7,943	..	1,546	..	..
County of Lake	1,415	5,679	4,003	16,164	..	2,588	..	..
County of Wallace ..	131	546	4,093	16,575	..	3,962	..	..
County of Fiord	4	16	40	161	..	36	..	..
County of Southland ..	10,150	41,290	24,147	98,545	..	13,997	..	..
County of Clutha	3	8	18	66	..	15	..	..
County of Waikouaiti ..	..	..	587	2,262	..	587	..	..
	34,070	**137,447**	81,828	331,494	..	47,758	**7,559,266**	**30,078,588**
Unknown	**276**	**1,072**	1,065	3,612	..	789	**3,813**	**14,227**
Totals	**292,620**	**1,199,212**	422,825	1,694,553	..	130,205	**21,827,711**	**85,847,675**

No. 3.

GOLD PRODUCED, 1857 TO 1916.

TABLE SHOWING THE TOTAL QUANTITY AND VALUE OF GOLD ENTERED FOR EXPORTATION FROM THE 1ST JANUARY, 1857, TO THE 31ST DECEMBER, 1916. (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.
		£		£		£		£		£		£		£		£
Prior to 1914	5,823,841	22,203,539	310,983	1,229,258	92,330	359,612	7,259,953	28,841,373	7,396,809	29,423,234	273	1,044	123	483	20,884,312	82,058,543
1914 ..	115,814	455,877	895	3,581	930	3,611	61,393	236,776	48,922	195,522	..	..	..	..	227,954	895,367
1915 ..	214,772	863,556	497	2,010	3,568	13,864	121,082	479,965	82,893	335,106	..	..	13	52	422,825	1,694,553
1916 ..	188,585	793,967	2,174	8,698	2,319	9,012	65,192	248,997	34,346	138,519	..	..	4	19	292,620	1,199,212
Totals ..	6,343,012	24,316,939	314,549	1,243,547	99,147	386,099	7,507,620	29,807,111	7,562,970	30,092,381	273	1,044	140	554	21,827,711	85,847,675

No. 4.

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

Year.	Coal and Shale raised in the Dominion.		Coal imported.		
	Tons.	Yearly Increase or Decrease.	Tons.	Increase over Preceding Year.	Decrease below Preceding Year.
Prior to 1878	709,931	..	..	..	..
1878	162,218	..	174,148	..	..
1879	231,218	*Inc.* 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	*Inc.* 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	*Inc.* 111,542	364,359	176,291	..
1913	1,888,005	*Dec.* 289,610	468,940	104,581	..
1914	2,275,614	*Inc.* 387,609	518,070	49,130	..
1915	2,208,624	*Dec.* 66,990	353,471	..	164,599
1916	2,257,135	*Inc.* 48,511	293,956	..	59,515

No. 5.

TABLE SHOWING THE OUTPUT OF COAL FROM THE VARIOUS COALFIELDS, AND THE COMPARATIVE INCREASE AND DECREASE, FOR THE YEARS 1915 AND 1916, TOGETHER WITH THE TOTAL APPROXIMATE QUANTITY OF COAL PRODUCED SINCE THE MINES WERE OPENED.

Name of Coalfield.	Output.		Increase.	Decrease.	Approximate Total Output up to 31st December, 1916.
	1916.	1915.			
	Tons.	Tons.	Tons.	Tons.	Tons.
North Auckland	126,506	117,882	8,624	..	3,512,634
Waikato (including Mokau) ..	359,608	342,533	17,075	..	4,560,665
Nelson	26,147	26,629	..	482	308,671
Buller	714,015	710,969	3,046	..	14,401,071
Inangahua	11,402	12,151	..	749	264,509
Grey	544,071	529,245	14,826	..	8,710,458
Canterbury	19,465	15,954	3,511	..	718,597
Otago	281,552	293,604	..	12,052	8,853,137
Southland	174,369	159,657	14,712	..	2,760,429
Totals	**2,257,135**	2,208,624	48,511	..	**44,090,171**

No. 6.

TABLE SHOWING THE OUTPUT OF DIFFERENT CLASSES OF COAL.

Class of Coal.	Output.		Increase.	Decrease.	Approximate Total Output to the 31st December, 1916.
	1916.	1915.			
	Tons.	Tons.	Tons.	Tons.	Tons.
Bituminous and semi-bituminous	1,422,074	1,404,400	17,674	..	28,800,708
Brown	653,898	725,001	..	71,103	13,145,210
Lignite	181,163	79,223	101,940	..	2,144,253
Totals	**2,257,135**	2,208,624	48,511	..	**44,090,171**

No. 7.

TABLE SHOWING THE TOTAL QUANTITY AND VALUE OF COAL IMPORTED INTO AND EXPORTED FROM NEW ZEALAND FROM AND TO EACH COUNTRY DURING THE YEAR ENDED 31ST DECEMBER, 1916.

Country imported from or exported to.	Imports.		Exports.	
	Quantity.	Value.	Quantity.	Value.
	Tons.	£	Tons.	£
United Kingdom	..	..	115,682	121,734
Straits Settlements	..	..	49,811	41,688
Canada, via West Coast	..	..	5,330	5,198
Australia	293,956	189,526	51,972	48,509
Fanning Island	..	..	11	24
Fiji	..	..	17,391	15,997
Egypt	..	..	25,246	26,307
Chile	..	..	1,815	2,293
U.S.A., via East Coast	..	..	2,403	2,583
U.S.A., via West Coast	..	..	15,596	17,031
German Samoa	..	..	575	580
Guam	..	..	40,705	41,172
Hawaii	..	..	640	864
New Caledonia	..	..	766	600
Society Islands	..	..	2,172	2,254
Tuamotu Archipelago	..	..	1,560	1,962
Totals	293,956	189,526	331,675*	328,796

* Includes 3,492 tons imported and subsequently exported.

No. 8.

NUMBER OF PERSONS ORDINARILY EMPLOYED IN MINING OTHER THAN COAL DURING THE YEAR ENDED 31ST DECEMBER, 1916.

County or Borough.	Number of Persons ordinarily employed at				Total.	
	Gold-quartz Mines.	Gold Alluvial Mines.	Gold-dredges.	Mines other than Gold and Coal.	1916.	1915.
NORTHERN INSPECTION DISTRICT.						
County and Borough of Thames	153	..	..	..	153	196
County of Ohinemuri	359	..	..	..	359	395
,, Coromandel	72	..	..	..	72	62
,, Piako	3	..	..	..	3	2
Borough of Tauranga	3	..	..	..	3	2
,, Waihi	1,099	..	..	..	1,099	1,207
Puhipuhi district	..	..	..	5	5	6
Rotorua	..	..	..	..	..	2
Great Barrier Island	4	..	..	..	4	6
WEST COAST INSPECTION DISTRICT.						
County of Marlborough	97	3	..	..	100	92
,, Waimea	10	..	..	..	10	12
,, Collingwood	..	11	..	..	11	13
,, Murchison	..	53	..	..	53	50
,, Buller	4	33	..	..	37	48
,, Inangahua	590	4	40	..	634	730
,, Grey	..	79	21	..	100	154
,, Westland	..	121	56	..	177	188
Borough of Ross	..	18	..	..	18	69
,, Hokitika	..	4	..	..	4	..
SOUTHERN INSPECTION DISTRICT.						
County of Taieri	..	3	..	4	7	2
,, Tuapeka	6	156	35	1	198	241
,, Vincent	6	59	128	..	193	227
,, Maniototo	..	63	..	..	63	77
,, Waihemo	29	..	..	24	53	28
,, Waitaki	..	17	..	..	17	21
,, Lake	..	43	5	62	110	103
,, Wallace	..	47	..	..	47	51
,, Bruce	..	..	7	..	7	20
,, Southland	..	73	100	..	173	195
Stewart Island	..	..	..	3	3	6
Totals	2,435	787	392	99	3,713	4,205

Summary of Persons ordinarily employed in or about New Zealand Mines during 1916 and 1915.

	1916.	1915.	Increase or Decrease.
Gold, silver, and scheelite	3,614	4,193	Dec. 579
Other metalliferous mines	99	12	Inc. 87
Coal-mines	3,988	4,156	Dec. 168
Totals	7,701	8,361	Dec. 660

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, 16th May, 1917.

I have the honour to present my tenth annual report on metalliferous mines, together with annexures and statistical information, for the year ended 31st December, 1916.

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, 1916, to the 31st March, 1917.

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

I. Production of Minerals.

II. Persons employed.

III. Accidents.

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

V. Minerals other than Gold.

VI. Stone-quarries.
- (1.) Quarrying Operations and Statistics.
- (2.) Accidents.
- (3.) Summary Report by Inspector of Stone-quarries for North Island.

VII. State Aid to Mining.
- (1.) Subsidized Prospecting.
- (2.) Government Prospecting-drills.
- (3.) Subsidized Roads on Goldfields.
- (4.) Government Water-races.

VIII. Schools of Mines.

Annexures,—
- (*a.*) Summary of Reports by Inspectors of Mines.
- (*b.*) Reports of Water-race Managers.
- (*c.*) Reports of Directors of Schools of Mines.
- (*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, 1916:—

Classification.	1915.	1916.	Increase or Decrease.	Total from the 1st January, 1853, to the 31st December, 1916.
	£	£	£	£
Gold	1,694,553	1,199,212	Dec. 495,341	85,847,675
Silver	95,583	85,111	Dec. 10,472	2,181,493
Tungsten-ore	27,784	49,070	Inc. 21,286	201,550
Other minerals	5,377	14,614	Inc. 9,277	412,642
Kauri-gum...	279,133	339,343	Inc. 60,210	17,875,483
Totals	**2,102,430**	**1,687,350**	**Dec 415,080**	**106,518,843**

The advance in the production of tungsten-ore is due to the increased price created by munition requirements. The decrease in the value of bullion from gold-mines is not unexpected, quartz-mining and gold-dredging being declining industries.

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, 1916.
	Northern.	West Coast.	Southern.	
Gold, silver, and tungsten	1,693	1,144	866	3,703
Cinnabar	5	...	...	5
Tin	...	...	3	3
Copper	...	...	2	2
Totals for 1916	1,698	1,144	871	**3,713**
Totals for 1915	1,876	1,356	971	4,205

The decrease in the number of persons employed may, to a considerable extent, be attributed to enlistment for military service, and to the decline of gold-mining.

III. ACCIDENTS.

The following is a summary of persons killed or seriously injured in metalliferous mines during 1916:—

Inspection District.	Explosives.		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	1	2	2	1	...	...	1	...	...	...	4	4
West Coast	...	1	1	...	1	...	...	1	1	...	1	...	4	2
Southern	...	...	...	...	...	...	...	...	1	...	...	1	1	1
Totals	...	**2**	**2**	**2**	**3**	**1**	...	**1**	**3**	...	**1**	**1**	**9**	**7**

Being at the rate of 2·42 fatalities per 1,000 persons employed.

During the first half of 1916 no fatal accident occurred at any metal-mine; then followed nine before the close of the year. Of these only two may be classed as accidents inseparable from the dangerous occupation of mining—viz., those by which T. F. Rowney at Waihi and perhaps T. J. O'Connor at Reefton lost their lives—and I regret to report that the accidents to W. Irvine, A. Riley, J. Shore, M. Hillhouse, E. Parker, and G. Edgar were due to either the recklessness or ignorance of the sufferers, and that the death of J. McIntosh was due to a criminally mischievous act, for which the culprit escaped justice. Full details of these fatal accidents are here furnished. The most capable management and inspection in the world is helpless against some of the careless acts I describe.

The following is a brief description of fatal accidents in connection with metalliferous mining operations during 1916:—

Date.	Name and Situation of Mine.	Name, Age, and Occupation of Person killed.	Cause of Accident, Nature of Injuries, and Remarks.
27 June ..	Blackwater Mine, Waiutu	Albert Riley (15), working at cyanide-vats	Found dead in a vat full of cyanide solution a little after midnight. He was working alone at the vats; there is no evidence to show how this accident happened. It is assumed that he climbed on to the rim of the vat and accidentally fell in, or that he fell from a gangway above the vats, being an adequately fenced and lighted gangway. A boy so young should not have been left in sole charge of cyanide-works at night; a breach of the Mining Act, section 236 (*b*), was committed thereby.
30 June ..	Waihi Gold-mining Company's mill, Waikino	William Irvine (40), working at ore-hoppers	He was found suffocated at the bottom of a quartz-hopper which supplied ore to an automatic feeder at a stamp battery. It is supposed that while carrying out his duties he either fell into the hopper and was rendered insensible, or was buried while endeavouring to loosen quartz which had arched and ceased running in the hopper.
16 July ..	Success dredge, near Hokitika	Joseph Shore (58), engineer	About 11 p.m. on a bright Sunday night, whilst boating himself across the paddock to the dredge, he fell into the paddock and was drowned. The dredge was equipped with all the safety appliances as required by the law. Deceased was the holder of a first-class certificate as manager under the Coal-mines Act.
19 July ..	Talisman Mine, Karangahake	Matthew Kay Hillhouse (39), mine-manager	While standing on a skip in the Talisman underlay (63°) shaft, 24 ft. above No. 8 level, for the purpose of throwing a plumb-line on to a beam between the winding-drum and pulley, he slipped and fell down the shaft to the No. 14 level, a distance of about 850 ft., and was killed. At No. 8 level, about 24 ft. below the point from which deceased fell, there are doors provided to close the shaft when men are working above; this door was not closed. On the 8th June Inspector Paul had warned deceased not to work in the shaft without putting in a stage. He had the reputation of being a careful man, but in this case he took a risk, and lost his life in consequence. This is the third fatal accident, causing altogether the loss of four lives, which has occurred at this shaft during the past four years.
11 Aug. ..	Waihi Gold-mining Company's Mine, Waihi	Thomas Francis Rowney (50), stoping contractor	He and his mate, A. E. Lewis, experienced and careful miners, having broken through into a temporarily suspended stope at No. 2 level, Martha lode, which had been stopped on account of danger, were cleaning up quartz in order to crib a pass, when they heard a fall from the back of the suspended pass above them and about 30 ft. away. For the purpose of investigation they unnecessarily and unwisely proceeded into the suspended stope too far, when a large flake fell from the back, striking deceased on the head and body, and breaking his leg. He died the same evening from the injuries received.
28 Aug. ..	Parker's claim, Kyeburn	Edwin Francis Parker (41), alluvial miner..	On the day work was resumed at the claim of deceased, after a suspension over the winter months, he took a needless risk and entered the tail-race to build a wall of stones to support it, when a fall of about 1 ton of earth occurred, crushing his chest and breaking one leg. He died from shock two hours later. He and his mate, Thomas Blanchard, knew that the race was dangerous owing to undermining; and the proper course would have been to sluice the sides down, and make the race safe before effecting repairs therein.

13 Oct. ..	Waihi Gold-mining Company's Mine, Waihi	John McIntosh (46), miner	He and his mate, John Brown, experienced miners, working on contract, at about 1 p.m., carrying lighted candles, entered the cage at No. 5 shaft to descend to No. 12 level (1,350 ft.). The cage was provided at its ends with single bars as protective barriers 4 ft. 4 in. above the bottom of the cage. During the descent something struck the cage, causing a slight oscillation and extinguishing the candles. Brown immediately spoke to deceased, but received no reply. Nearing No. 12 level he felt for his companion, but found he was gone. On arrival at that level a bent piece of iron tramway-rail was found lying flat on the bottom of the cage; this had fallen into the cage during its descent. The body of deceased was found much mutilated in the sump of the shaft. At the subsequent inquest, which occupied several days, evidence was given that during the two days prior to this fatality several weighty articles had been put down the shafts from the upper levels in a mysterious manner, but the officials had failed to report these dangerous occurrences to the manager—a contravention of section 262 of the Mining Act by the shift boss. The verdict of the Coroner's jury was as follows: "The jury are unanimous that the deceased met his death at No. 5 shaft through being struck with an iron rail and dislodged from the cage while descending to No. 12 level. There is not sufficient evidence to show how the rail came into the shaft; we are of the opinion that it did not get into the shaft accidentally, and are thoroughly satisfied from the pitman's evidence and our inspection of No. 5 shaft that it was in good order prior to the accident. The rail and the ladder were put down into the shaft by some person or persons unknown; the evidence is insufficient to show by whom. We are also of the opinion that the articles falling down No. 2 shaft entered it in the same manner. We cannot lose sight of the fact that the missiles that came down No. 2 shaft previous to the fatal accident at No. 5 shaft should have been reported to the mine-manager immediately, thus probably preventing the unfortunate fatality." For the contravention of section 262 of the Mining Act, in not reporting previous cases of articles falling down the shafts, the Inspector of Mines, Mr. M. Paul, took legal proceedings against Mr. J. T. Hollis, shift boss at the Waihi Mine, who in consequence was fined. This fatality was undoubtedly due to the criminally mischievous act of a person who indiscriminately put heavy articles into the shaft, careless of the consequences; unfortunately, insufficient evidence existed to warrant a prosecution for manslaughter.
30 Oct. ..	Keep-it-Dark Mine, Reefton	Thomas John O'Connor (27), quartz miner	He and his mate, both experienced miners, were working at a face in No. 4 level. At about 7 a.m. a fall of quartz from the roof occurred, instantly killing deceased. His mate considered the place safe, as did the shift boss, who visited the place about half an hour before the accident.
15 Dec. ..	Blackwater Mine, Waiuta	George Edgar (27), assistant chamberman..	He was engaged at the chamber of No. 4 level, which was well lighted by electricity. He inadvertently, and in an absent-minded manner, walked into the shaft in the presence of the chamberman and shift boss; he possibly thought the cage was there. He fell 600 ft., and was killed instantly. The shaft was properly protected by doors, which were open at the time, as stone was being raised.

IV. GOLD-MINES.

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

—	Production of Bullion, 1916.* (All Mines.)	Dividends paid, 1916. (By Registered Companies only.)	Number of Persons ordinarily employed.	Number of Working Quartz and Alluvial Mines and Dredges.
	£	£		
Quartz-mining	944,188	185,065	2,435	91
Dredge mining †... ...	125,317	9,915	392	45
Alluvial mining ‡ ...	123,492	13,109	787	232
Totals, 1916 ...	**1,192,997**	**208,089**	**3,614**	**368**
Totals, 1915 ...	1,348,489	274,615	4,149	397

* 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 45 dredges, but the dividends given are only from 10 of these, the property of registered companies; seventeen dredges, the property of registered companies, declared no dividends. The profits of privately owned dredges and mines are unobtainable, which renders this statement incomplete.

‡ The bullion-production is from 232 alluvial mines, 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 1915 and 1916 :—

Inspection District.	Statute Tons of Ore treated.		Value of Bullion.		Dividends paid. (By Registered Companies only.)	
	1916.	1915.	1916.	1915.	1916.	1915.
			£	£	£	£
Northern	318,456	330,199	759,809	796,685	158,566	210,016
West Coast	121,066	151,161	183,140	231,150	26,499	27,249
Southern	2,840	3,269	1,239	2,689	...	...
Totals	**442,362**	484,629	**944,188**	1,030,524	**185,065**	237,265

The average value per ton of ore treated amounted to £2 2s. 8d., being an increase of 2d. above the average for 1915.

The following is a statement of the production, dividends declared, and the number of persons employed by the principal gold-quartz mining companies during 1916 :—

Name of Company.	During 1916.			Dividends paid.		Number of Persons ordinarily employed.
	Quantity of Quartz treated.	Value of Bullion.	Average Value per Ton.	1916.	Total to End of December, 1916.	
	Statute Tons.	£	£ s. d.	£	£	
Northern District—						
Waihi Gold-mining Company (Ltd.)*	173,420	363,612	2 1 9	99,181	5,040,514	687
Waihi Grand Junction Gold-mining Company (Ltd.)	112,203	211,108	1 17 7	38,438	190,188	394
Talisman Consolidated (Ltd.) ..	16,935	81,454	4 16 2	17,250	1,047,472	220
West Coast District—						
Wealth of Nations	24,186	37,300	1 10 10	..	..	102
Blackwater Mines (Ltd.)	40,247	78,590	1 19 0	24,999	162,494	176
New Big River Gold-mining Company (Ltd.)	5,548	19,363	3 9 10	..	91,200	47
Other quartz-mines throughout New Zealand	69,823	152,761	2 3 9	5,197	..	809
Totals, 1916	**442,362**	**944,188**	**2 2 8**	**185,065**	Unknown	**2,435**

* The total value of the output of this company at the end of the year was £11,500,231. The dividends here given are free of income-tax.

Reports on the various quartz-mines by the district Inspectors of Mines are contained in Annexure A accompanying this report.

RIMU GOLDFIELD
WESTLAND MINING DISTRICT
NEW ZEALAND
1917.

Plan showing Mining Claims and
Prospecting Bore Holes by Government Drills,
under Superintendent G.E.D Scale. M.I.M.E.

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

— Reference. —
Bore Hole and Number..... shown thus... ●21
Depth of bore in feet ..... " ..... 26'
Estimated valuc in pence per cubic yard ..... " 14

Frank Reed. M. Inst. M.M. Lic. Surveyor
Inspecting Engineer of Mines.
5/4/17.

Drawn by G.E.Harris. 1917

TASMAN SEA
HOKITIKA – ROSS RAILWAY
Takutai Rly. Stn.
Rly. & Traffic Bridge
to Hokitika
HOKITIKA RIVER
T. N.
Native Res. Nº 24
Trout Stream
Hooper's Creek East
Road
R.127
P.53
Perry's Saw Mill
PERRY'S TRAMWAY
To Ross
Mahinapua Creek
PARHAM Sp. Claim 7ac.
Pine Creek
Borough
Beroz' Dam
Gully
N. BEROZ 5ac.
J. BEROZ 5ac.
T. BROWN Prospecting 17ac.
BUTLAND Prospecting Lic. 75 ac.
KELLER Prospecting Lic. 145ac.
PARHAM Special Claims 345ac. 2r. 22p.
WILLETS Prospecting Lic. 80 ac.
HUNGERFORD Special Claim 100 ac.
PEARSON Prospecting Lic. 100 ac.
RIMU Nº3 GROUP
RIMU Nº1 150 acres
RIMU Nº1 DREDGING Co LTD.
RIMU Nº2 GROUP
300 acres
Adair
Adair's Road
Wombat Creek
Fisherman Creek
Sandy Pt. Dredge commenced
RIMU Nº 4
(Drilling in progress)
Rimu Lead Track
Insolvent Track
BRIGHTON TERRACE G.M.Co LTD.
Drainage Tunnel
Paddock & Shaft
Tail Race
Pipe Line
Turbo Pumping Station
Electric Transmission Line from Kaniere Forks Power Co's Station (length 5 miles)
Kaniere Bridge
School Res.
Granville
Road
RIMU DOMAIN
Trig. K
WOODSTOCK
RIMU
To Ross
Seddon Terrace Road
1677 1679 1603 1602 1421 1588 8328 1300
2059 F.R.
1910
1751
2512

(2.) Dredge Mining.

This class of gold-mining is rapidly declining, only forty-five dredges being in commission during 1916, whereas in 1906 there were 167 active dredges. During the year five dredges ceased operations —viz., Red Jacks and Murray's Freehold on the West Coast, and Manuherikia, McGeorge's No. 1, and Earnscleugh No. 2, in Otago—in addition to which the Confidence at Lowburn and the Bruce at Glenore were dismantled.

The following table shows the result of dredge-mining operations in New Zealand during the past eleven 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
1913 ..	74	195,848	2,646	11	18,750	621
1914 ..	64	191,112	2,986	16	23,080	491
1915 ..	52	164,605	3,165	21	26,333	427
1916 ..	45	125,317	2,785	10	9,915	392

There appears to be a reasonable probability of a revival of dredging in the Hokitika district. Near Rimu, on the Hokitika River, favourable results have recently been attained after prospecting operations by means of three Mines Department Keystone placer drills, carried out by Mr. G. E. D. Seale, Government Drill Superintendent, for the Rimu Options (Limited), an Australian company. The area taken up by this company consists of thirteen special claims, containing about 1,200 acres, which has been divided into four dredging properties or subsidiary companies, as shown on the accompanying plan. This plan also shows the position of boreholes and estimated values given by Mr. Seale, for which, however, the Mines Department accepts no responsibility. The claims are situated on a buried channel of the Hokitika, commencing near Rimu Township and extending north-westward to the Hokitika–Ross Railway at Mahinapua Creek, near the ocean-beach, a distance of three miles and a half with an average width of about 50 chains. The whole of the buried channel is contained in this area. This channel has been several times referred to in the reports and maps of the Geological Survey Branch of the Mines Department as a probable locality for payable gravel; but owing to the presence of water and the difficulty of testing the somewhat "heavy" and, in places, "tight" gravel by the primitive methods formerly employed the lower portion of the channel has remained unprospected until the operations here referred to were undertaken. Government Keystone drilling has been carried out over 650 acres, upon those properties situated nearest the beach outlet to the channel.

The group of claims known as Rimu Options No. 4, which are embraced in the property near the Rimu end of the channel and which contain about 550 acres, is now being prospected by Government drills for the Hokitika Syndicate (Limited), a recently formed London company.

Dredging operations commenced during April, 1917, by the Rimu No. 1 Dredging Company. The dredge "Glasgow," formerly in commission at Sandy Point, Otago, having been purchased, was refloated on the claim. This dredge has buckets of 7 cubic feet nominal capacity, with an estimated speed of ten buckets per minute. Owing to the heavy nature of the ground, this dredge has so far not proved at all suitable. The following are the published results of dredging to the time of this report going to the printer :—

Date of Clean-up, 1917.	Time worked.	Value of Gold obtained. £ s. d.
April 16	1 week	158 18 0
April 23	1 week	111 16 0
April 30	1 week	70 4 0
May 9	1 week 2 days	70 10 0
May 18	1 week 2 days	170 8 0
June 2	2 weeks 1 day	183 5 0

These returns, averaging about 5d. per cubic yard, when compared with the results obtained by Keystone drilling, as shown upon the accompanying plan, are unsatisfactory. The ground worked so far is about 1 acre; it contains very large stones tightly cemented by oxide of iron.

The following is a statement showing the capacity, production, and profits of bucket gold-dredges during 1916. (NOTE.—The profits made by privately owned dredges are not obtainable for publication.

Name of Dredge.	Locality.	Capacity of Dredge-buckets, in Cubic Feet.	Number of Buckets discharged per Minute.	Nominal Horse-power of Engines.	S = Steam. H = Hydraulic. E = Electrical. SG = Suction Gas.	Average Depth of Ground dredged.	Value of Bullion obtained during 1916.	Dividends declared.	
								During 1916.	Total.
Otago and Southland.						Ft.	£	£	£
Rise and Shine No. 1	Cromwell	5½	10	20	S	40	6,249	4,200	51,900
Rise and Shine No. 2	,,	5½	10	20	S	40	6,399		
Rising Sun	,,	7	10	25	S	45	5,366	1,200	23,600
Ferry (private)	,,	4½	11½	16	S	40	2,618	..	..
Electric No. 1	,,	5	10	16	S	35	5,185	..	133,900
Electric No. 2	,,	5½	10	16	S	40	1,239		
Earnscleugh No. 2	Alexandra	5	12	20	S	28	203	..	30,250
Earnscleugh No. 3	,,	7	12	150	E	50	4,015		
Earnscleugh No. 5	,,	6	13	150	E	35	3,278		
Ngapara	,,	5	10½	16	S	30	4,155	600	3,525
Karanui (private)	,,	6	10	25	S	35	2,074	..	..
Good Chance	,,	4½	10½	16	S	..	..	..	..
Manuherikia	,,	5	11	16	S	40	86	..	34,200
Olrig	,,	5	10	16	H	15	566	300	300
Kohinoor	Roxburgh	4	10	16	S	40	69	..	..
New Golden Run	Island Block	6½	11	25	S	35	1,593	..	3,200
Pride of Clutha (private)	Miller's Flat	5	10	20	S	40	1,432	..	..
Golden Treasure (private)	,,	5	10	16	S	30	2,427	..	..
Cardrona	Cardrona	4	10	..	H	18	651	..	800
Lefranchis (private)	,,	4	10	..	H	20	112	..	..
Lower Nevis	Nevis	4	11	12	S	10	1,986	240	2,970
Nevis Crossing (private)	,,	3½	10	12	S	10	1,780	..	..
Crewe No. 2	,,	3½	12	12	S	30	299	..	9,125
Otakau	Kyeburn	4½	12	70*	SG	16	4,552	1,350	2,325
Adams Flat	Glenore	4½	10	16	S	10	1,671	..	..
Rosedale (private)	Waikaka	4½	10	16	S	16	2,776	..	..
Duke of Gordon (private)	Waikaka Valley	5	10	12	S	14	2,821	..	..
Paterson's Freehold No. 1	,,	5	10	12	S	17	674	..	22,200
							652	..	..
Star (private)	,,	4	11	12	S	9	1,789	..	..
Lady Florence (private)	,,	4½	11	12	S	16	2,873	..	..
Waikaka Deep Lead No. 1	,,	4	11	16	S	14	1,796	300	300
McGeorge's Freehold No. 1 (private)	,,	6	10	16	S	14	2,433	..	..
McGeorge's Freehold No. 2 (private)	,,	6½	9	16	S	14	5,397	..	..
McGeorge's Freehold No. 3 (private)	,,	6½	9	20	S	35	5,113	..	..
Waikaka Forks (private)	,,	5	10	14	S	11	3,555	..	..
Charlton Valley (private)	Charlton Creek	3¾	11	16	S	18	1,899	..	..
Koputai (private)	Waikaia	6	11	16	S	20	1,945	..	..
Kura (private)	,,	3½	9	16	S	30	5,328	..	..
Muddy Creek (private)	,,	3½	9	12	S	15	160	..	..
							211	..	..
West Coast.									
Success	Near Hokitika	6	12	25	S	30	6,831	1,500	3,500
Red Jacks	Grey Valley	5	11	16	S	..	2,954	225	675
Ahaura	Ahaura River	7	11	20	S	35	3,575	..	..
Murray's Freehold	Mawheraiti	5½	11	16	S	20	2,940	..	..
Worksop No. 2	Antonio's Creek	8	14	16	S	21	4,714	..	..
Slab Hut Creek	Tawhai (near Reefton)	5	11	12	S	16	2,573	..	..
Hessey, Cameron, and Tacon	Capleston	6	11	20	S	30	4,302	..	..
Totals	..	..	..	..	..	..	125,317	9,915	..

* Brake horse-power.

(3.) ALLUVIAL MINING.

There has been a small decline in the production of bullion from alluvial mines, but this has been chiefly confined to the West Coast. There are indications, however, that there may be an improvement in output from the West Coast during the current year.

The Howard River goldfield, situated on a tributary of the Buller River near Tophouse, was discovered early in 1915, but has not proved extensive or rich, and the number of miners thereon has declined from about one hundred and fifty to eighty during the past year.

The following is a statement showing the value of bullion produced, the dividends declared by registered companies, the number of persons employed, and the number of working alluvial claims during the past three years :—

	1916. £	1915. £	1914. £
Value of bullion produced	123,492	153,360	157,323
Dividends declared by registered companies	13,109	11,118	10,992
Number of persons ordinarily employed at claims	787	1,019	1,054
Number of working claims	232	283	258

The following is a statement showing the value of production and dividends paid by the principal sluicing companies in the Southern District during 1916 :—

Name of Company or Party.	Value of Gold produced.	Dividends declared.	
		During 1915.	Totals to End of 1916.
	£	£	£
Deep Stream Gold-mining Company	918	187	2,000
Gabriel's Gully Sluicing Company	7,615	3,760	9,095
Golden Crescent Sluicing Company ..	1,131	175	11,375
Havelock Sluicing Company	3,335	1,900	9,300
Ladysmith Gold-mining Company	4,249	2,481	16,376
Nokomai Sluicing Company	10,425	3,600	48,083
Round Hill Gold-mining Company	4,033	706	12,286
Ourawera Gold-mining Company	1,975	300	14,215
117 other claims	47,465	..	..

No West Coast alluvial mining company declared a dividend during 1916. On the 11th April the Ross Goldfields Reconstructed (Limited) agreed to the voluntary winding-up of the company, being of the opinion that the Ross Flat had, after exhaustive testing, proved valueless as a mining proposition, the sole cause of the company's failure being the low value of wash found in the mine and the high mining-cost due to a costly hydro-electric power plant. The company went into liquidation and sold its plant, &c., repaying therefrom the £7,000 borrowed from the Government under Part X of the Mining Act. The purchaser of the plant was the Woolston Tanneries (Limited).

At Woodstock, on the Hokitika, the Brighton Terrace Gold-mining Company has acquired leases over about 146 acres of the Brighton Terrace, with an option to purchase an additional 100 acres. The company's claims adjoin the south-east boundary of those of Rimu Options (Limited), and consist of portion of the terrace bank of the ancient channel of the Hokitika, which the last-named company is now floating into gold-dredging companies (see accompanying plan). In the early days of the Westland goldfields these terraces were in places successfully worked by driving. The difficulty in obtaining water by gravitation prevented sluicing operations on a large scale.

The Woolston Tanneries (Limited) during 1916, having purchased the hydro-electric plant and water-rights from the recently liquidated Ross Goldfields Reconstructed (Limited), formed a company named the Kanieri Forks Power Company for the sale of electric power. This company has constructed a transmission-line from the Kanieri Forks power-station to a point on the south side of the Hokitika immediately opposite the claims of the Brighton Terrace Gold-mining Company, a distance of about five miles, the electric power there to be used for pumping river-water to the dam on the terrace claims above. The pumps consist of two units of two-stage centrifugal type, estimated by the makers (Thompson and Co., Castlemaine) to deliver 1,860 gallons per minute through a nozzle at a pressure of 50 lb. per square inch. The depth of gravel on the company's claims varies from 50 ft. to 70 ft. The system of working is otherwise the same as at Kumara—viz., by sluicing from paddock-faces, and removal of material and water by drainage-tunnel and tail-race into the river, the gold being saved in sluice-boxes near the tunnel-mouth. The drainage adit, formerly known as Douglas tunnel, is about 19 chains in length, and was driven in the (Brighton) bottom some years ago to test the back leads of Rimu Flat. It was subsidized to a small amount by the Government.

The company commenced sluicing early during the current year. On the occasion of my inspection during January about 8 cubic feet of water per second was being pumped up into the dam above the ground to be sluiced, 367 electric horse-power being indicated at the pumps. The plant appeared to work satisfactorily. It is proposed to sluice for twelve hours each day, utilizing about 8 sluice heads at the nozzle; the night water will be stored for flushing the tail-race. Thus 16 heads will be used during the period worked.

It is estimated that the capital expenditure on this property, exclusive of the electric-power plant, by the present owners amounts to about £6,000, in addition to £15,000 paid for the property to Rimu Options (Limited). This scheme and operations in connection therewith has been carried out under the superintendence of Mr. Frank B. Powell, mining engineer, of Hokitika.

A description of the alluvial claims by the district Inspectors of Mines is contained in Annexure A accompanying this report.

V. MINERALS OTHER THAN GOLD.

Tungsten-ore.

The quantity of tungsten-ore exported during the year amounted to 226 tons, valued at £49,070, as compared with 194 tons, valued at £27,784, in 1915. The following statement shows the quantity and value of ore exported :—

Year.	Quantity.	Value	Year.	Quantity.	Value.
	Tons.	£		Tons.	£
1899	32	2,788	1909	58	4,263
1900	54	2,635	1910	143	15,070
1901	2	83	1911	138	11,853
1902	39	1,200	1912	135	13,347
1903	42	1,439	1913	221	22,933
1904	17	791	1914	204	21,498
1905	28	1,848	1915	194	27,784
1906	55	3,407	1916	266	49,070
1907	137	15,486			
1908	68	6,055	Totals ..	**1,833**	**201,550**

The quantity of tungsten-ore mined during the year was 285 tons (value £47,374) as the result of treating 19,360 tons of scheelite-bearing quartz, from which gold to the value of £7,651 was also obtained.

There has been considerable activity in mining and prospecting for tungsten-ore in the form of scheelite, due to the commandeering of all British supplies by the Imperial Government at a fixed import price of £2 15s. per 1 per cent. of tungstic acid in the shipment, c.i.f. London or Liverpool, being an increase of about 80 per cent. above the average price for several years previous to the war.

The principal operations have been carried out in the locality of Glenorchy, where the lodes occur in the mica-schist of Mount Judah in the Richardson Range, which flanks the lake to the eastward. The area over which these lodes occur and mining operations are in progress is considerable, extending from the Junction Mine, a few miles to the east of Glenorchy, at an altitude of about 3,500 ft. above Lake Wakatipu, northward about twelve miles to Mount Alfred Mine, near Paradise, on the Dart River. At numerous points in this distance scheelite-quartz lodes have been found at altitudes varying up to 5,000 ft. above the lake. All the lodes developed have the general characteristics of those of the Macetown, Skipper, Shotover, Bendigo, and Carrick Range lodes as described by Professor James Park*—viz., as belonging to the class of replacement fissure lodes in which a zone of country rock lying between two more or less parallel fissures has become crushed and contorted by wall-movement, and more or less silicified and partially replaced by quartz and calcite containing scheelite and a little gold.

The scheelite-bearing quartz with calcite in the Glenorchy district occurs in the form of irregular lenses in the crushed country rock within the striated mica-schist and but slightly inclined walls, these lenses being connected by a ramification of small quartz veins of irregular course. From the form of the ore-body and connecting veins as exposed in the mine-workings I believe the contents to be derived from ascending solutions. The scheelite occurs in irregular veins not exceeding 20 ft. in length, and is generally associated with calcite, which the miners regard as a favourable indication that a vein of scheelite is being approached. The lenses of ore occur with a certain regularity, and so far as mining operations have extended they have continued. Driving in the lode through barren matter, in the form of crushed and contorted country rock containing feeble and irregular veinlets of quartz, is therefore carried on with confidence that a lens of ore is being approached.

The known ore-deposits are, however, too small and intermittent to warrant any large undertaking for their exploitation, and the present scale of operations by small and economically managed mines is to be commended.

The principal operator in scheelite in the Lake Wakatipu district is the Glenorchy Scheelite Company, a Dunedin concern. This company has three mines—viz., Glenorchy, Junction, and Mount Alfred mines—in addition to employing numerous working-parties obtaining ore from among the ranges. At the Glenorchy Mine the lode is inclined about 30° east. Eight levels have been driven from the outcrop, the vertical height between the top and bottom level being about 240 ft.; the longest level is about 850 ft. Owing to the slight inclination of the lode the ore and rock is lowered from the stopes by jigs, as in the bords of a coal-mine. The lode varies considerably in thickness up to 10 ft.

At the Junction Mine, situated at a considerably higher level than the Glenorchy Mine, and 2,500 ft. above the lake, the lode is also inclined at about 30°. Three levels are being driven to the southward ; stoping is also in progress. The lode averages about 4 ft. in width.

The newly opened Mount Alfred Mine, near Paradise, has been considerably prospected on the surface, and by three levels in a lode varying up to 6 ft. in thickness having an inclination of about 45° with strike south-south-west. This mine being situated in the western bank of the River Dart, and the lowest level being only a few feet above the river-bed, pumping and winding machinery will be necessary for deeper development; and there is every indication that the ore-bodies will be found to continue to deeper levels, therefore sinking is advisable here.

* Bulletin No. 7, N.Z. Geological Survey, 1909, p. 74.

The treatment plant at all the company's mines is somewhat similar, the order of treatment being from stone-breaker to screen, jig, Wilfley table; tailing being finally crushed by stamp battery. The concentrate now obtained never contains less than 70 per cent. tungstic acid, which may be regarded as high concentration. The gold is no longer saved at the Glenorchy mines, owing to the low tenor of the quartz in this metal.

In the annual report of Inspector Whitley, in the Annexure A accompanying this report, reference is made to the foregoing mines in addition to the scheelite-mining operations at Macrae's, Stoneburn, The Reefs, and Waipori; and in the report by Inspector Bishop reference is made to the gold-scheelite mines at Wakamarina, Marlborough, where the output from the principal mine—the Dominion Consolidated—has declined from 110 tons of scheelite-ore, value £14,133, during 1915, to 67 tons, value £11,849, during 1916. At this mine development has not been satisfactory, the lode having pinched out above the bottom crosscut, and prospecting operations underground for its recovery have not been successful. The company, however, has considerable reserves of low-grade scheelite-quartz in their Golden Bar Mine, the value of which may be too low for it to be worked profitably.

Table showing the Quantity of Quartz crushed and Scheelite-ore obtained for the Year ended 31st December, 1916.

Name of Mine or Company.	Locality.	Quartz crushed.	Scheelite Concentrates obtained.	Value.
Otago and Southland.		Tons.	Tons cwt. qr. lb.	£ s. d.
Glenorchy Scheelite Company and seven parties of miners	Glenorchy, Lake County	926	75 4 0 20	14,593 2 6
Grant and Sinclair	,, ,,	4	0 10 1 8	91 17 6
G. Scurr and party	,, ,,	4	1 0 3 24	161 17 6
Hayward and Hood	,, ,,	4	1 11 1 26	243 5 0
Paulin and Tripp	,, ,,	60	16 17 1 27	3,305 2 6
H. Birley and party	,, ,,	30	10 19 0 20	1,984 17 10
Golden Point Company	Macrae's, Waihemo County	440	20 7 0 0	5,914 6 3
D. Peddie and party	Ditto	290	13 6 1 5	
Deep Dell Company	,,	17	2 9 2 22	475 15 7
A. Phelan	,,	8	5 3 0 15	957 3 0
H. Berry	,,	51	2 16 0 1	513 0 9
E. Callery	,,	13	1 3 0 16	216 14 10
A. Innes	,,	2	0 6 3 14	61 18 0
F. A. Smith	,,	7	1 12 3 27	296 3 0
Patrick Donoghue	,,	6	2 10 1 27	469 3 3
W. B. Macgregor	,,	12	1 6 0 27	231 5 0
W. Lidstone	,,	1	0 8 0 12	71 3 3
Fraser and Gaytan	,,	75	9 15 2 23	1,811 14 3
Fraser, Gaytan, and Phelan	,,	5	0 7 1 6	65 13 7
William Macgregor	,,	16	1 2 2 27	194 19 6
D. McConnell	,,	6	1 3 3 25	225 3 3
Philip Donoghue	,,	3	1 5 2 17	225 15 0
James Donaldson	,,	1	0 7 2 12	68 12 3
A. A. Cockerell	,,	9	1 13 0 1	297 10 0
G. A. Carson	,,	7	1 1 2 19	201 5 0
Frank Cockerell	,,	10	0 18 1 12	161 17 6
Pascoe and Reid	,,	1	0 6 3 27	61 5 0
Mareburn Company	Mount Highlay, Waihemo County	1,010	2 15 2 0	496 5 6
Stoneburn Company	Stoneburn, Waihemo County	738	3 5 3 23	523 15 0
A. H. Forbes	Ditto	..	0 16 2 18	122 10 0
R. A. Mathewson	,,	..	0 5 2 1	31 10 0
C. P. Cunningham	,,	..	0 4 0 26	40 5 0
H. S. Molineaux	The Reefs, Taieri County	40	3 6 1 21	606 5 3
A. C. Buckland	,, ,,	10	1 11 1 16	273 0 10
Alexander Ewart	,, ,,	4	1 3 2 16	214 7 6
G. Bertenshaw	Waipori, Tuapeka County	..	1 12 0 23	316 1 0
Marlborough.				
Dominion Consolidated Mine	Wakamarina	15,550	67 0 0 0	11,849 4 11
Totals		19,360	257 18 0 16	47,373 16 1

Certain of the above mines produced gold as follows: Dominion Consolidated, £6,735; Golden Point, £334; Deep Dell, £1; W. Macgregor, £9; Stoneburn, £295; Mareburn, £277.

The number of persons employed at scheelite-producing mines was 169.

Sulphur.

Native sulphur in sufficient quantity to be profitably worked is known only to occur in the thermal districts of the North Island, near Rotorua and Lake Taupo, and at White Island. With the exception of the small lake deposit on White Island, all the known native sulphur in payable quantity occurs in the form of pockets in pumice, or sinter around fumaroles or thermal springs (from which it has been sublimed in crystalline form), and as black sulphur. The fumarolic deposits, although of high grade generally, are inextensive when compared with those of massive form in seams or in veins as extensively worked in Japan, Sicily, and North America.

Prior to 1898 there was no separate record kept of the quantity of native sulphur exported, this being included under the heading of "mixed minerals" in the official statistics, but the quantity was not large. The following quantities have since been exported :—

1898	1,765 tons ;	value,	£4,097
1899	1,227 ,,	,,	£3,483
1900	1,692 ,,	,,	£4,824
1901	143 ,,	,,	£360
1902	100 ,,	,,	£475

Since 1902 the small quantity of sulphur produced has been used at chemical works in the Dominion. Owing to the nature of the deposits and to transport difficulties it is unlikely that sulphur can be exported at a price to compete with the supplies of the above-mentioned countries.

The following is a description of the most important of the native sulphur-deposits :—

White Island.—On this island sulphur-mining operations have been attempted on two occasions. During 1885 Mr. J. A. Wilson, of Auckland, and others bought the island, and from thence shipped 600 or 700 tons of native sulphur to Sydney ; they also erected a small treatment plant at Auckland, but the venture was not a financial success. The island subsequently was sold to Mr. Andrew Grey, of Wellington, who resold to the New Zealand Loan and Mercantile Agency (Limited). This company during 1912 sold the island to the New Zealand Sulphur Company, composed chiefly of Vancouver shareholders, and this company expended about £30,000. Near Crater Bay, on the island, it installed a refining plant consisting of a boiler for producing superheated steam and three cast-iron retorts each of 4 tons capacity ; a small wharf was also constructed. The crater lake was drained by a ditch to Crater Bay to enable the layers of sulphur thereunder to be worked ; and while the lake-bed was draining, quarrying operations by the use of explosives were commenced on small veins or pockets of native sulphur in the crater-walls near the eastern shore of the island. A small quantity of sulphur was refined and filled into casks ready for shipment. These operations were in progress when, on or about the 11th September, 1914, a violent eruption of the great active thermal crater occurred ; all the eleven employees of the company, the treatment plant, huts and wharf were hurled out to sea, and every trace of the same was obliterated. The lake-bed and the site of the works were buried under from 10 ft. to 15 ft. of mud and boulders ejected during the eruption. A new vent was formed in the lake-bed, and it is stated that activity therefrom is much greater than from the former "blowhole" now buried in débris from the crater-walls. Large blocks of sulphur from under the lake-bed hurled up during the formation of the new vent, and now lying on the surface, show the seam of sulphur under the lake to be fully 6 ft. thick ; its area, however, is unknown.

The quantity of sulphur in sight on other parts of the island does not exceed a few thousand tons. The cost of transport from the island would be considerable, and the dangers from sulphur-gases and further eruptions render the island absolutely unfit for the employment of men. The following are analyses by the Dominion Analyst of samples taken by me :—

	Sulphur. Per Cent.	Moisture. Per Cent.
Average grade from lake-bed	77·90	0·81
High grade from company's opencut	90·31	0·56
High grade from fumaroles near crater-walls	75·77	13·10
Refined brimstone from company's casks	99·59	0·23

Tauhara North.—Upon Subdivision 1, Tauhara North, Block 16, Tatua Survey District, owned by 172 Maoris, and distant about nine miles north-east of Taupo by fairly good road, the most extensive of our known sulphur-deposits occurs. Immediately to the north of Lake Rotokawa, off the usual tourist track, is a considerable area containing hot springs, around which many pockets of rich sulphur outcrop, which may safely be estimated to contain several thousands of tons of high-grade sulphur. Additional pockets would certainly be proved by prospecting under the loose pumice surface.

Samples of crude sulphur taken by me were analysed by the Dominion Analyst, with the following results :—

	Sulphur. Per Cent.	Moisture. Per Cent.
Average grade	89·29	0·83
High grade	95·50	3·22
High grade crystalline (hard)	97·19	0·38
Black (hard)	73·80	1·04

The percentage of moisture was lost at 100° C. in all analyses. This deposit has never been worked ; the cost of transport to a shipping port would be considerable.

Tikitere.—About eleven miles north-east by road from Rotorua are situated upon Native land the pools of boiling mud and springs of Tikitere, familiar to tourists. In proximity thereto pockets of yellow and black fumarolic sulphur outcrop, of which a few hundred tons may be easily obtained without injury to the sights which attract a considerable number of visitors annually. No sulphur has ever been removed from Tikitere, with the exception of a few tons exported by Captain H. R. Macdonald, of Rotorua, several years ago.

The following are analyses of crude sulphur collected by me at Tikitere :—

	Sulphur. Per Cent.	Moisture. Per Cent.
Average grade	71·76	4·14
High grade	84·33	0·91
Highest grade	91·23	1·34
Black	69·41	0·74

Whale Island.—A few years ago sulphur-mining operations were commenced on a small scale at Whale Island, off Whakatane. A small refining plant was installed at Tauranga, but the operations did not prove a financial success, owing principally to the limited quantity of sulphur and the occurrence of hot springs, which hindered mining operations.

Te Tarata.—About twelve miles by road north-east of Rotorua, on No. 3 Block, Whakapoungakau, a hot lake and a number of hot springs known as Te Tarata are situated. From this locality during 1902, and a few years prior thereto, about 5,000 tons of crude sulphur, averaging about 67 per cent. sulphur, was mined and loaded into drays by the Maori owners, for about £1 per ton, for Captain H. R. Macdonald. This ore was punted on the lake to Rotorua, and from thence carted to Rotorua Railway-station. Some of this was sold for exportation to Sydney for about 11d. per unit on trucks at Rotorua. By these operations nearly the whole of the sulphur in sight was removed. In all probability there remains a moderate supply of sulphur under the hot lake, but to drain this a tunnel of considerable length would be necessary, and without prospecting this is not warranted.

The following is an analysis of crude sulphur from Te Tarata: Sulphur, 71·30 per cent.; moisture, 3·13 per cent.

Rotorua.—The Department of Tourist and Health Resorts during 1916 granted to Messrs. Kempthorne, Prosser, and Co., New Zealand Drug Company, a three-years lease of Section 3 of the Sanatorium Reserve, situated near the Postmaster Bath at the extreme southern shore of the lake. A royalty of 15s. per ton is required for all crude sulphur removed. Prior to 1916 this company removed 3,204 tons of native sulphur from pockets in the sinter on the lake-shore, and this was refined at the company's works at Auckland. For this sulphur a royalty amounting to £801, being at the rate of 5s. per ton, was paid to the Department of Tourist and Health Resorts.

During August last, after the lease was obtained, the company recommenced operations, and at the end of the year had obtained 466 tons of crude sulphur from their lease. A sample of fragments of crude sulphur, obtained by me from this lease, upon analysis was found to contain—Sulphur, 77·37 per cent.; moisture, 2·26 per cent.

In August last the price of roll sulphur on the London market was approximately £13 per ton. Thereafter the price began to rise, and in March roll sulphur was quoted at £28 per ton, flowers of sulphur at £29 per ton.

Petroleum.

Operations in search of petroleum have been confined almost entirely to Taranaki. No new wells were commenced during the year, and no development of importance occurred.

The Taranaki Oil-wells (Limited) was principally engaged in recasing No. 2 well to a depth of 3,045 ft. with 8 in. pipe. The other wells of this company remain in the same condition as referred to in my last annual report; the production of oil therefrom has somewhat declined. The Taranaki Oil Lands Acquisition and Development Company (Limited) has deepened its Blenheim well to a depth of 4,777 ft.* A small flow of petroleum occurs at about 2,200 ft. It is stated by this company that 15,300 gallons of crude oil was produced from the Blenheim well during 1916.

The Consolidated Oilfields, Huiroa bore, has attained a depth of 4,788 ft.† Gas and traces of oil have been encountered at various depths. The bore is cased with 6 in. pipe throughout.

Cinnabar.

The Whangarei Cinnabar-mining Company has been engaged with a small staff driving levels on the lode, and it is reported that favourable assay value has been obtained therefrom. The extraction plant was found unsatisfactory, and its use is now discontinued.

Phosphate.

The only operations in connection with the quarrying of phosphate were those of the Ewing Phosphate Company at Clarendon, Otago, which produced during the year an output of 7,600 tons. The total output for this company from 1902, the year of its initiation, to the end of 1916 is 102,472 tons. The known quantity of phosphate of commercial value in the Dominion appears small.

Kauri-gum.

The quantity of kauri-gum exported during 1916 amounted to 5,448 tons, value £339,343, as compared with 4,575 tons, value £279,133, during 1915, an increase of 873 tons and £60,210. The total value of kauri-gum exported to the end of the year amounted to £17,875,483.

The European market for this fossil resin, used in the manufacture of varnish and linoleum, being greatly restricted by the present war, new but smaller markets have been obtained. During the year the distillation of kauri-gum oil from peat in North Auckland was resuscitated after a lapse of years. The peat yields from 20 to 30 gallons of oil per ton; and about 25 per cent. of the yield is stated to resemble petrol, and it is being used to propel motor-cars and launches. The residue is said to contain twenty-eight different kinds of heavy oils.

* During recent months the bore has been further deepened, and on 2nd July, 1917, was reported to be 5,014 ft. deep.

† During the past few months the Huiroa bore has been further deepened, and on 2nd May its depth was reported to be 4,921 ft.

VI. STONE-QUARRIES.

(1.) Quarrying Operations.

For the closer inspection of those 283 quarries and places which come under the operations of the Stone-quarries Act, 1910, at which about 1,648 persons were ordinarily employed during the year, and from which 1,331,003 tons of crude stone was produced, the whole of the statutory quarry-inspection has been transferred to the Inspectors of Mines; and for North Island quarries an additional and special Inspector, Mr. J. F. Downey, has been appointed. The respective inspection districts are defined in the tabulated statement of output accompanying this report.

For the better regulation of the stone-quarries of the Dominion, amendment of the Stone-quarries Act appears desirable, so that quarries or places having a face exceeding 20 ft. deep, whether explosives are used thereat or not, shall come under the provisions of the Act; and, judging by the number of fatalities at Government quarries during 1915 and 1916—viz., eleven, in comparison with four at all the other quarries in the Dominion—it also appears desirable that Government quarries shall be brought under the Act and receive independent inspection in the interests of safety, by persons other than officials in charge of and directing the operations, who at present act in a dual capacity and inspect their own work. It is also desirable that provision shall be made for annual returns from quarries, similar to those required from coal-mine owners and mining-claim holders. Owing to there being no legal authority for the collection of returns of output, the following tabulated statement must be regarded as incomplete.

The exportation of the produce of our quarries is not yet extensive. During 1916 small quantities of serpentine, lime, pumice-stone, and building-stone were exported, also 4,064 tons of pumice-sand—value, £11,944—mostly to Australia for use as insulation for cold storage and freezing-works.

Table showing the Number of Quarries under the Stone-quarries Act, 1910, also the Number of Persons ordinarily employed thereat, and the Annual Output of Crude Stone.

Provincial District.	Name and Address of Government Inspector of Stone-quarries.	Number of Working Quarries under the Act.	Number of Persons ordinarily employed.	Output of Crude Stone during 1916.							
				Stone or Gravel for Macadamizing or Ballast.	Stone for Harbour-works.	Building-stone.	Limestone for Agriculture.	Limestone for Cement or Mortar.	Phosphate for Agriculture.	Claystone or Fire-clay for Bricks or Tiles.	For other Purposes.
				Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Auckland ..	J. F. Downey, Mines Dept., Auckland	100	823	500,016	140,000	..	3,000	59,600	..	..	..
	M. Paul, Mines Dept., Waihi (Hauraki Mining District only)	11	77	61,871	..	109	..	..	..	..	..
Hawke's Bay	J. F. Downey, Mines Dept., Auckland	47	109	7,300	3,000	..	3,900	80	..	..	..
Taranaki ..	..	44	123	42,600	..	..	6,000	..	..	..	..
Wellington	..	28	148	44,250	7,200	..	7,800	..	..	..	..
Marlborough	T. O. Bishop, Mines Dept., Reefton	2	7	..	..	..	1,200	..	..	..	..
Nelson	T. O. Bishop and J. Newton, Mines Dept., Westport (Buller County only)	4	40	10,000	..	1,500	..	31,000	..	..	..
		1	21	57,690	..	..	..	..	..	..	..
Westland ..	T. O. Bishop ..	3	24	..	2,713	..	..	..	..	..	151*
Canterbury..	E. R. Green and A. Whitley, Mines Dept., Dunedin	14	98	82,459	48,333	3,662	1,601	1,474	..	..	..
Otago ..	Ditto	23	146	55,354	47,050	2,443	59,346	7,985	7,600	2,500	1,386†
Southland ..	,, ...	6	32	9,000	2,300	130	7,300	100	..	..	..
Totals ..	..	283	1,648	870,540	250,596	7,844	90,147	100,239	7,600	2,500	1,537

* Serpentine. † Miscellaneous and unspecified.

(2.) Quarry Accidents.

The following is a summary of persons killed or seriously injured during 1916 at stone-quarries and places within the operation of the Stone-quarries Act:—

Cause of Accident.	Number of Accidents.		Number of Sufferers.	
	Fatal.	Serious.	Killed.	Seriously Injured.
Explosives	1	..	1	..
Falls of ground	1	1	1	1
Falling from face, or during ascent or descent	..	2	..	2
Machinery	..	..	..	..
Miscellaneous	..	1	..	1
Totals	2	4	2	4

The fatal accidents per 1,000 persons ordinarily employed at quarries were two, being at the rate of 1·23 deaths per 1,000 persons employed. During the previous year two persons also were accidentally killed. This may be regarded as a reasonably low proportion.

The following is a brief description of fatal accidents during 1916 at quarries under the Quarries Act, 1910 :—

Date.	Name and Situation of Quarry.	Name, Age, and Occupation of Person killed.	Cause of Accident, Nature of Injuries, and Remarks.
31 Mar.	Nihotupu Dam, Auckland	William Wallace Langlands (53), one of the contractors for construction of the dam	He was in his office at the works when a blast was fired at a spot 85 yards distant and 95 ft. higher. The blast consisted of a charge of ten sticks of gelignite in a hole 5 ft. deep. Warning was given of the intention to fire, but deceased apparently considered he was out of the danger-zone. A piece of flying rock from the blast fell through the office-roof, killing him by striking him on the head. Subsequent examination of the blast revealed a concealed joint in the rock, which reduced the resistance to the blast, causing the débris to be precipitated a greater distance than anticipated. At the Coroner's inquest a verdict of "accidental death" was returned
10 April	Jermyn Street improvement scheme, Auckland	Jeremiah O'Donohue (58), labourer on works	He was not at his proper working-place, but was gathering up tools to commence loading a dray when a piece of sandstone weighing about 4 cwt. fell from the face of the cutting and crushed him against the wheel of the dray. A shot had been fired about half an hour previously, and the ganger who fired the shot was barring down the loose ground at the time. Deceased was supposed to be working 14 ft. away to the left. The place had been examined and was thought safe. Death resulted from shock due to fracture of the ribs and possibly other internal injuries. The Coroner's inquest found the death to be accidental.

For the guidance of quarry managers and foremen the following particulars are furnished in connection with fatal accidents which occurred during 1916 at quarries and places which do not come under the operation of the Stone-quarries Act, and are therefore not inspected by officers of the Mines Department :—

Explosion at Ohakune Quarry.

On the 15th May at about 5.30 p.m. a premature explosion of a 2,000 lb. charge of high explosive occurred at the Public Works Department ballast-quarry at Ohakune, by which six persons were killed and two injured. Those killed were G. H. J. Mellsop, Assistant Engineer; H. J. H. Larking, engineering cadet; Arthur Davis, overseer; L. J. Torrens, William McCord, and P. McGarry, labourers. Those injured were Michael Sheehy, quarry foreman, and G. E. Morgan, labourer.

Three drives had been put into a nearly vertical face of scoria for simultaneous firing by electricity. In one of these—*i.e.*, No. 3 drive—a mixed charge containing about 2,000 lb. of cambrite, gelignite, and dynamite had been placed in position in the original cases, with only the lids removed, at the end of the drive; an electric fuse with two detonators was connected with the charge, and by insulated cable carried along the roof of the drive about 60 ft. to two dry-cell red-seal (about 5 volts each) batteries placed within the drive at its mouth. To these batteries a Nobel's galvanometer and combined battery was connected. This battery was capable of generating 0·05 ampere: to explode a detonator 1·6 amperes is required. At the time of the explosion all the deceased were working within the drive, and the two injured men in proximity thereto outside. The charge was being built in.

At the inquest held in connection with this disaster the evidence of Dr. J. S. Maclaurin, Chief Inspector of Explosives, appears to be conclusive as to its cause. Dr. Maclaurin stated that he found samples of the explosives in the quarry magazine in perfect order, and that the accident was not due to defective explosive, but in his opinion it was due to misadventure in testing the wires by Mr. Mellsop. The custom is to test the cables and fuse with a galvanometer and a small electric current to make sure they are in order, and such small current was available from the combined galvanometer. In this case two red-seal dry batteries had been found after the explosion, and Dr. Maclaurin assumed these had been then used in addition to the galvanometer battery. These batteries could be safely used for testing the cables, provided the current passed through the galvanometer, but their use was fraught with grave danger owing to liability of inadvertently touching the wires together, instead of touching the galvanometer-poles.

Mr. R. W. Holmes, M.I.C.E., Engineer-in-Chief, Public Works Department, agreed in the possibility of the above, and stated that, considering the nearness of the poles in the galvanometer, it was risky to use an outside cell.

The Coroner's jury found that the accident was due to premature explosion of explosives placed in No. 3 drive.

It was stated in evidence that explosive was kept in the engine-house at the quarry, a quite improper and illegal practice. This, however, had no connection with the fatal explosion.

On the 22nd June a fall of papa in the Okahukura Tunnel caused the death of Michael Joyce, miner. Deceased, under instruction from the shift boss, had gone in with a mate to work down some ground loosened by shots fired by the previous shift. While in the act of doing this a lump of papa weighing 5 cwt. to 6 cwt. fell from the side wall and struck deceased, breaking his neck and causing instantaneous death. The Coroner's jury found that the death was accidental, and no blame attachable to any one.

(3.) Summary Report of Mr. J. F. Downey, Inspector of Stone-quarries for the North Island.

I have the honour to present my report for 1916 on such quarries, tunnels, &c., as come under the operation of the Stone-quarries Act, 1910, in the whole of the North Island (excluding the Hauraki Mining District, which is included in the inspectorate of Inspector Paul).

Having only been for such a short portion of the year in the service of the Department, my report is naturally brief, and, as I have had no legalized power to collect data, the figures given in the attached table with regard to output are as correct as I could get them under the circumstances.

The exceptionally severe weather conditions prevailing through a great portion of the year have materially affected quarrying-work. A shortage of suitable labour, resulting from war conditions, has also greatly interfered with operations. Nevertheless, as will be seen from the table, a large amount of work has been carried out, and considerable numbers of men have been employed.

Since I entered on my duties on the 1st September, 1916, I have made a personal inspection of the greater proportion of the quarries. I found that, in general, the managers do not seem to be well acquainted with the provisions of the Act, and that the provisions have not been closely observed. In the working of the quarries there has been a great tendency to create high vertical and, in cases, overhanging faces. Most of the quarries are worked by contract parties, whose plan of action is to break out what stone they need as cheaply as possible, and without proper regard to safety. Stripping is evaded because it means delay and expense without apparent financial return, and benching is avoided by reason of the extra labour it entails. I found few quarries suitably benched, or with the tops cleared back sufficiently. In the handling of explosives considerable carelessness was evident, in some cases detonators being stored with explosives, and in many cases explosives were carried into the quarry either in the hand or in open packets instead of in covered cases or canisters.

The proper observation of section 8, subsections (1) and (2), relating to the notification to an Inspector under the Act of the renewal or discontinuance of work, is not general.

In the course of my inspection I found many quarries in which explosives are used, but which, owing to the face being below 20 ft. in height, do not come under the Stone-quarries Act, and have not been included in the number of quarries given in the table. One such quarry had fourteen men employed, and considerable blasting was done. I recommend that all such quarries be brought under the Act, so that the men employed in them may be protected.

Many other places, such as scoria-pits, pebble-beds, and friable rock faces, at times greatly exceed 100 ft. in height, and are not worked in a satisfactory manner, but owing to the fact that explosives are not used in them they do not come under the Act. These quarries also, if they exceed a certain height of face—say, 20 ft.—should, I consider, be brought under the Act.

The use of water for laying dust arising from drilling or rock-crushing operations has only been adopted to a limited extent in quarries, but, I think, will gradually become more general. The dust in many cases must be very injurious to the workmen.

Sufficient ropes have been provided in nearly all cases, but the managers find it difficult to get the men to use them properly by securing them to their bodies when working on ledges.

As will be seen from the table, the greater portion of the quarrying-work has been in connection with the supply of road-metal and ballast. There has, however, been a considerable amount of harbour-work carried out, especially at Auckland. The agricultural-lime and the cement industries have been fairly active, and their output should materially increase in the future. No less than three operators supplying agricultural lime are installing new machinery, which will greatly increase their capacity; and at Mangapai, near Whangarei, the large mill of the Dominion Cement Company is nearing completion.

VII. STATE AID TO MINING.

(1.) Subsidized Prospecting.

During the year ended 31st March, 1917, seventeen approved prospecting parties were granted subsidies amounting to £6,506 13s. 4d., of which £5,353 13s. 4d. was expended during that period. In addition to this, £1,419 9s. 1d. granted during previous years was expended by twenty-four parties during the past financial year.

The following statement shows the total expenditure during the year ended 31st March, 1917, on authorities issued previous to that date, in subsidies to prospecting associations and parties of miners in the different counties :—

	Expenditure. £ s. d.
Coromandel County	154 5 0
Ohinemuri County	43 5 0
Pelorus Road Board	368 10 0
Takaka County	78 0 0
Inangahua County	119 12 0
Murchison County	12 0 0
Buller County	163 6 8
Westland County	271 15 6
Ross Borough	3 0 0
Prospecting associations, &c.	5,559 8 3
Total	6,773 2 5

Upon the above operations and those previously subsidized, altogether twenty-two parties, employing sixty-seven persons, have during 1916 been engaged, but nothing of importance to the mining industry has been discovered; and I regret to report that with the solitary exception of the discovery of the Blackwater lode during 1905 by subsidized prospectors, I have not been able to record any discovery of importance as the result of subsidized prospecting.

The following is a statement showing the number of subsidized prospectors, the amount of subsidy granted and paid, also the character and result of such prospecting operations, from the 1st April, 1916, to the 31st March, 1917:—

Name of Prospecting Party.	Number of Prospectors.	Locality of Operations.	Amount of Subsidy granted.	Amount of Subsidy expended.	Distance driven.	Nature of Claim.	Character of Operations.	Remarks.
Northern Inspection District.				£ s. d.	Ft.			
Hauraki Prospecting Association—Tierney and Regan	2	Mahakirau, Coromandel ..	£1,000, at £2 subsidy for £1 subscribed	333 0 0	300	Quartz ..	Surface prospecting	So far nothing payable has been discovered.
Waitangi Gold-mining Company	6	Thames	£166 13s. 4d., at 6s. 8d. per foot	Nil	Nil	,, ..	Driving	Driving on 4 ft. lode, No. 2 level, hanging-wall portion carrying low values.
Hauraki Reefs Gold-mining Company	4	Coromandel	£125, at 5s. per foot	125 0 0	500	,, ..	,, ...	A short block of payable ore was opened up.
P. Power and party	2	,, ...	£50, at 5s. per foot	50 0 0	200	,, ..	,, ...	2 ft. lode intersected low-grade quartz.
W. M. Wallnutt and party ..	2	Waitekauri	£37 10s., at 7s. 6d. per foot	Nil	Nil	,, ..	Sinking	To test lode exposed on surface in the vicinity of where good dish prospects can be obtained.
Success Development Syndicate..	2	May Bell Claim, Waitekauri	£125 and £87 10s., at 5s. per foot	212 10 0	850	,, ..	Driving	Driving still in progress, and although, according to survey, the distance has been driven, the main lode has not been cut.
West Coast Inspection District.			£ s. d.					
Mountain Camp partnership ..	4	Wakamarina	100 0 0	70 0 0	210	Quartz ..	Driving	Crosscut being driven to cut scheelite-bearing lode.
Allen and Roberts	2	Ross	55 0 0	..	..	Alluvial ..	.. ..	No work started.
Deep Creek Syndicate.. ..	6	Wakamarina	166 13 4	166 13 4	500	Quartz ..	Driving	Driving on reefs at Deep Creek, results poor.
,, ...	4	,, ...	100 0 0	..	..	,, ..	,, ...	Work in progress, driving on two lodes.
Duffy and Pennington ..	2	Larry's Creek	66 13 4	20 0 0	60	,, ..	,, ...	Driving in progress, on lode 3 ft. wide; little gold.
K. S. Hungerford	6	Kanieri Forks	234 0 0	..	..	Alluvial ..	Sinking	Thirty-two shafts sunk to date; prospects payable.
G. W. Kellar..	2	Hokitika	90 0 0	..	..	,, ..	,, ...	Work not started.
Kulsen and Havill	2	Kanieri	78 0 0	32 10 0	..	,, ..	Driving	Work in progress; prospects good.
Mount Greenland Syndicate ..	5	Ross	100 0 0	..	..	Quartz ..	,, ...	Work in progress; lode very patchy.
M. and D. O'Keefe	2	Wakamarina	78 0 0	45 10 0	..	,, ..	Surface prospecting	No results of value.
Slattery and Rasmussen ..	2	,, ...	39 0 0	13 0 0	..	,, ..	Sinking	Work abandoned, as lode cut out in winze.
Victoria Range Syndicate ..	4	Reefton	41 13 4	..	..	..	..	An increase of 1s. 8d. per foot on remaining 500 ft.
Southern Inspection District.								
Browne and party	2	Lawrence	100 0 0	100 0 0	400	Quartz ..	Driving	A small leader showing coarse gold was found; when driven upon it cut out in all directions, and work was abandoned.
Deep Dell Gold and Scheelite Mining Company	2	Macrae's	120 0 0	11 6 8	34	,, ..	,, ...	Work in progress.
Symes and party	2	Bald Hill Flat	92 0 0	92 0 0	..	,, ..	Surface prospecting and trenching	Work in progress. No discovery of any value yet made.
Gordon and party	2	Kawarau..	87 10 0	52 0 0	210	Alluvial ..	Driving	Prospecting for an auriferous lead on high-level terrace. Results unfavourable, and work abandoned.

(2.) Government Prospecting-drills.

Type of Drill.	Name of Drill Superintendent.	Number of Holes drilled.	To whom lent.	Mineral sought for.	Total Depth drilled.	Diameter of Bores.	Character of Country pierced.	Average Cost per Foot.	Remarks.
					Ft.	In.		s. d.	
Keystone No. 2 ..	G. E. D. Seale ..	8	F. B. Powell, Rimu Flat, near Hokitika	Alluvial gold	372	6	Tight river-bed gravel and large stones	5 6	Very satisfactory.
„ No. 2 ..	„ ..	2	Boretz Prospecting Syndicate, near Hokitika	„	116	6	River silt	9 2	Nil.
„ No. 1 ..	„ ..	26	Rimu Options (Limited), Rimu No. 3 Claim, Rimu Flat	„	1,235	6	Tight river-bed gravel and other fairly loose	10 6	Very satisfactory.
„ No. 2 ..	„ ..	28	Rimu Options (Limited), No. 2 Claim, Rimu Flat	„	1,050	6	Tight river-bed gravel and large stones	10 3	„
„ No. 3 ..	„ ..	8	Ditto	„	365	6	Ditto	11 6	„
„ No. 1 ..	„ ..	5	Rimu No. 1 Dredging Company, Rimu Flat	„	206	6	„	10 0	„
„ No. 2 ..	„ ..	4	Batson and party, Kanieri ..	„	257	6	River-bed gravel and river silt	6 3	Fairly satisfactory.
„ No. 3 ..	„ ..	1	Wilkinson and Young, Hatters, Stafford	„	76	6	River-bed gravel, tight, but not stoney	37 6	Bore not completed.
„ No. 3 ..	„ ..	1	Linklater and party, Hatters, Stafford	„	80	6	Ditto	3 9	Poor.
Sullivan CN (diamond)	W. Carter ..	1	Kaitoke Prospecting Company (Limited)	Coal ..	111	2·5	Country hard	..	Country not coal-bearing; drilling unwarranted; negative results.
Schramm-Harker (oil-driven diamond drill)	W. H. Warburton	2	Liverpool Colliery, No. 1 ..	..	424	3	Sandstone, grit, and shaly mudstone	5 5	Drilled for ventilators, very successful.
Ditto	„	1	Liverpool Colliery, No. 3A Section	Coal ..	80	2½	Shaly mudstone and sandstone	9 4	Hole abandoned; country faulted.
Keystone Drill No. 3	„	4	Malaya Tin Corporation Company (Limited) ..	Alluvial gold	174	6	Gravel and cement layers ..	18 4	Unsatisfactory; cost of transport very heavy.
„	„	9	Rimu Options (Limited) ..	„	390	6	„ ..	9 10	Very satisfactory.

(3.) Subsidized Roads on Goldfields.

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, 1917 :—

	Direct Grants. £ s. d.	Subsidies. £ s. d.
Coromandel County	350 10 0	61 17 6
Thames County	25 0 0	176 8 10
Ohinemuri County	1,365 5 3	..
Pelorus Road Board	339 10 0	..
Collingwood County	147 18 10	..
Takaka County	100 0 0	..
Waimea County	13 10 7	..
Buller County	4,311 4 11	133 6 8
Inangahua County	3,730 10 11	79 17 1
Murchison County	274 13 1	..
Westland County	1,064 16 0	..
Grey County	2,716 0 8	50 0 0
Arrowtown Borough	49 19 6	..
Bruce County	..	300 0 0
Vincent County	192 0 0	..
Tuapeka County	50 0 0	..
Lake County	379 19 1	..
Wallace County	300 0 0	..
Southland County	579 11 6	265 0 4
Miscellaneous	41 5 6	..
Totals	£16,031 15 10	£1,066 10 5

During the year ended 31st March, 1916, the expenditure by way of direct grants was £23,662 1s. 5d., and by way of subsidies £769 19s. 2d.

(4.) Government Water-races.

The Waimea–Kumara and Mount Ida water-races, which render possible hydraulic mining in the Kumara district, Westland, and the Naseby district, Central Otago, have during 1916 supplied seventy miners with water for sluicing, by which gold to the value of £14,683 was obtained. The cash received for water sold amounted to £2,609, and the expenditure on upkeep of the races was £3,462.

After deducting the price paid for Government water, the average earnings during the year by each person using such water was only £170, and from this must be subtracted the cost of plant and material, rent, and other incidental expenses.

VIII. SCHOOLS OF MINES.

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.
Totals prior to 1916	33,965 13 3	3,103 0 3	2,429	27,100 2 1	66,597 15 7
1916–17 ...	1,133 14 11	6 5 0	133	2,519 13 7	3,792 13 6
Totals ...	35,099 8 2	3,109 5 3	2,562	29,619 15 8	70,390 9 1

ANNEXURE A.

SUMMARY OF REPORTS BY INSPECTORS OF MINES.

Northern Inspection District. (Mr. M. Paul, Inspector of Mines.)

Quartz-mining.

Waihi Gold-mining Company (Limited).—No. 12 level (1,447½ ft. below collar of No. 4 shaft): The Dreadnought lode was intersected in the north-west crosscut at 86 ft. from No. 4 shaft. Width, 7 ft.; assay value, 13s. 6d. per ton. This lode was followed eastward for 132 ft., the width varying from 3 ft. to 7 ft., and westward for 238 ft., the width varying from 3 ft. to a few inches.

Commencing at 160 ft. west a crosscut is being driven direct to No. 2 shaft. At the end of the year there was still 230 ft. to drive to make the desired connection.

A south-east crosscut to intersect the Royal lode has been driven 348 ft. The lode should be cut in another 50 ft. to 70 ft. of driving. Owing to a very heavy influx of water this drive was suspended early in November.

No. 11 level (1,301 ft. below the collar of No. 5 shaft): The east drive on Empire lode was extended 400 ft., and is now close to the boundary. The width of the lode varies from 12 ft. to 30 ft., and payable ore was disclosed in various places along the drive. Some further work was done on the Martha lode, but no payable ore located. The south branch of the Dreadnought lode was followed east to 503 ft., and a long run of good ore, averaging 10 ft. wide, opened up. The Royal lode was followed for 100 ft. from Princess south crosscut. The lode was 13½ ft. wide and of low value. The drive south on the Edward lode was extended 346 ft. in low-grade ore.

Shafts: No. 2 shaft was sunk 107 ft., and is now 1,373¾ ft. from the surface. No. 4 shaft was sunk 75¾ ft.; total depth, 1,546 ft. from surface.

Waihi Grand Junction Gold Company (Limited).—No. 8 level (north-west crosscut): The first 30 ft. is a mixture of quartz and country rock of no value; from 30 ft. to 46 ft. is quartz, low grade; from 46 ft. to 70 ft. is soft country rock. This level is 1,320 ft. from surface.

South-east crosscut, driven 175 ft.: At 116 ft. from the shaft a lode was struck, and from the above distance to 123 ft. is quartz, assay value of which is 19s. 8d. At 147 ft. quartz was again struck, and continued to 163½ ft. The first 4½ ft. assayed 2s. 10d., the next 4½ ft. 19s., the next 5 ft. 17s. 6d., next 2½ ft. £1 4s. 6d. Drive east was advanced 56 ft. from south-east crosscut; the average value for a width of 58 in. was 12s. 7d., the south wall being exposed.

Lode cut at 147 ft. (Empire footwall branch): Drive west was advanced 22 ft. from crosscut; assays average £1 13s. 6d. for a width of 60 in.; south wall exposed. Drive east was advanced 6½ ft. A rise was put up 28½ ft., and holed to a winze on the Empire footwall branch from No. 7 level. Assays averaged £2 12s. 1d. for a width of 47 in.; south wall exposed.

Total depth of main shaft, 1,346½ ft. from surface.

The Waihi Gold-mining Company recently decided to suspend development-work at and below No. 12 level, which is 98 ft. below the Grand Junction No. 8 level. It is intended by the Waihi Company to keep the water low enough not to interfere with development-work now in progress at No. 8 level, Waihi Grand Junction Mine.

Thames County and Borough.—Owing to the mine-water rising to the surface all mining operations below high-water mark have been suspended, and the only work at present in progress within the borough is the Waiotahi Mine, and a few tribute parties on the north end of the field. In the Thames County the principal producing mines are the New Sylvia, Occidental, and Golden Belt Gold-mining Companies. The gold won, however, is only sufficient to cover working-expenses.

Coromandel.—In this district, with the exception of a few prospectors, mining operations are confined to the Hauraki Reefs and Four-in-Hand Gold-mining Companies.

Oil-wells.

Taranaki (New Zealand) Oil-wells (Limited).—No new wells have been drilled during the past year, the drilling staff being engaged in recasing and deepening No. 2 bore. This well is now 3,045 ft. in 8 in. casing, and at this depth the surface water is being cemented off; 10 in. casing was carried to a depth of 2,223 ft. The old well had only 5 in. casing at this depth. Depths of wells, No. 2, 3,045 ft.; No. 3, 4,019 ft.; No. 5, 2,950 ft.; Rotary, 2,494 ft. Crude-oil production, 1915–16, 121,000 gallons.

Taranaki Oil Lands Acquisition and Development Company.—The Blenheim bore at the time of my visit (13th February, 1916) had reached a depth of 4,777 ft. A little petroleum is being obtained from 2,220 ft. This well is in good working-order.

Consolidated Oilfields of Taranaki.—Huiroa bore: This well on the 14th February, 1916, had reached a depth of 4,788 ft. The formation at bottom consists of heavy clay; pump shows strong gas-indications and brine water. For the whole distance this well is cased with 6 in. casing in movement.

Fatal Accidents.

William Irvine was killed on the 30th June, 1916, at the Victoria Mill, Waikino, by falling into a hopper, where he was suffocated.

Nº 9 LEVEL
(Depth 1009 Feet)

VENTILATION PLAN

WAIHI G. M. Cº LTD

W. H. Johnston, M.E., Lic. Surveyor.

— Specimen Plan —

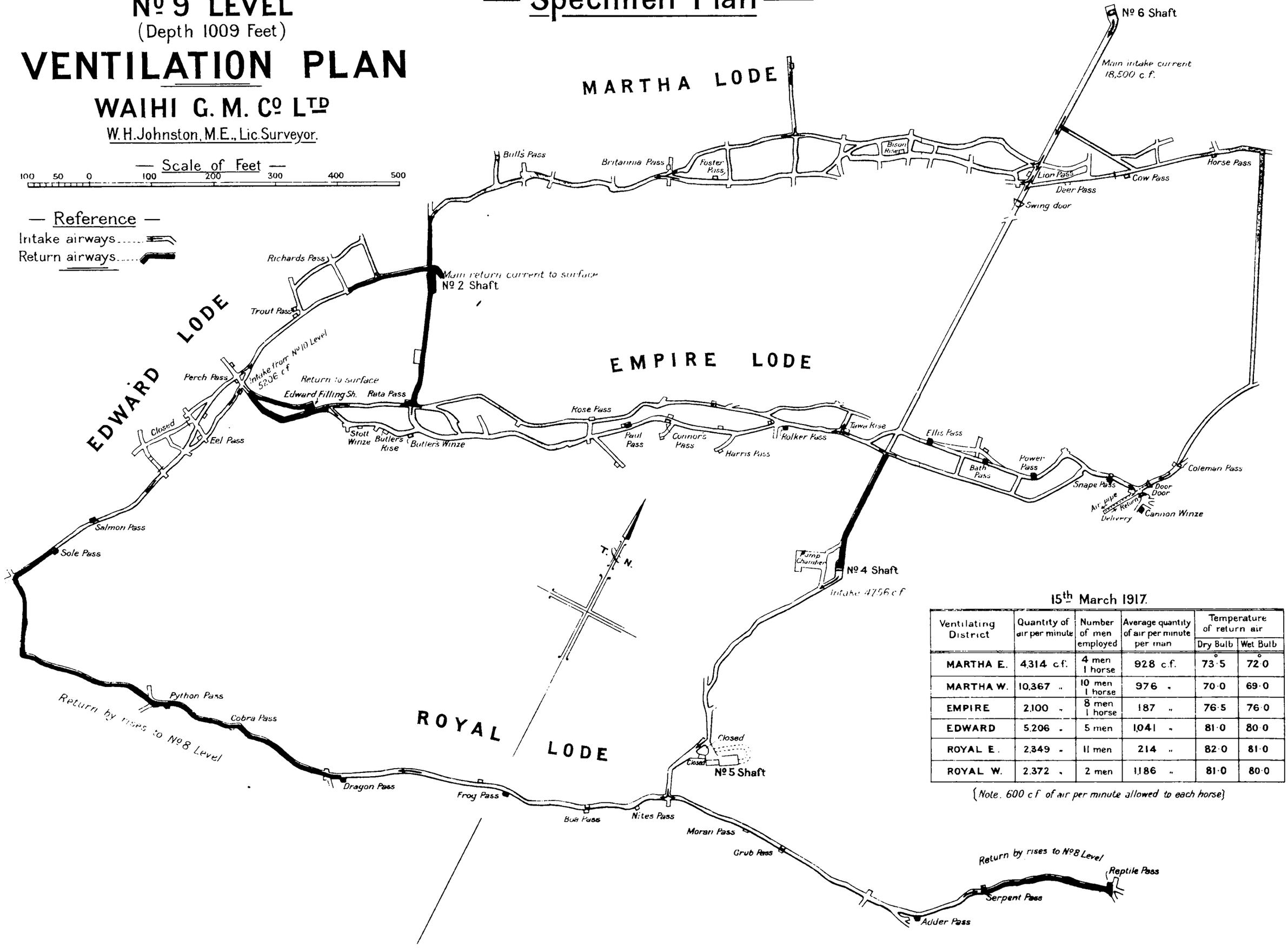
— Scale of Feet —

100 50 0 100 200 300 400 500

— Reference —

Intake airways.....

Return airways.....



15th March 1917.

Ventilating District	Quantity of air per minute	Number of men employed	Average quantity of air per minute per man	Temperature of return air	
				Dry Bulb	Wet Bulb
MARTHA E.	4,314 c.f.	4 men 1 horse	928 c.f.	73°5	72°0
MARTHA W.	10,367 "	10 men 1 horse	976 "	70·0	69·0
EMPIRE	2,100 "	8 men 1 horse	187 "	76·5	76·0
EDWARD	5,206 "	5 men	1,041 "	81·0	80·0
ROYAL E.	2,349 "	11 men	214 "	82·0	81·0
ROYAL W.	2,372 "	2 men	1,186 "	81·0	80·0

(Note. 600 c f of air per minute allowed to each horse)

G.F.H. del.

Matthew K. Hillhouse was killed on the 19th July, 1916, at the Talisman Mine by falling down an inclined shaft at the top of which he was working.

Thomas F. Rowney was killed on the 11th August, 1916, at the Waihi Mine by a fall of ground in a stope.

John McIntosh was killed on the 13th October, 1916, at the Waihi Mine by the criminally mischievous act of a person who put a rail into a shaft in which deceased was being lowered in a cage, the rail knocking him out of the cage.

Full details of these fatal accidents are contained in the tabulated remarks of the Inspecting Engineer.

Non-fatal Accidents.

H. Wroe: On the 17th July, Waihi Mine, Wroe was engaged blasting two boulders, using fuses 3 ft. 6 in. in length. Only one explosion took place. Wroe states that he waited twenty to thirty minutes, and on going back to relight the unexploded charge he reached a point a few feet from the boulder when it went off, peppering him in the legs with small grit.

Alfred Waite: On the 28th September, Waihi Mine, in a stope on the Martha lode, Waite and his brother were working down the loose ground when about half a ton of rubbly quartz suddenly came away, striking A. Waite on the head and shoulders, injuring his back. Stope not more than 5 ft. in height where the accident occurred.

William Strongman (Hauraki Reefs Mine, Coromandel): On the 31st March, 1916, Strongman was engaged gadding a piece of reef down when a lump came away from the hanging-wall, breaking his right leg above the ankle.

Alfred Briggs (New Zealand Crown Mines, Karangahake): On the 25th July, 1916, Briggs, engaged tributing in this mine, went down to repair a pass by means of a rope; his candle went out, and when he got to the end of the rope, thinking himself only a few feet from the bottom, he let go and fell 20 ft. He suffered severe bruises about the body and legs, but escaped serious injury.

There were numerous minor accidents during the year, but those quoted are the most serious.

Cinnabar-mining.

The following reference to the Whangarei Cinnabar-mining Company is from the report of Mr. Boyd Bennie, Inspector of Mines:—

During the whole of the year the mine of the Whangarei Cinnabar-mining Company has been worked with from four to six men. The main reef has been driven on for some length. The lode dips at an angle of about 10° north, is from 3 ft. to 4 ft. wide, and at one place there is a pipe formation or thickening of the lode where good assay values have been obtained. Three drives have cut into the lode, and samples of ore taken by me and assayed at the Dominion Laboratory gave very satisfactory percentages of mercury. I found the mining carried on in a satisfactory manner. The treatment-furnace, &c., erected some time past was found to be unsatisfactory and the manager discontinued its use. The directors are making inquiries as to the best treatment plant and the probable cost; in the meantime mining is carried on with a limited staff, and is mainly in the nature of prospecting the extent and value of the ore-deposit.

Collins Bros. are preparing to work an alluvial flat for cinnabar-ore north-east of the Whangarei Cinnabar-mining Company's claim. Dish prospects of fine ground cinnabar from the washed dirt are very encouraging, but there cannot be a great area of deposit. Sufficient water is available to drive a primitive pug mill and for washing purposes.

I could find no trace of any other mining being done by other claim-holders in the district.

MARLBOROUGH, NELSON, AND WEST COAST INSPECTION DISTRICT. (MR. T. O. BISHOP, Inspector of Mines.)

Quartz-mining.

MARLBOROUGH.

Dominion Consolidated Mining and Development Company (Limited).—Work has been steadily carried on at this company's mine throughout the year, but the returns of both gold and scheelite show a considerable falling-off as compared with those for 1915. Development of the mine has not opened up any further supplies of ore, and nothing of value has yet been found in the bottom level. A surface tramway about one mile and a half in length is being constructed round the hillside to the south of the present mine to enable stone from the Golden Bar old levels to be conveyed to the mill. There is a fairly large ore-body in these levels, but the grade appears to be low, and there is some doubt as to its being payable.

Deep Creek Gold-mining Syndicate has carried on prospecting-work during the year. Numerous outcrops of quartz have been found and have been tested by trenching and driving. Most of these appear to cut out very quickly in depth, and in nearly all of them values are very low. On the north side of Deep Creek there is one reef from 3 ft. to 5 ft. thick which shows gold, and this is being driven on at present. In some of the outcrops there are traces of scheelite, but so far I have seen nothing which would warrant the erection of even a small battery.

Alford and Party (Mountain Camp).—This party has discovered a small scheelite-bearing lode, and is at present driving a crosscut to intersect it about 80 ft. below the outcrop. The country is very hard and flat, and it would have been much better prospecting to have sunk on the reef first. Ultimate results are doubtful. There has been a little prospecting for scheelite at Top Valley during the year, but no defined lode has been found: There is no other quartz-mining in Marlborough.

NELSON.

Colossus Gold-mining and Development Company, of Napier, took over Messrs. Van Bell, Balting, and Grace's prospecting-areas at Connor's Creek, Wangapeka, but after starting a long crosscut and driving it about 300 ft. they abandoned the work, and are now preparing to further test Culliford's old reef at Blue Creek. Gold can be seen in one portion of the reef where it is exposed in the old drive, and it is possible there may be something found here on further development. There is now no other quartz-mining in the Nelson District.

LYELL.

New Alpine Consols Company.—During the year the Alpine reef-line has been struck in the crosscut and it is now being driven on to the south. The channel is well defined with good walls, and little solid and uncrushed veins of quartz occur in the formation. Some of these show free gold. Nothing payable to work has been struck so far, but driving is being continued.

CAPLESTON.

Boatman's Consolidated Gold-mining Company (Limited).—The work at the Fiery Cross shaft has been carried on throughout the year, and the cleaning-out and repairing has been completed to the bottom—450 ft. A contract has been let for sinking, and the work commenced. The company's balance-sheet up till the 30th September, 1916, shows an expenditure of nearly £12,000.

Work at the Golden Arch Mine was stopped early in the year, nothing of value having been found.

REEFTON.

Murray Creek Mines.—Mining and crushing were continued until August, £12,252 worth of gold being obtained from 3,183 tons treated; but, as it was then thought there was a considerable loss of gold in the milling process, the mine was closed while the mill and treatment plant were enlarged and rearranged. This work is still in progress. At the time of closing down the mine was looking very well.

Energetic Extended.—Prospecting has been carried on with four men during the year. More than one reef-track has been explored by driving, and some crosscutting has also been done, but nothing of value has been found.

Wealth of Nations and Energetic Mines.—Work has been carried on continuously throughout the year, the returns being somewhat smaller both as to tonnage and value than for 1915. No important ore-bodies have been developed, but the blocks at the lowest level, No. 12 (2,019 ft.), are just as good as any in the mine. To maintain the ore reserve further sinking of the main shaft is now a necessity.

Keep-it-Dark Mine.—This old mine has failed to pay working-expenses for some years past, and early in the year the company gave an option over the property to a Christchurch syndicate organized by the Rev. R. Wilson. This syndicate, instead of vigorously prospecting with the object of locating a payable ore-body, continued mining the unprofitable stone worked by the company. Very little prospecting has been done, and the mine fell into such a state of disrepair that early in December it was necessary to withdraw the men and prohibit any work being done excepting that necessary to restore the airways and re-establish the ventilation. This work is still in progress, and it will be months before regular mining operations can be resumed. There are two reefs in this mine, the East and the West. The former in the upper levels gave very good results, but it has never been seen below No. 5 level, nor has there been very much work done to find it. The West reef, which has been worked alone from No. 6 level down to No. 9, the present bottom level, has never been payable. The future prospects therefore appear to depend upon the finding of the East reef in the lower levels.

Progress Mines.—This mine has had a steady run for the year, but there has been a marked fall in the returns as compared with 1915, due chiefly to a shortage of men. The development of ore has been, on the whole, satisfactory, and the reserve must have been considerably increased.

Cumberland Mines.—No work has been done during the year

New Big River Mine.—This mine has nearly doubled the previous year's returns, but chiefly owing to shortage of labour it has again failed to show upon the dividend-list. No. 11 level has so far proved disappointing, and the reef is there seriously interrupted by faults. Probably further sinking will be required to get beyond the disturbance.

North Blackwater Development Syndicate.—The sinking of the Prohibition shaft has been vigorously pushed on, and a depth of over 800 ft. has now been reached. The reef should be struck some time this year.

Blackwater Mines.—The returns from this mine are £30,000 less than for the previous year, partly due, no doubt, to shortage of labour, but also to some extent to a diminution in size of the reef having caused a smaller tonnage to be produced. Nos. 5, 6, and 7 levels all proved disappointing, the reef being much smaller and more broken than was the case above. No. 8 level so far has been better, and it may prove to be below the region of the displacement; and at the present time (3rd March, 1917) the north faces of Nos. 6 and 7 levels are also looking much better than they have done for some time, as they are showing a good reef in nice solid country. This is favourable for the prospects of Blackwater North, as these latest developments are only about 500 ft. from the boundary.

Blackwater South Mine.—Some further prospecting has been done here by continuing Absalom's tunnel, but nothing of value has been found.

HOKITIKA AND ROSS.

Mount Greenland Company has carried on work at Cedar Creek during the year, and a small battery has been erected and was started and run for a few weeks, but since dry weather set in there has been no water for power purposes, and no returns have been obtained. The two levels of the mine have been connected by an uprise, but no other development-work has been done. There are some rich patches in the reef, but as no systematic sampling has been done the average value is not known.

General Remarks on Quartz-mining.

In addition to the mines above mentioned there have been a few prospecting-works in progress during the year, but nothing of value has been found, and there is now very little interest being taken in work of this kind. All the mines have been frequently visited, and the provisions of the Mining Act have been enforced in all cases. One mine-manager was prosecuted for failing to maintain proper sanitary arrangements, and was fined two guineas. Two miners were convicted of dry-boring at Blackwater Mine and fined. An official inquiry under section 266 of the Act was held before Warden Hutchison, and Messrs. T. Watson and W. Power, assessors, into a fatal accident at the Keep-it-Dark Mine. The Court decided that the manager was not guilty of negligence, though it held that the system of working at the time of the accident was faulty, and recommended that the Act be amended so as to prevent a leading stope being worked within 20 ft. of any face being worked in the level below. With reference to the table of accidents herewith, it will be seen that this one, by which T. O'Connor was killed at the Keep-it-Dark Mine, was preventable, but the others come into the class of accidents which are not preventable by any careful management or careful inspection, being caused directly by the negligence of the victims themselves.

The return-air shaft at the Progress Mines collapsed and rendered necessary the construction of new airways and installation of a fan, and this work was carried out without risk, all mining-work being suspended while it was done. The mechanical ventilation is now established and is satisfactory.

At the Keep-it-Dark Mine the return airways collapsed, and the men were withdrawn from the mine in December, and all work except that required for restoration of ventilation is now suspended.

As regards ventilation generally in this district there has been some improvement during the year, and the installation of a mechanical system at the Progress Mine will, it is to be hoped, be followed by similar installations at other mines.

Dredging.

The dredging industry in this district has not been very successful during the year, there having been considerable falling-off in the returns. Two companies have ceased operations—viz., Murray's Freehold and Red Jacks—while the Ahaura River has failed to pay expenses, and work has been suspended pending a reconstruction of the company.

The Rimu No. 1 dredge is almost ready for work, and is expected to average over 100 oz. per week, when the claim is fully opened out. The test bores have given good results, but the dredge is on the light side for the class of work she has to do, and the working-time may be considerably interrupted by breakages.

Alluvial Mining.

MARLBOROUGH.

Alluvial mining in Marlborough has given a return of only 4 oz. for the year, but Larkin and party, at Enchanted Creek, who have been unable to clean up for want of water, write that a fair return is expected.

COLLINGWOOD DISTRICT.

Parapara Hydraulic Sluicing and Elevating Company.—This claim has employed seven men during the year, chiefly upon non-remunerative work—construction of a long tail-race through worked ground to reach a new face ahead. The total return for the year was 52 oz.

There are three other small claims working in the district, but returns are very poor.

HOWARD DIGGINGS.

This goldfield has given employment to about eighty men for the whole year, and as nearly as I can ascertain they have all made fairly good wages. A number of ordinary claims are held without being registered, and from these no returns are available. The small branches of Louis Creek are now practically worked out, but some claims in the main creek will last for another year. There has also been some work done in small creeks on the Gowan side of the watershed during the past year, but returns from this side have been poorer than from Louis Creek. No important finds have been made in the terraces, and it does not therefore appear that there will be any great extension of work in this locality.

MURCHISON.

There are two parties of three men each working at Upper Matakitaki and obtaining payable results—viz., Messrs. Beilby and Richardson, and M. White and party. Taylor's Creek Company, with English and New Zealand capital, has proved another failure, and it should now be finally established that the Matakitaki is a working-man's field only, no less than five companies having come to grief.

BULLER VALLEY.

Practically no work is now carried on in the Buller Valley.

WESTPORT DISTRICT.

Carthage Company has ceased operations, and a few old men who work intermittently on the beach have been the only producers of gold during the year.

ADDISON'S FLAT.

Working-parties are still making good wages at Addison's.

Shamrock Claim is again being worked on behalf of English owners, but the result of the year's work has been very poor. The claim is now known as the "Totara Mines."

Addison Gold-mining Company.—Development-work is still in progress at this claim (Carmody's), and somewhat slow progress has been made. Sluicing is expected to commence very early in the new year.

CHARLESTON.

There is nothing new to report from Charleston. Messrs. Powell Bros. and Butterworth and party have been working throughout the year and have had satisfactory returns.

GREY VALLEY.

The miners in the Grey Valley are becoming fewer each year, and returns from this source are small. There has been nothing calling for comment during the year.

Lake Hochstetter Company is still carrying on water-race construction, and has been reconstructed during the year in order to provide sufficient capital to finish the work.

BARRYTOWN.

McKay and party continue to get payable returns, but no other claims are now at work.

KUMARA DISTRICT.

The number of working-miners between Greymouth and Hokitika has remained about the same as for the previous year.

Golden Terrace Company, at Maori Gully, has employed seven men for a return of 76 oz.—a very disappointing result.

Hohonu Diamond Terrace Company has continued sluicing with the small water-supply available, and has obtained £622 worth of gold. No work has been done upon the larger water-race.

HOKITIKA DISTRICT.

There has been a renewal of activity in mining matters in Hokitika this year, owing to Australian capitalists having carried on the prospecting of large areas of alluvial ground in the district.

Rimu Flat has been proved by Keystone drilling to be rich dredging ground, and one dredge is now about to start work, while others will be built as soon as financial arrangements can be made under the War Regulations. At present the formation of new companies is scarcely possible.

Brighton Terrace Sluicing Company.—This company is now preparing to sluice an area adjoining Rimu Flat and facing the Hokitika River, using electric power to pump water from the river for sluicing purposes. The power plant at Kanieri Forks installed by the Ross Goldfields Company is being used as a power source for this work, and the pump-station at Woodstock is nearing completion. If the ground in this claim proves as good as the trial bores indicate the work should prove remunerative even after paying for water. Mr. Powell and his principals deserve every encouragement, as they are really the pioneers in this method of mining so far as Westland is concerned.

Other Prospecting.—Mr. K. S. Hungerford, representing the Malayan Dredging Corporation, has carried on extensive prospecting at Duke's Terrace, Kumara; at Pine Creek, near Rimu Flat; and in the neighbourhood of Lake Kanieri. At Duke's Terrace three bores were put down and several shafts were sunk, but values were too low to warrant further work. At Pine Creek eighteen shafts were sunk, the deepest being 50 ft. The leads of gold proved to be narrow, and the average value of the ground too low to be profitable for dredging. Near Lake Kanieri Mr. Hungerford is at present prospecting, and reports that he has sunk twenty shafts, the deepest being 100 ft. The bottom has not been found. There are several rich runs of gold in the area, and there appears to be every probability of this being a highly payable property. It is proposed to work by free sluicing, using Humphrey's Gully water for this purpose.

ROSS.

There is practically no mining now being carried on at Ross. The plant on the Ross Goldfields Mine has been nearly all removed.

Southern Inspection District. (Mr. A. Whitley, Inspector of Mines.)

Quartz-mining.

Quartz-mining in Otago during the past year has been carried on chiefly for the production of scheelite, an ore of tungsten, which mineral occurs in quartz lodes in schist at Glenorchy, Macrae's, The Reefs, Waipori, and Bendigo. At Macrae's it is associated with gold in the lodes, but the latter metal is now looked upon as a secondary product, for owing to the war having created an increased value and demand for scheelite it has been found the most profitable to mine.

GLENORCHY.

Glenorchy Scheelite-mining Company (Limited).—Operations have been carried on continuously throughout the year at the Glenorchy, Junction, and Mount Alfred mines. The Alaska and Mount McIntosh mines, which are situated at altitudes of over 5,000 ft. above sea-level, were closed down during the winter months, and work was not resumed owing to the scarcity of miners. The principal development-works carried out by the company are as follows: At the Glenorchy Mine a new level, No. 1A, was started 50 ft. below No. 1 level, and driven 330 ft., at which point the lode was cut, showing a width of 3 ft. of good-grade ore. At the Mount Alfred Mine three levels are being driven south on the lode. The lowest of these is situated 150 ft. below the crest of the ridge through which the lode runs, and is connected by tramway with the ore-dressing plant. The lode in the north end of the workings is from 6 ft. to 10 ft. in width, but going south it branches into small veins varying in width from a few inches up to 2 ft. Two of these veins in the east wall are being driven upon at No. 2 level. Plant installed during the year comprises ten head of stamps and magnetic separator at the Glenorchy mill; stone-breaker, screens, jigs, and Wilfley tables at Mount Alfred.

Paulin and Tripp's Black Peak and Temple Peak Claims, and *Birley and Party's Claim* on Mount Larkins, which are situated between 5,000 ft. and 6,000 ft. above sea-level, were worked during the summer season for highly payable results.

A number of small parties of two or three miners, working their own claims, are making good wages. Some of these dress their scheelite by hand to bring it up to the required standard; others dispose of the ore to the Glenorchy Scheelite Company.

MACRAE'S.

Golden Point Mine was worked by D. Peddie and party up to August, when it was taken over by the Golden Point Gold and Scheelite Mining Company. Operations were confined to shallow surface levels. Scheelite was the principal product, the output amounting to 33 tons 13 cwt. Gold valued at £165 was also obtained. The company paid £2,450 in dividends as the result of five months' operations.

Deep Dell Consolidated Scheelite and Gold Mining Company.—The work of extending the adit level was suspended during the year, and operations were confined to mining scheelite from a small lode in the north-east section of the mine.

Fraser and Gaytan.—This party discovered a lode carrying high-grade scheelite close to the main road from Dunback to Macrae's, and about two miles from the latter township. The work done, which comprises surface trenching and sinking a winze to a depth of 20 ft. on the lode, has given highly payable results.

Mareburn Gold and Scheelite Company (Highlay).—One mile of incline tramway was laid down to connect the battery with Block 18, where a large lode carrying gold and scheelite is being mined by opencast method.

New Zealand Gold and Tungsten Mining Company (Highlay).—This company was formed during the year for the purpose of reopening and working the gold and tungsten mine formerly owned by Donaldson Bros. No. 3 level has been repaired and extended to open up a small block on the reef.

Stoneburn Mining Company.—This company's operations have not proved successful. The ore mined during the year was low-grade.

Golden Bar Gold-mining Company (Stoneburn).—This company has gone into liquidation. The mine and battery were sold to W. E. Griffin, of Macrae's. No mining was done during the year.

A number of small parties of miners are profitably employed working the outcrops of scheelite lodes which occur within an area extending from Stoneburn in the south to Highlay in the north, having a width of about three miles by a length of eighteen miles.

THE REEFS.

H. S. Molineaux and A. C. Buckland are working the Barewood lode for scheelite. Rich pockets of the mineral are found in veins in the footwall. A lode carrying good scheelite was found about one mile south-west of the Barewood line of reef by Mr. A. Ewart. An option was taken over the find by a Dunedin syndicate, and development has commenced. The output of scheelite for the year from this part of the district amounted to a little over 6 tons.

WAIPORI.

Waipori Prospecting Company.—About 1,000 ft. of driving and crosscutting was done on the O.P.Q. lode without meeting with any blocks of payable quartz. Operations have been suspended.

Cox's Reef.—A. Rodgers and party crushed 14 tons of quartz from the lode for a return of 12 oz. 12 dwt. gold. The reef is very small, and the return did not pay the cost of mining and treatment.

Mr. T. Bertenshaw discovered a small scheelite vein in his alluvial claim at Lammerlaw Creek. About 1½ tons of scheelite were obtained from shallow surface workings.

BALD HILL FLAT.

R. Symes and party are carrying on mining operations on White's and the Excelsior reefs. No discovery of importance has been made during the year.

BANNOCKBURN.

Carrick Gold-mining Company.—The low-level tunnel was extended 104 ft. during the year. This tunnel was started for the purpose of developing the lodes on the Carrick Range at a low level, and the work was subsidized by the Mines Department at the rate of pound for pound up to £500. Although the work is important to the company and the district generally, no energy has been shown in carrying it out.

Alluvial Mining.

LAWRENCE.

Gabriel's Gully Sluicing Company.—Sluicing and elevating the tailing-deposit from Blue Spur has been continued with payable results. The value of the gold won for the year amounted to £7,615, and dividends paid £3,760.

Cornishman Claim.—A sluicing company has recently been formed to work the Cornishman Claim at Blue Spur formerly owned by Kitto and party. Since commencing operations several miles of water-race have been cleaned out and enlarged, and the pipe-line shifted to bring water on to the tailing-deposit in Munroe's Gully, which will be elevated.

Golden Crescent Sluicing Company (Wetherstones).—An area of about 2 acres of low-grade cement was sluiced off to an average depth of 20 ft. preparatory to elevating the lower and richer part of the deposit resting on the schist rock. Water under an hydraulic head of about 700 ft. enables the company to deal effectively with the hardest of the cement.

WAITAHUNA.

Sailor's Gully Sluicing Company.—New pipe has been laid down over a length of one mile and three-quarters, and water for sluicing and elevating is now delivered at the claim under an hydraulic head of 600 ft. The company is working auriferous cement similar to that at Blue Spur. The height of lift is 70 ft.

Havelock Sluicing Company.—This company has had another successful year. Gold valued at £3,335 was obtained, and dividends paid amounted to £1,900. The ground being worked is river-flat, consisting of clay and gravel resting on a pipeclay bottom.

WAIPORI.

The principal alluvial claims in this part of the district are Munroe and George, Post Office Creek; R. J. Cotton, Lammerlaw Creek; and Gare Bros., Pioneer Creek. These claims employ an average of four men each, and are giving payable returns.

ROXBURGH.

Teviot-Molyneux Gold-mining Company.—An area of about 12 acres was sluiced off to an average depth of 20 ft., and a paddock three-quarters of an acre in area sunk to a depth of 30 ft. To save the fine gold contained in the gravels the sluice-boxes are so arranged that the fine gravel, after passing over ripples, is discharged through perforated plate into a trough at the side of and below the boxes, from whence it is elevated and distributed over a set of tables having an area of 1,080 square feet lined with coconut matting. Numerous large schist boulders, which require to be broken up by explosives, occur in the upper gravels; to deal with these a jack-hammer drilling plant has been installed on the claim. During the greater part of the year the plant has been employed stripping off overburden without attempting to save any of the gold-contents. The claim is just entering the producing stage, and this year's operations will prove it definitely.

Roxburgh Amalgamated Gold-mining Company.—This company's new claim at Mervyn's Flat has been tested by boring, and the prospects were sufficiently encouraging to warrant the directors in recommending the incorporation of a new company to raise the capital required to take the water and plant on to the claim. The results obtained from the block of ground known as Louden's area have been disappointing.

Ladysmith Gold-mining Company.—This company has had another successful year. Gold to the value of £4,249 was won, and dividends amounting to £2,481 paid. The average height of lift is 50 ft. Most of the gold is obtained from a seam of tight stony wash about 6 ft. in thickness resting on the schist bottom.

Commissioner's Flat.—Coulter and party brought water for elevating purposes across the Clutha River from Manuel's water-race at Coal Creek Flat. The water is delivered at the elevator under a pressure of 150 lb. per square inch, and has enabled the party to work the deep ground.

CROMWELL.

Roaring Meg Sluicing Company.—After repeated efforts bottom was reached at a depth of 52 ft. in this company's claim, the prospects being valueless. The company is now in liquidation.

Gordon and Party.—This party's efforts to locate a payable lead on a high-level terrace in the Kawarau Gorge resulted in failure.

ARROW RIVER.

Sluicing operations are being carried on by the Macetown and Shamrock Sluicing Companies and Anderson and Son. Paterson Bros. failed to locate a payable lead in Billy Creek, and work has been suspended.

SHOTOVER CREEK.

Between twenty and thirty men are employed in the alluvial claims in this part of the district. The Klondyke, Sandhills, and New Skipper's claims, which are the most productive, are just paying a little over working-costs.

MATAKANUI.

Undaunted and Tinker's Gold-mining Companies have shifted their plants from the lead near the foothills where the overburden was becoming exceedingly heavy. Elevating is being carried on in blocks of unworked ground on the flat, which vary in depth from 40 ft. to 90 ft. The operations of both claims are considerably hampered owing to scarcity of water. A combination of interests and water rights would bring about beneficial results.

OPHIR.

High Levels Sluicing Company.—This company commenced sluicing operations in the latter part of the year. Water for sluicing is pumped to a height of 250 ft. The pumping plant comprises 85 h.p. Crossley gas-engine and generator, and high-speed turbine pump, 10 in. diameter. One and a half sluice-heads are delivered into a dam situated 140 ft. above the claim. The area available for working is small, and the quantity of water inadequate to satisfactorily deal with the wash. Unless the ground is exceptionally rich the company's operations will result in failure.

ST. BATHAN'S.

Scandinavian Water-race Company.—Sluicing and elevating was resumed during the year. Operations are being carried on close to the boundary of the United M. and E. Company's claim, where difficulty will be experienced in working without encroaching on the latter company's ground. To enable the work to be carried on with advantage the two claims should be amalgamated.

The United M. and E., Vinegar Hill, Morgan's, and O'Hara's claims continue to work on a small scale.

NASEBY.

All the available water from the Mount Ida race is used by the claim-holders working in Enterprise, Spec, and Main Gullies, most of whom are making good wages.

PATEAROA.

Three parties of miners are engaged in sluicing operations in the locality. The average depth of ground worked is 30 ft.

MAEREWHENUA AND LIVINGSTONE.

The deposit of auriferous greensand which has been worked in this district for many years is almost exhausted, and the number of miners employed gradually getting less. The past year has not been favourable for continuous operations, a spell of dry weather in the early part causing a stoppage of all work for six weeks.

WAIKAIA.

Muddy Terrace Sluicing Company.—The water-race on the terrace leading from the siphon was extended 36 chains to command Maori Gully, where payable ground 8 ft. in depth was opened up. The shallow gullies running down from the terrace are evidently the richest parts of the claim; most of these have been worked. There is still a large area of unworked ground on the terrace, but in places it has an overburden of clay and gravel up to 50 ft. in height which has to be sluiced away before the auriferous wash is reached. Gold to the value of £4,265 was produced for the year. Twenty-four men were employed.

NOKOMAI.

Nokomai Hydraulic Sluicing Company.—Two elevators have been kept almost constantly working throughout the year. No. 2 claim, in Victoria Gully, has given highly payable returns. The average depth of ground worked in this claim is 30 ft., and hydraulic head available for elevating 300 ft. No. 3 claim, in Nokomai Creek, has not given as good returns as No. 2 owing to its greater depth and the large quantity of non-auriferous gravel that has to be dealt with. Water from the Lion race is used for elevating under an hydraulic head of 600 ft. The depth of ground worked averages 80 ft.

NEVIS.

Seven hydraulic elevating claims, employing twenty-nine men, are working in this part of the district. The heights of lift vary from 20 ft. to 40 ft., and pressure for elevating from 300 ft. to 400 ft. As the water-races are frozen up in the winter the sluicing season only lasts nine months.

ROUND HILL AND OREPUKI.

Round Hill Mining Company.—A flood in the Ourawera Stream on the 28th March swept away the protection bank above the No. 2 claim, filled the claim with water and debris, and completely buried the elevator and plant. Another pumping plant had to be procured for recovery purposes, which occupied four months, sluicing operations being considerably delayed thereby. No. 1 claim has been worked continuously for payable returns.

Ourawera Gold-mining Company.—Elevating is being carried on in Italian Gully. Operations for the year have given a little profit over working-expenses.

Twelve men find employment at sluicing around Orepuki. In most cases they are making a living-wage.

Dredge Mining.

Two dredges were dismantled during the year—viz., the Confidence, at Lowburn, and Bruce Syndicate, at Glenore.

At Waikaka, McGeorge's Freehold No. 1 claim was worked out, and the dredge is to be dismantled. Paterson's Freehold No. 1 has changed ownership, having been purchased by J. Anderson.

Two of the dredges operating in the gorges of the Clutha, Electric No. 2 and Manuherikia, got in a short run of about three weeks during midwinter. The others did not start owing to the unsettled state of the river.

The Rise-and-Shine dredges continue to be the most productive in the southern district. Dividends paid during the year amounted to £4,200.

The Otakau dredge, operating in the Kyeburn, paid £1,350 in dividends for the year, and should continue to give good results in 1917.

The Karanui, at Alexandra, was purchased from the company by a local syndicate, and dredging has been resumed by the new owners.

Minerals other than Gold.

Tungsten-ore.—The advance in price of scheelite has caused prospecting and consequent discoveries of new deposits and also increased development of known deposits, resulting in the output for 1916 being almost double that for 1915. Prospecting has been most actively carried on in Macrae's, Glenorchy, and Barewood districts.

Tin.—The Stewart Island Tin and Wolfram Company's sluicing operations at Port Pegasus have given very disappointing results. The return of tin and wolfram concentrates obtained from six months' work only amounted to 2½ cwt., of an estimated value of £12. No work has been done during the year to test the lode on the company's property.

Copper.—A parcel of 3 tons of ore was mined from the lode at Moke Creek and shipped to Australia for treatment by Messrs. Paulin and Tripp. Assays of the ore gave results up to 24 per cent. of copper. The lode is about 12 in. wide, and consists of rusty-coloured quartz containing small bunches of copper and iron-pyrites.

Limestone.—The output of limestone from the Milburn Lime and Cement Company's quarries at Milburn and Dunback amounted to 51,428 tons.

Marl.—The output of marl from the Milburn Lime and Cement Company's pit at Burnside amounted to 7,985 tons.

Phosphates.—The Ewing Phosphate Company produced 7,600 tons of rock phosphate from the quarry at Milburn.

Accidents.

Fatal.—28th August: Edwin Francis Parker, miner, aged forty-one years, was killed by a fall of earth while working in a tail-race in his own claim at Kyeburn diggings.

Serious.—19th October; Koputai dredge, Waikaia: Edward Sinclair sustained concussion of the brain. Accident caused by a wire rope breaking while the men were connecting up dredge-buckets.

ANNEXURE B.

EXTRACTS FROM REPORTS OF GOVERNMENT WATER-RACE MANAGERS.

WAIMEA–KUMARA WATER-RACES, WESTLAND. (Mr. JAMES ROCHFORD, Manager.)

Waimea Water-race.

The cash received for sales of water from this race for the year ended the 31st March, 1917, was £600 10s. 11d., and the expenditure on management, gauging, maintenance, and repairs amounted to £714 12s. 11d., showing a debit balance of £114 2s. on the year's transactions.

The average number of miners supplied with water during the year was 21·08, a decrease of 3·67 on the previous year; and the approximate amount of gold obtained by them was 1,160 oz., valued at £4,553, a decrease on that of last year of £1,519 6s.

The sales of water amounted to £676 3s. 8d., a decrease of £257 12s. 5d. on the previous year. Although the sales were the smallest for the past eight years, it does not by any means imply that the payable ground commanded by the Government water in the district is becoming worked out, but it can be accounted for to a great extent by the disastrous flood that occurred on the night of the 14th April (which has previously been fully reported on), which had the effect of materially reducing the ordinary supply of water for mining in the Callaghan's, Goldsborough, and Stafford districts for the first five months of the year. There was also a scarcity of labour owing to the number of young men that enlisted for the war or were drawn in the ballot, with the result that two claims at least in the Stafford section had to close down for lack of men for some months during the year, and certain other parties could not use as much water as last year owing to the same reason.

The cash received was £313 7s. 8d. less than the previous year, and the expenditure increased by £12 18s. 11d., and the race is now in good order.

Although the past year was the driest in the memory of the oldest inhabitants, the supply of water in the Waimea Race after repairs had been completed at the end of August never fell below 29 or 30 heads of water, which was due to the additional supply from the newly constructed Waimea Branch Race from the Arahura, Wainihinihi, and Macpherson's Creeks, which supplied from 8 to 10 heads of water in the driest weather.

Kumara Water-race.

The cash received for sales of water from this race for the year ended the 31st March, 1917, was £71 13s. 1d., and the expenditure on management, gauging, maintenance, and repairs amounted to £349 13s. 9d., showing a debit balance of £278 0s. 8d. on the year's transactions.

The average number of miners supplied with water during the year was 4·66, a decrease of 8·75 on the previous year; and the approximate amount of gold obtained by them was 220 oz., having a value of £863 10s., a decrease on last year of £1,679 6s.

The sales of water amounted to £77 7s. 11d., a decrease of £264 as compared with the previous year.

The cash received was £143 0s. 11d. less than last year, and the expenditure was reduced by £125 16s. 1d.

Branch Race to Callaghan's and Middle Branch Flat.

The cash received for sales of water from this race for the year ended the 31st March, 1917, was £197 8s. 4d., and the expenditure on management, gauging, maintenance, and repairs amounted to £380 11s. 11d., showing a debit balance of £183 3s. 7d. on the year's transactions.

The average number of miners supplied with water was 4·75, a decrease of 2·19 on the previous year.

The approximate amount of gold obtained was 344 oz., having a value of £1,350 4s., a decrease of £767 10s. on last year.

The sales of water amounted to £198 17s. 6d., a decrease of £64 12s. 1d. on the preceding year.

The cash received for sales of water was £87 15s. less than for the previous year, and the expenditure was reduced by £48 6s. 11d.

Kumara Trans-Taramakau Water-race

Owing to the serious break which took place in the Taramakau pipe-line in the river-bed on the 20th November, 1915 (which was fully reported in my last annual report), water was supplied to the miners on the north bank of the river only during the last three weeks of the financial year. The Department called for tenders, which closed on the 31st May, 1916, for the construction of a pipe-bridge over the Taramakau River. The successful tenderer was Mr. H. J. Bignell, bridge contractor, of Greymouth, who started the construction-work on the 14th July, and the bridge was completed on the 20th December. The bridge is 328 ft. in length, and is a very strong structure, consisting of eight piers of hardwood piles, seven piles to the pier, and a land pier of three piles. The superstructure for carrying the 30-in. pipe main is composed of steel girders 16 in. by 6 in. by 33 ft. in length. The work of restoration was not finally completed until the 16th March, and since that time everything has gone on satisfactorily, and the water has been running continuously through the pipes. During the last three weeks of the year four parties, comprising in all seventeen men, were engaged in sluicing operations on the north bank of the Taramakau River, and purchased water to the value of £22 11s. 10d., but of this amount £9 16s. was authorized free water for opening up new ground.

The cash received for sales of water from this race for the year ended the 31st March, 1917, was £14 15s., and the expenditure on management, gauging, maintenance, and repairs amounted to £85 17s. 6d., showing a debit balance of £71 2s. 6d. on the year's transactions.

The number of miners supplied with water was seventeen, and the approximate amount of gold obtained was 47 oz., having a value of £184 9s. 6d., a decrease of £891 18s. 6d. on last year.

The sales of water amounted to £12 15s. 10d., a decrease of £128 2s. 4d. on the previous year.

The cash received was £143 9s. less than for the preceding year, and the expenditure decreased by £99 13s. 6d.

Erin-go-Bragh Water-race.

The cash received for sales of water from this race for the year ended the 31st March, 1917, was £398 5s. 7d., and the expenditure on management, gauging, maintenance, and repairs amounted to £309 10s. 1d., showing a credit balance of £88 15s. 6d. on the year's transactions.

The average number of miners supplied with water was 12·33, an increase of 0·33 on the previous year; and the approximate amount of gold obtained by them was 739 oz., having a value of £2,900 11s. 6d., a decrease of £281 16s. 6d. on the last year.

The sales of water amounted to £378 8s., a decrease of £9 3s. 8d. on the previous year.

The cash received showed an improvement of £50 13s. 5d., and the expenditure increased by £5 3s. 7d. as compared with the year previous. As anticipated in my last annual report, this race showed a fair profit on the year's transactions notwithstanding the reduction in the price of water from 4d. to 2½d. per head per hour, which came into force on the 1st April, 1916.

Wainihinihi Water-race.

On the night of the 14th April, when the flood previously mentioned was at its highest, a large slip came down the side of the mountain between Caretaker Walker's hut and the intake of the race. The slip carried away a by-wash, broke down several timbered sets, and completely filled up a portion of the race with broken rock and other debris. The same flood broke into the race at the Little Wainihinihi and filled up several chains of ditching, also carried away a portion of the new siphon and two intakes on the newly constructed Waimea Branch Race. These repairs were all completed by the end of August, 1916, and both races are now in good order.

Waimea–Kumara Water-races.

The following is a summary of the revenue and expenditure of these races for the year ended the 31st March, 1917: Sales of water, £1,343 12s. 11d.; cash received, £1,282 12s. 11d.; expenditure, £1,840 6s. 2d.; approximate value of gold obtained, £9,851 15s.; average number of miners employed, 44·23.

The sales of water showed a decrease of £723 10s. 6d., and the cash a decrease of £636 19s. 2d. In addition to the above sales, authorized free water to the value of £128 2s. 2d. was supplied to parties opening up new claims.

The total expenditure on the combined races was £1,840 6s. 2d., as against £2,096 0s. 2d. for the previous year, a decrease of £255 14s.

Comparing the sales of water with the expenditure, the combined races show a loss of £496 13s. 3d. for the year.

Owing to the break which occurred in the Kawhaka Race on the 20th March preventing the miners at Goldsborough and Stafford from washing up by the end of the financial year, the outstanding accounts show an increase of £39 3s. 9d., but £62 10s. 7d. of this amount was paid in after the Easter washings, and the true position shows a decrease of £23 6s. 10d. for the year.

Mount Ida Water-race, Central Otago. (Mr. J. C. Buchanan, Manager.)

The total sales of water from the Mount Ida Water-race during the year amounted to £1,326 12s. 6d., an increase on that of last year of £140 16s. 11d. The expenditure on maintenance, cleaning, and repairs for the same period amounted to £1,622 2s. 11d., an increase on that of last year of £125 3s. 6d.

The total cash received was £1,326 12s. 6d. Free water for washing up was supplied to the value of £104 1s. 5d.

The total value of water supplied from this race amounted to £1,430 13s. 11d., an increase on that of last year of £124 1s. 5d.

The approximate quantity of gold obtained by parties using water from this race during the year was 1,255 oz., valued at £4,831 15s., an increase on that of last year of £261 16s.

The average number of men employed was 25·75.

From the 1st April to the 30th September there was a fair supply of water, and the winter being an exceptionally mild one most of the claims were working steadily during this period. The water becoming short, I started on the 2nd October with all the available men to clean and repair the race, and had the water on again on the 1st November. Owing to the scarcity of labour the work of cleaning and repairing the race took much longer than in former years.

Good rains during November gave a plentiful supply of water, which also filled the Eweburn Reservoir. From the 27th November to the end of the year was one continuous drought, and the Eweburn Reservoir running out on the 3rd February the supply from this date to the end of March became very short, at times being as low as 2½ heads. To cope with the demand for water I found it necessary at the time of cleaning and repairing the race to give it an extra good cleaning as far as Idaburn, a distance of about eighteen miles. I had also to enlarge and completely renew three short flumes, two of them on the west side of Main Gully, and one at the bend of the race in Home Gully. I also found it necessary to lay an additional 17 in. siphon alongside the siphons crossing Enterprise and Main Gullies, and strengthened the Eweburn tunnel with eight new sets of timber. The race during the year was fairly free of mishaps. Two breaks occurred—viz., in Coalpit Gully, also between the East and West Eweburns. The race at present is in good order, and the demand for water still equals the supply.

ANNEXURE C.

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 of Mines, Wellington.

Sir,— Coromandel, 1st March, 1917.

I have the honour to present my report on the work done at the Coromandel School of Mines for the year ended the 31st December, 1916.

Attendance.—A total of twenty-three students attended the classes in one or more subjects during the year, showing an increase of three over last year's number. Instruction was given in thirteen subjects, two students taking the full course for the Mine-managers' Examination. Several students who attended the classes in theoretical and practical chemistry and other science subjects were unable to sit for the School of Mines examinations. One student, Mr. M. A. Macdonald, enlisted and went on active service towards the end of the year.

Examinations.—At the annual Government examinations fifteen students presented themselves in theoretical subjects, and one student did two of the practical examinations. The certificates gained were five first class, six second class, and three third class. The students who take assaying, surveying, and electricity, and some of those who take chemistry and other subjects, at the Coromandel School do so purely for purposes connected with mining pursuits.

Assays.—The number of ore-samples assayed and reported on in 1916 was 136, of which 128 were done for prospectors free of charge; also, seven samples of fish-manure, three of limestone, and ten of water were analysed at the school.

In conclusion, I wish to express my hearty appreciation of the manner in which the officers and members of the Council have worked for the benefit of the school during the year.

I have, &c.,
U. B. Inglis, Director.

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

Sir,— Thames, 26th April, 1917.

I have the honour to present my annual report on the work done at the Thames School of Mines during the year 1916.

Attendance.—Notwithstanding the large number of students who are in camp or at the front the attendance has kept up to the average, as shown in the following schedule:—

	First Term.	Second Term.	Third Term.
Registered students	31	30	31
Class attendance of registered students	47	42	41
Elementary-science class	40	35	29
Teachers' science class	10	10	9
Total individual students	81	75	69

Examinations.—Forty-one students presented themselves for examination in one or more of fourteen subjects, and obtained fifty-nine first-class, four second-class, and three third-class certificates. Two students also passed the Senior Civil Service Examination in geology. One student completed the second-class Mine-managers' Examination. Sixteen passes were obtained in the practical examinations in chemistry and assaying. One student passed the second-class Engineers' Examination.

Battery and Experimental Plant.—The details of the work in the battery have been embodied in a separate report. Thirteen parcels have been treated, of a total weight of 4·43 tons, for a bullion return of £1,401 18s. 5d. In every case experiments are made to determine the condition in which the values exist, and a report made as to the probable best mode of treatment.

One hundred and fourteen assays for gold and silver, thirty-five analyses for zinc, lead, antimony, and copper, fourteen estimations of mercury, and nine milk-tests were made during the year, besides the assays and analyses necessary for the ore-treatment in the battery.

Gas-testing Plant.—Four certificates were granted during the year, making a total of thirty-two.

General.—The school library has been augmented by the addition of several books that were purchased, and by the bulletins supplied by the Mining and Geological Survey Departments of Tasmania, Queensland, West Australia, Victoria, South Australia, and the United States. Several specimens have also been donated to the museum.

In conclusion, I wish to express my appreciation of the work done by the school staff and of the unfailing interest of the President and Council in the welfare of the school.

Experimental Plant.

Twelve parcels of ore have been treated, ranging in weight from 28 lb. to 2 tons, and in value from 8s. per ton to £7,200. The total weight of ore treated was 9,927 lb. (dry weight), for a yield of gold and silver valued at £1,401 18s. 5d.

Almost the whole of this return was obtained from picked stone treated for the Occidental Gold-mining Company. In the treatment of this class of ore all the pulp after amalgamation is

saved and assayed, and stored until sufficient slimes have accumulated to make a cyanide charge. Should these slimes belong to several owners the amount obtained is distributed proportionately, after deducting the school charges. With careful amalgamation ore that is worth roughly an ounce to the pound (approximately £2 15s. per pound) will, with Thames stone, yield tailings worth £75 per ton; with Coromandel ore, about £12 per ton. This difference in values is due almost invariably to the presence of pyrargyrite with the Thames gold and its intimate association with blende. Ordinary grinding is not sufficiently fine to liberate the gold from these mineral particles, and it is therefore found in the tailings. Cyanidation will not extract more than 75 per cent. of the bullion from these tailings without further grinding.

Three separate parcels of river-sands from the bed of the Ohinemuri River were treated by concentration. These averaged a little over 1 dwt. of gold and 1 oz. of silver per ton. In every case concentration gave a product valued at from £4 to £7 per ton. The experiments showed that if these tailings could be cheaply lifted from the river-bed concentration would give a product from which the bullion could be obtained with comparatively low capital cost.

Two parcels of slags, one bank smelting residues and the other cyanide bullion slags, were treated by amalgamation.

One parcel of sand was treated by agitation with cyanide in B. and M. tanks, and a fair recovery obtained. Further treatment of this parcel will be made by amalgamation and cyanidation.

One parcel of complex sulphide ore was treated in three lots, and a series of experiments made to determine the adaptability of the ore for amalgamation, concentration, sand treatment, and slime treatment. During the treatment of this parcel over eighty estimations of gold, silver, zinc, lead, and copper were made to determine the relative values of the various grades.

Table showing Parcels of Ore treated at Thames School of Mines Experimental Plant, 1916.

Locality.	No.	Weight of Ore or Material, in Pounds.	Nature of Ore or Material.	Value received from Bank.
				£ s. d.
Thames	253	28	Silver residues	14 7 6
Waikino	254/1	869	River-sand	..
	254/2	176	,, ...	..
Paeroa	255	672	,, ...	..
Thames	256	70	Picked stone	228 4 4
Coromandel ..	257	60	,, ...	94 5 7
Thames	258	130	,, ...	400 3 4
,, ...	259	80	,, ...	262 9 4
,, ...	260	700	Slags, ashes, &c.	47 10 0
Te Aroha	261	1,700	Cyanide slag	33 0 10
Coromandel ..	262	200	Quartz	9 2 0
	262/1	2,293	,, ...	..
Thames	262/X	567	Sulphide ore	..
	262/D	1,390	Quartz	..
,, ...	263	750	Sands and slimes	13 18 0
,, ...	264	242	Picked stone	298 17 6
Totals ..	..	9,927	..	1,401 18 5

Notes on Treatment Results.

Parcel No. 254, river-sand from Waikino.—No. 1: Net weight, 869 lb.; assay value, 1 dwt. 13 gr. gold, 1 oz. silver: value, 8s. per ton. 369 lb. was washed through a 20-mesh screen and the undersize concentrated on a Wilfley table. 17 lb. of concentrate was obtained, assaying 1 oz. 7 dwt. gold and 5 oz. silver per ton. Value of concentrate, £7 18s. per ton. 500 lb. was then concentrated without previous sizing, but, as expected, this treatment was not successful, a concentrate being obtained which contained much river-gravel.

No. 2 was similar river-sand composed of a mixture of 79 lb. river-gravel and 97 lb. battery sand. Assay value, 2 dwt. gold and 1 oz. silver per ton. 12 lb. of concentrate was produced, containing 13 dwt. gold and 3 oz. 7 dwt. silver per ton. The latter was not a clean concentrate.

From a metallurgical point of view there is no difficulty in treating these sands. The commercial value depends on the facilities for lifting them from the river-bed, and their quantity. The plant required would comprise lifting, sizing, and concentrating machinery. On account of the high silver to gold proportions in the bullion the treatment of the sands, unless on a very large scale, would not pay: the economic value lies in the concentrates. The treatment of the concentrates would be either by tube-milling and cyaniding, or preferably roasting, amalgamation, and cyaniding.

Parcel No. 255, river-sand from Paeroa.—Three parcels of 2 cwt. each. Each parcel was separately concentrated and the concentrate returned to owner. Assays of concentrates: No. 1, 1 oz. 1 dwt. gold, 4 oz. 10 dwt. silver, per ton; value, £6 13s. per ton. No. 2, 18 dwt. gold, 7 oz. 7 dwt. silver, per ton; value, £4 6s. 7d. per ton. No. 3, 12 dwt. 16 gr. gold, 5 oz. 3 dwt. silver, per ton; value, £3 0s. 11d. per ton.

Parcels Nos. 258 and 259, picked stone containing quartz, iron-pyrite, blende, and ruby silver.

Parcel No. 261, slag from cyanide bullion from Waiorongomai. This slag contained too much copper to permit the cyanidation of the residue.

Parcel No. 262/1, X, D, three samples from Mount Zeehan, Thames. 262/1: Net weight, 2,293 lb. of quartz with blende, galena, pyrite, and chalcopyrite. The ore was crushed and concentrated. Although fine gold was intermittently seen on the Wilfley table practically no amalgamation took place on the plates on account of the heavily mineralized nature of the ore. The values of the various products were as below :—

Sample.	Gold, per Ton.	Silver, per Ton.	Value per Ton for Gold and Silver.	Lead, per Cent.	Zinc, per Cent.	Copper, per Cent.
	Oz. dwt.	Oz. dwt.	£ s. d.			
Original ..	1 6	4 0	5 12 0	2·40	2·82	0·76
Sand	0 9	1 2	1 18 1	0·68	1·14	0·19
Concentrate ..	6 15	19 10	28 19 0	8·97	13·38	3·61
Slime	0 9½	3 0	2 4 0	0·77	2·62	0·38
Overflow ..	0 7½	2 0	1 14 0	0·38	1·97	0·37

The weight of concentrate saved was 12·25 per cent. About 60 per cent. of the gold, silver, and lead values are in the concentrate.

Parcel No. 262 X.—Net weight, 567 lb. of very heavily mineralized ore, chiefly galena, blende, pyrite, and chalcopyrite. The values of the products obtained after crushing were as under :—

Sample.	Gold, per Ton.	Silver, per Ton.	Value per Ton for Gold and Silver.	Lead, per Cent.	Zinc, per Cent.	Copper, per Cent.
	Oz. dwt.	Oz. dwt.	£ s. d.			
Original ..	4 10	17 10	19 15 0	13·25	16·48	2·78
Sand	1 7	6 12	6 1 2	2·50	10·20	1·47
Concentrate ..	7 18	27 18	34 7 9	22·20	22·13	4·93
Slime	1 15	10 10	8 1 0	10·60	12·71	2·31

The weight of concentrate saved was 43·7 per cent. It contained 75 per cent. of the original bullion and lead values. The high value of the slime was due to fine mineral, which could, however, be decreased by the use of a slime-table.

Parcel No. 262/D.—Net weight, 1,390 lb., consisting of mullocky quartz with the usual sulphide minerals. This parcel was crushed through a 25-mesh screen and concentrated and graded as in previous parcels.

Sample.	Gold, per Ton.	Silver, per Ton.	Value per Ton for Gold and Silver.	Lead, per Cent.	Zinc, per Cent.	Copper, per Cent.
	Oz. dwt.	Oz. dwt.	£ s. d.			
Original ..	0 14	3 10	3 3 0	3·18	4·43	0·50
Sand	0 7	2 2	1 12 2	1·93	2·21	0·20
Concentrate ..	3 2	13 0	13 14 0	6·75	14·94	3·24
Slime	0 5	1 14	1 3 5	2·12	2·49	0·10

The concentrate was 13·7 per cent. of the original, and contained 60 per cent. of total bullion values and only 50 per cent. of the lead. The low lead-extraction was due to the intimate mixture of galena with the quartz, and renders the further subdivision of the ore necessary.

The sands from the three parcels aggregated 2,571 lb., carrying 9 dwt. gold and 2 oz. of silver per ton. After treatment for four days with 0·3-per-cent. solution of cyanide, 50 per cent. of the silver and 55 per cent. of the gold were extracted. After three more days' treatment the total silver-extraction was 55 per cent. and gold 61 per cent. The low extraction was due to the presence of sulphides in the sands.

Cyanidation of Slimes.—The slimes were agitated in a B.M. tank with air for forty-eight hours. Original assay of slimes: 16 dwt. gold, 4 oz. 6 dwt. silver, per ton, valued at £3 12s. 6d. per ton. The residue assayed 2 dwt. gold, 10 dwt. silver, per ton, giving an extraction of 87 per cent. of gold and 89 per cent. of the silver. Cyanide-consumption was 2 lb. per ton.

Cyanidation of Concentrates.—100 lb. were slimed and agitated with 0·4 per cent. cyanide. Original assay, 3 oz. 2 dwt. gold and 13 oz. silver per ton. After three days' agitation the residue assayed 5 dwt. gold and 10 oz. 5 dwt. silver per ton. This shows an extraction of 92 per cent. of the gold and only 20 per cent. of the silver. A stronger solution for a greater time results in a higher silver-extraction. Cyanide-consumption, 17 lb. per ton.

Summary.—The ore is easily crushed. As the chief values lie in gold, silver, and lead, it is economically preferable to disregard the other minerals at present. The zinc-residues could be stacked, and if high prices continue could be re-treated by flotation. Concentration will recover 60 per cent. of the bullion and lead values in one-seventh of its bulk, and cyanidation, after tube-milling, will recover without difficulty a high percentage of the remaining gold-silver content.

I have, &c.,
W. H. Baker, Director.

Mr. W. A. Given, M.A., A.O.S.M., Director of the Karangahake School of Mines, to the Under-Secretary of Mines, Wellington.

Sir,— Karangahake, 12th March, 1917.

I have the honour to present my report on the work done at the above school of mines for the year ended December, 1916.

Attendance.—Twenty students in all attended the school during the year, and instruction was given in all the school subjects. Notwithstanding the fact that several of our best and most promising students had enlisted for active service, the work done at the school compared favourably with that of previous years.

Examinations.—Ten students sat at the annual examinations, obtaining eleven first-class, six second-class, and three third-class passes. Three students sat for the examination for battery superintendents, at which examination one student was successful, while one obtained a partial pass, having failed in one subject only.

Open Nights.—Two open nights were held during the year, one at Karangahake and one at Waikino. Short illustrated lectures were given by Mr. H. C. Tempest, electrical instructor, and myself, on "Electricity in respect to the War" and "Chlorine Gas" respectively. These lectures were well attended, and our efforts were thoroughly appreciated.

School Equipment.—A late-pattern Braun pulverizer and a 2 horse-power Fairbanks-Morse oil-engine were recently installed in the assay department. The laying of the foundation and the setting-up of this plant were done by the voluntary efforts of the Council members themselves. During the year a large specimen-case was added to the geological-museum equipment, in order to hold a number of specimens kindly presented during the past few years.

Public Assays.—In all 117 public assays were made during the year, a decided increase on the last few years. A number of mineral determinations were also made.

In conclusion, I desire to express my appreciation of the work done by the other members of the staff; also of the keen and active interest taken in the school affairs by the members of the Council.

I have, &c.,
W. A. Given, Director.

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

Sir,— Waihi, 16th March, 1917.

I have the honour to present the following report on the work of the school during 1916:—

Attendance.—The attendance for each of the three terms is shown in the following table:—

	Number of Students.	Class Attendance.
First term	61	97
Second term	50	73
Third term	48	70
Average	53	80

This must be considered highly satisfactory, considering the large number of young men who are at present on active service.

Examinations.—Thirty candidates presented themselves for the written examinations, sending in forty-two papers, of which twenty-six gained first-class, four second-class, and nine third-class certificates. In addition ten passes were recorded in the practical examinations. Advice has just been received also that Mr. C. Kingsford was successful in completing a pass for first-class metal-mine manager's certificate.

Public Assays.—As in previous years, a large number of assays and analyses were made for the public. A considerable number of these were assays for gold and silver made for prospectors free of charge. Several analyses of mine-air were made also for the Inspector of Mines.

Metallurgical Plant.—At the close of the year an experimental flotation machine was procured and has been installed in the metallurgical building, which was extended to accommodate it, as well as any additional plant that it may be found advisable to obtain. We have now a convenient and up-to-date experimental plant, comprising machinery for grinding ore to any required degree of fineness, and apparatus for varying the treatment of the ore in any desired manner. The crushing machinery has also proved extremely useful in preparing samples for assay. The exhaust fan installed to carry off the dust does its work effectively.

Library.—During the year a number of recent works was purchased in order to keep the library up to date. We are indebted also to Mr. Jarman for a gift of mining literature, as well as a considerable number of lantern-slides of mining subjects.

Staff.—I wish to take this opportunity of expressing my appreciation of the work done by the members of the staff, especially Mr. Seelye, upon whom devolved a large amount of extra work on account of my absence. I wish also to thank the Council for their generous action in granting me leave of absence in order to proceed on active service.

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

Mr. James Lamont, Director of the Huntly School of Mines, to the Under-Secretary of Mines, Wellington.

Sir,— Huntly, 28th April, 1917.

I have the honour to present my annual report on the work done at the Huntly School of Mines during the year 1916.

Attendance.—The attendance was practically the same as the previous year. A number of students are at present serving in the Expeditionary Forces, but this is counterbalanced by new registrations. Since the inauguration of the school over three years ago the activity in the coal-mining industry at Huntly has decreased considerably, otherwise the attendance would have been much higher.

Examinations.—At the annual Government examinations eleven certificates were gained. At the mine-managers' examination one student was successful in gaining a second-class colliery-manager's certificate, and at the underviewers' examination three candidates were successful. During the year I have examined candidates, and issued seven certificates for testing the correct percentage of gas in mine-air.

Equipment.—A Hailwood's gas-testing machine has been installed, and is frequently made use of in demonstrating to students and in examining the ability of underground officials to detect the correct percentage of gas in air-mixture with a safety-lamp. The gas for use in the machine is conveyed from Auckland in steel cylinders. Surveying-instruments have been acquired, and students can now be taught practical field-work. Electric lighting has been installed, the current being taken from the town-supply mains.

Library.—The stock of books in the library deals with all branches of engineering science, is kept well up to date, and is much appreciated by students and members.

In conclusion, I have to acknowledge the assistance rendered me by the members of the Council, who maintain a keen interest in the welfare of the school.

I have, &c.,
James Lamont, Director.

Mr. H. Lovell, A.O.S.M., Director of the Westport School of Mines, to the Under-Secretary of Mines, Wellington.

Sir,— Westport, 4th April, 1917.

I have the honour to present my report on the Westport School of Mines, and its branches at Ngakawau, Millerton, and Denniston, for the year ended 31st December, 1916.

Attendance.—The average number of students attending the school was forty, with an average class attendance of eighty-three. This is rather less than last year, the average attendance being forty-two.

Examinations.—Government certificates: At the examinations for Government certificates under the Coal-mines Act held in December last seven candidates presented themselves, with the following results: First-class mine-manager—W. Crowe, Ngakawau; partial pass, M. McClean, Ngakawau, and W. H. Hewitson, Denniston. Second-class mine-managers—F. Duffy, Denniston; partial pass, W. Lowden, Ngakawau. Underviewers and deputies: Two candidates sat for underviewers' and four for the deputies' examination, W. Maher passing in the former, while H. Reid, B. Miles, and I. Pratt passed in the latter examination. T. Calder secured a partial pass in the deputies' examination.

Assay Laboratory.—Thirty-two samples of ores and minerals were examined and reported on during the year. The majority of the samples consisted of quartz ores for assay.

Library and Museum.—Again I have to acknowledge, with thanks, the receipt of text-book, mining and geological literature from the Department.

In conclusion, let me express my appreciation of the interest taken in the school's welfare by the members of the Council.

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

Mr. Sidney Fry, Director of the Reefton School of Mines, to the Under-Secretary of Mines, Wellington.

Sir,— Reefton, 9th May, 1917.

I have the honour to present my report on the work of the Reefton School of Mines for the year ended the 31st December, 1916.

Attendance.—The average attendance at classes during the year was—Reefton, ten students; Waiuta, eleven; Greymouth, fifteen.

Gas-testing.—Demonstrations and examinations were held monthly in the latter part of the year, and seven students gained certificates of competency.

Assays.—Eighty-one assays were made during the year, and twenty-nine determinations of the value of specimens commercially.

Examinations.—At the annual School of Mines Examinations students from this school obtained the highest marks for the Dominion in five subjects. At the examinations for mine-managers three sat for metal-mine managers' certificates and two for coal-mine managers' certificates; of the latter two, one gained a pass and one a partial pass. The results for bullion-assaying have not come to hand.

I have compiled the above information from notes left for me by my predecessor, Mr. J. H. Williamson, whom I did not meet on my arrival here to take up my duties a few weeks ago. Notwithstanding these troublous times the educational facilities offered by this school of mines are being largely availed of, as the present attendance at the classes is forty-four students, and several more are enrolling this week.

I have, &c.,
SIDNEY FRY, Director.

Professor JAMES PARK, Dean of the Mining Faculty, to the UNDER-SECRETARY OF MINES, Wellington.

SIR,— Otago University, Dunedin, 15th May, 1917.

For the session 1916 there was an attendance of sixteen students taking the full diploma course, and of these four were returned soldiers. Before the end of the session two of the other twelve volunteered for active service, and were called up a few weeks before the final examinations began.

Examinations.—Fourteen students sat for the annual examinations qualifying for the B.E. or A.O.S.M. course, and all succeeded in passing. War passes were granted to the two students called up in the second term.

Diplomas.—During the year the diploma as Associate in Mining was granted to three students, and the certificate of Land and Mine Surveyor to two students.

War Service.—With the consent of the University Council Professor Waters volunteered for active service, and left New Zealand early in 1916 with the New Zealand Tunnelling Corps. Since then his lectures and laboratory-work have been carried on by the Director of the school. A considerable number of our graduates and undergraduates are associated with Captain Waters both as officers and tunnellers; and from the frequency of reference in general despatches of the good work of the New Zealand Tunnelling Corps in France we may gather that the men from the Otago University School of Mines are worthily upholding the best traditions of their *alma mater*. Old graduates of the school in considerable number made for London from all parts of the globe on the outbreak of war, and most of them now hold commissions in the Royal Engineers. To the parents and relations of our old students who have fallen on active service or been wounded the Mining Faculty extends its warmest sympathy. Special sympathy is offered to the relations of Lieutenant W. M. Durant, A.O.S.M., and of Major D. M. Tomlinson, B.E., both killed on active service in France, and of Captain W. T. Tomlinson, of the Royal Engineers, who was dangerously wounded. All of these were gallant soldiers and promising mining engineers. Major Tomlinson and Captain Tomlinson surrendered lucrative mining appointments in Korea, and enlisted as privates in the Imperial Forces, London, at the beginning of the war.

Changes in Staff.—At the end of the session Professor P. Marshall resigned the Chair of Geology, and in his place the University Council appointed Dr. Benson, D.Sc., who has already taken up his duties. Dr. Marshall was appointed as Lecturer in Geology in the School of Mines in 1900, and was raised to the status of professor in 1908. From the first he proved himself a keen and successful teacher, always unsparing of his time and vital energy in carrying out the work of his department. His successor, Dr. Benson, is a distinguished graduate of Sydney and Cambridge Universities, who, if we may judge by his record, should worthily maintain the high standard of work set by his predecessors.

I have, &c.,
JAMES PARK, Dean of Mining Faculty.

ANNEXURE D.

MINING STATISTICS.

Table 1.

STATEMENT SHOWING QUANTITY OF QUARTZ CRUSHED AND GOLD OBTAINED IN THE HAURAKI MINING DISTRICT FOR THE YEAR ENDED 31ST DECEMBER, 1916.

Locality and Name of Mine.	Average Number of Men employed.	Quartz crushed.*	Gold obtained.		Value.
			Amalgam.	Cyanide.	
THAMES COUNTY AND BOROUGH.					
Tapu—		Tons cwt. qr. lb.	Oz. dwt.	Oz. dwt.	£ s. d.
Mahara Royal	1	Cleaning up mill	180 16	..	360 13 1
Tararu—					
New Sylvia	46	5,910 0 0 0	..	7,542 5	10,469 9 1
Watchman	22	2,400 0 0 0	718 9	1,438 7	3,959 14 8
C. Berry	1	Sluicing Tararu Creek	41 3	..	110 9 5
Kurunui—					
Kurunui (Tributers)	2	80 0 0 0	40 0	..	95 6 2
J. P. Williams	2	Cleaning up mill	128 9	..	377 16 8
Moanataiari—					
Moanataiari (Tributers) ..	6	19 0 1 6	100 0	..	249 0 9
Adelaide	3	4 0 0 2	2 8	..	6 10 0
Kurunui-Caledonian	4	53 1 2 9	351 0	..	791 17 4
Waiotahi—					
Waiotahi	4	269 0 0 0	174 11	..	451 5 5
Cambria	6	20 0 0 0	22 0	..	57 0 1
Nonpareil	3	40 0 1 12	79 6	..	197 8 11
Golden Drop	1	0 0 0 4	2 0	..	4 5 9
Karaka—					
Occidental	7	166 0 0 0	855 3	..	2,302 5 3
Newcastle	2	3 0 1 23	35 0	..	80 1 6
Good Hope	4	16 0 0 0	53 0	..	138 7 0
North Star	1	0 0 0 12	9 0	..	21 2 4
Labour Day	1	0 0 2 12	41 1	..	90 7 9
Tairua—					
Golden Hills	4	655 0 0 0	924 0	..	1,849 19 7
Golden Belt	16	1,147 0 0 0	9,870 18	..	11,580 4 7
Gumtown—					
Kapowai	2	50 0 0 0	36 4	..	77 19 7
Prospectors	3	0 0 0 15	11 0	..	27 5 0
Totals	141	10,832 3 2 11	13,675 8	8,980 12	33,298 9 11
WAIHI BOROUGH.					
Waihi—					
Waihi Gold-mining Company ..	687	173,420 0 0 0	..	550,408 17	363,611 19 6
Waihi Grand Junction Company	394	112,303 0 0 0	..	205,413 3	211,107 13 6
Gladstone	1	Cleaning up mill	45 15	..	11 7 0
Totals	1,082	285,723 0 0 0	45 15	755,822 0	574,731 0 0
† OHINEMURI COUNTY.					
Owharoa—					
Rising Sun	22	2,370 0 0 0	4,947 14	989 10	11,877 3 1
Waitekauri—					
W. G. C. Nicholl	1	Cleaning up mill	28 5	..	48 18 6
Golden Cross	4	100 0 0 0	43 7	..	41 10 4
Karangahake—					
Talisman	220	16,935 0 0 0	10,785 2	35,093 11	81,454 18 6
N.Z. Crown	27	886 0 0 0	3,408 3	..	2,429 12 3
Paeroa—					
Waihi-Paeroa Gold-extraction Company	62	Re-treating tailings	..	93,198 17	43,950 0 0
Komata—					
Komata Reefs	10	693 0 0 0	..	413 4	1,033 0 0
Totals	346	20,984 0 0 0	19,212 11	129,695 2	140,835 2 8
PIAKO COUNTY.					
Waiorongomai—					
Hardy's Mines	3	Re-treating slags	208 1	..	68 2 3

* Ore treated given in "long" tons. † 155,000 tons of tailing recovered from the Ohinemuri River (sludge-channel) were re-treated. This tonnage is not included in the above statement, having been recorded when the ore was originally crushed.

Table 1—*continued.*

STATEMENT SHOWING THE QUANTITY OF QUARTZ CRUSHED AND GOLD OBTAINED IN THE HAURAKI MINING DISTRICT FOR THE YEAR ENDED 31ST DECEMBER, 1916—*continued.*

Locality and Name of Mine.	Average Number of Men employed.	Quartz crushed.*	Gold obtained. Amalgam.	Gold obtained. Cyanide.	Value.
		COROMANDEL COUNTY.			
Waikoromika—		Tons cwt. qr. lb.	Oz. dwt.	Oz. dwt.	£ s. d.
Four-in-Hand	18	514 9 0 0	1,796 1	..	5,042 1 4
Tokatea—					
Royal Oak	2	0 0 1 12	13 3	..	33 14 6
Lismore	1	0 2 0 0	3 5	..	9 2 0
Verdun	3	5 0 1 22	40 0	..	109 5 11
Luck-at-last	1	8 0 0 0	7 3	..	18 15 2
Mount Welcome	4	40 0 1 12	62 5	..	175 6 6
Marguerite	1	Tailings re-treated	15 16	..	43 1 7
Kapanga—					
Coromandel Hydraulic Sluicing Company	4	Tailings re-treated	62 10	..	241 19 9
Kapanga	1	Cleaning up mill	10 18	..	28 0 6
Hauraki Block—					
Hauraki Reefs	15	90 13 1 21	1,104 7	..	3,151 14 5
Kuaotunu—					
New Waitaia	13	254 0 0 0	657 16	..	1,902 8 9
Prospectors	2	0 0 2 4	37 8	..	94 5 7
Totals	65	912 6 0 15	3,810 12	..	10,849 16 0
		TAURANGA COUNTY.			
Te Puke—					
Te Puke Reefs	3	4 15 3 0	13 0	..	26 11 6
		SUMMARY.			
Thames County and Borough ..	141	10,832 3 2 11	13,675 8	8,980 12	33,298 9 11
Waihi Borough	1,082	285,723 0 0 0	45 15	755,822 0	574,731 0 0
Ohinemuri County	346	20,984 0 0 0	19,212 11	129,695 2	140,835 2 8
Piako County	3	..	208 1	..	68 2 3
Coromandel County	65	912 6 0 15	3,810 12	..	10,849 16 0
Tauranga County	3	4 15 3 0	13 0	..	26 11 6
Totals, 1916	1,640	318,456 5 1 26	36,965 7	894,497 14	759,809 2 4
Totals, 1915	1,814	330,198 17 0 18	44,972 7	929,910 12	796,684 17 8
Decrease	174	11,742 11 2 20	8,007 0	35,412 18	36,875 15 4

* Ore treated given in "long" tons.

During the year fifty-three men were employed on unproductive quartz-mining operations.

STATEMENT SHOWING THE QUANTITY OF QUARTZ CRUSHED AND GOLD OBTAINED IN MARLBOROUGH AND WESTLAND DISTRICTS FOR THE YEAR ENDED 31ST DECEMBER, 1916.

Locality and Name of Mine.	Average Number of Men employed.	Quartz crushed.	Gold obtained by Amalgamation.	Gold obtained by Cyanide.	Estimated Value.
		MARLBOROUGH.			
Wakamarina—		Tons.	Oz. dwt. gr.	Oz. dwt. gr.	£ s. d.
Dominion Consolidated* ...	80	15,550	1,855 19 0	..	6,734 15 5
		WESTLAND.			
Inangahua County—					
Blackwater	176	40,247	16,619 12 0	2,900 16 0	78,589 11 3
Progress	117	26,780	5,112 15 0	1,010 8 0	24,508 7 2
Wealth of Nations	102	24,186	6,717 16 0	2,642 9 0	37,299 17 2
New Big River	47	5,548	4,245 5 0	498 18 0	19,362 11 0
Keep-it-Dark	40	5,617	677 2 18	464 7 5	4,162 10 5
Murray Creek	50	3,138	2,812 12 0	290 4 0	12,252 0 0
Progress Junction old tailings	1	†	..	80 16 0	230 2 1
Totals	533	105,516	36,185 2 18	7,887 18 5	176,404 19 1
		SUMMARY.			
Marlborough	80	15,550	1,855 19 0	..	6,734 15 5
Westland	533	105,516	36,185 2 18	7,887 18 5	176,404 19 1
Totals, 1916 ..	613‡	121,066	38,041 1 18	7,887 18 5	183,139 14 6
Totals, 1915 ..	714	151,161	48,458 10 5	9,246 6 0	231,150 6 11
Increase	..	..	..	..	..
Decrease	101	30,095	10,417 8 11	1,358 7 19	48,010 12 5

* Also produced 67 tons of scheelite-ore, value £11,849 4s. 11d. † 387 tons of old tailings; this tonnage is not included in the above statement, having been recorded when the ore was originally crushed. ‡ In addition to which eighty-eight persons were employed on unproductive quartz-mining operations.

Table 1—*continued.*

STATEMENT SHOWING THE QUANTITY OF QUARTZ CRUSHED AND GOLD OBTAINED IN THE SOUTHERN MINING DISTRICT FOR THE YEAR ENDED 31ST DECEMBER, 1916.

Locality and Name of Mine.	Average Number of Men employed.	Quartz crushed.	Gold obtained.	Estimated Value.
VINCENT COUNTY.				
Bald Hill Flat—		Tons.	Oz. dwt. gr.	£ s. d.
Advance	2	50	38 0 0	145 16 0
WAIHEMO COUNTY.				
Macrae's—				
Golden Point	7*	730	87 0 0	333 17 0
Deep Dell	3*	17	0 6 0	1 2 6
J. Evans	1	4	2 13 0	9 18 9
W. McGregor	3*	16	2 10 0	9 8 0
Stoneburn	6*	738	77 10 0	295 3 10
Mareburn	5*	1,010	79 8 15	277 11 3
Gold and Tungsten	4	261	32 4 4	120 15 7
Totals	29	2,776	281 11 19	1,047 16 11
TUAPEKA COUNTY.				
Waipori—				
Cox's	3	14	12 12 0	45 13 11
SUMMARY.				
Vincent County	2	50	38 0 0	145 16 0
Waihemo County	29	2,776	281 11 19	1,047 16 11
Tuapeka County	3	14	12 12 0	45 13 11
Totals, 1916	34	2,840	332 3 19	1,239 6 10
Totals, 1915	25	3,269	728 9 18	2,689 6 6
Increase	9	..	..	..
Decrease	..	429	396 5 23	1,449 19 8

* Also employed at scheelite-mining during the year, but shown as quartz-miners in the return of number of persons ordinarily employed at metal-mines.

Seven men were employed at unproductive mining operations not included in this table.

STATEMENT OF VALUE OF BULLION WON FROM QUARTZ CRUSHED FOR ALL DISTRICTS FOR THE YEARS ENDED 31ST DECEMBER, 1915 AND 1916.

Mining District.	Year ended 31st December, 1915.	Year ended 31st December, 1916.
	£ s. d.	£ s. d.
Hauraki	796,684 17 8	759,809 2 4
Marlborough, Nelson, and West Coast	231,150 6 11	183,139 14 6
Otago and Southland...	2,689 6 6	1,239 6 10
Totals	1,030,524 11 1	944,188 3 8

Table 2.

GROSS TOTALS AND VALUE OF BULLION PURCHASED BY BANKS FOR THE YEAR ENDED 31ST DECEMBER, 1916.

Bank.	Bullion purchased.	Value.
Hauraki Mining District (Northern Inspection District).		
	Oz. dwt. gr.	£ s. d.
Bank of New Zealand	63,551 10 0	238,766 2 7
National Bank of New Zealand	153,376 17 9	139,314 7 9
	216,928 7 9	378,080 10 4

Table 2 - *continued.*

GROSS TOTALS AND VALUE OF BULLION PURCHASED BY BANKS FOR THE YEAR ENDED 31ST DECEMBER, 1916—*continued.*

Bank.	Bullion purchased.	Value.
Marlborough, Karamea, and Westland Mining Districts (West Coast Inspection District).		
	Oz. dwt. gr.	£ s. d.
Bank of New Zealand	17,672 9 1	68,831 19 2
National Bank of New Zealand	47,716 10 23	185,922 15 9
Bank of New South Wales	5,292 17 7	20,743 0 9
Union Bank of Australia	553 0 7	2,183 6 5
Private buyers	1,483 17 0	5,764 2 1
	72,713 14 14	283,445 4 2
Otago Mining District (Southern Inspection District).		
Bank of New Zealand	31,719 14 21	122,246 1 3
Bank of New South Wales	5,998 0 14	22,968 11 6
National Bank of New Zealand	10,463 9 6	40,436 11 8
Union Bank of Australia	250 18 17	824 6 7
Bank of Australasia	48,432 3 10	186,475 11 0
Totals, 1916	338,079 5 9	848,001 5 6
Totals, 1915	653,020 10 19	1,206,893 10 6

Table 3.

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.	£	£	£	£
Alluvial Claims (Limited)	24/10/16	1,200	600	600	36	25 0 0	..	15	5	..	..	265	..	124
Botha Gold-mines (Limited)	16/10/16	2,750	375	1,250	55,000	0 0 3	..	43	2	..	..	187	..	2
Cinnabar Mines of New Zealand	19/12/13	6,500	881	4,063	13,000	0 1 6	94	23	..	..	..	596	..	1,084
Four-in-Hand Mines (Limited)	24/8/14	3,627	586	1,250	73,918	0 0 3	..	75	19	2,072	5,979	6,938	921	95
Gallant Gold-mining Company (Limited) ..	20/10/15	526	524	2,125	21,210	0 2 6	3	47	..	..	..	538	..	11
Golden Belt Gold-mining Company (Limited) ..	22/12/11	23,451	23,451	17,027	117,255	0 4 0	..	116	29	12,707	14,620	15,095	..	19
Good Hope Gold-mining Company (No Liability)	10/11/10	12,975	1,982	1,622	129,746	0 0 7	..	74	..	99	277	2,404	..	104
Great Northern Waihi Gold-mining Company (Limited)	13/8/14	2,750	2,750	24,000	68,000	0 2 0	293	154	5	..	..	3,845	..	101
Hauraki Reefs (Limited)	28/4/10	17,500	10,816	5,083	175,000	0 2 0	..	400	13	..	8,850	20,249	..	214
Komata Reefs Gold-mining Company (Limited) ..	16/10/00	40,000	..	..	217,800	0 1 0	..	375	..	441.579	372,313	329,529	7,267	..
Kuranui Gold-mining Company (No Liability) ..	5/6/14	21,750	818	..	87,000	0 0 3	..	44	..	..	22	1,105	..	18
Maoriland Mines (Limited)	4/8/13	442	442	..	105,800	0 0 1	..	98	..	..	2,620	3,366	..	245
Mount Welcome Gold-mining Company (Limited)	8/7/09	5,000	2,959	458	100,000	0 0 8½	129	50	..	580	1,707	4,690	..	10
New Sylvia Gold-mining Company (Limited) ..	2/10/05	30,000	27,542	1,208	300,000	0 1 11	..	340	42	..	72,043	103,094	..	3,583
New Waitaia Gold-mining Company (Limited) ..	25/2/09	15,000	7,859	2,500	150,000	0 1 5	..	135	1	6,483	24,026	22,441	1,875	4
North Prince of Wales Consolidated Gold-mining Company (No Liability)	23/3/12	4,405	3,957	1,250	35,240	..	..	24	..	..	..	3,462	..	661
Occidental Consolidated Gold-mining Company (No Liability)	3/8/09	5,397	4,033	..	107,938	0 0 11	..	149	7	3,800	11,880	13,558	1,349	18
Ohinemuri Gold and Silver Mines (Limited) ..	1/6/14	66,549	4,535	55,000	133,098	0 5 0	692	140	..	..	..	5,094	..	50
Old Hauraki Gold-mines (Limited)	3/8/07	18,003	11,252	..	180,030	0 1 3	..	268	..	6,844	20,346	28,545	2,625	69
Rising Sun Gold-mining Company (Limited) ..	1/10/08	16,500	10,297	2,229	110,368	0 2 2	..	151	22	5,671	11,440	19,856	2,759	400
Saxon Gold-mining Company (Limited) ..	2/12/07	35,000	20,590	13,333	200,000	0 2 0	119	120	..	113	306	20,638	..	..
Tairua Broken Hills Gold-mining Company (Limited)	1/5/16	6,000	2,562	..	60,000	0 0 11	188	75	8	19	..	2,430	..	454
Te Puke Gold Reefs (Limited)	4/5/98	12,865	12,865	..	101,478	0 2 6	..	99	..	..	..	13,369	4,545	3
United Gold-mine (Limited)	17/7/15	15,132	2,318	10,000	15,132	1 0 0	487	44	8	..	..	4,142	..	70
Victoria Gold-mining Company (No Liability) ..	8/12/06	29,523	13,670	..	147,615	0 1 11	..	136	..	1,031	2,886	14,029	..	209
Waihi Extended Gold-mining Company (Limited)	12/8/95	149,967	1,346	5,498	149,967	0 8 8½	665	160	11	2	17	56,308	..	231
Waihi-Paeroa Gold-extraction Company (Limited)	4/3/10	125,000	65,000	60,000	125,000	1 0 0	..	145	71	35,545	202,711	279,375	12,499	2,000
Waiotahi Gold-mining Company (Limited) ..	28/7/71	18,000	16,000	..	240,000	0 1 4	..	566	4	..	677,783	280,843	400,786	..
Waitangi Consolidated Gold-mining Company (No Liability)	23/10/08	147,833	23,039	1,000	170,800	0 10 0	..	117	1	..	3,152	36,972	..	4,102
Waitawheta Gold-mining Company (No Liability)	22/7/14	9,698	383	4,849	96,982	0 0 1	21	108	1	..	..	479	..	276
Watchman Gold-mining Company (Limited) ..	4/12/11	37,500	15,000	10,625	150,000	0 2 0	..	184	7	12,484	26,211	41,560	..	417
Zeehan Consolidated (Limited)	23/10/10	15,000	2,825	37,000	150,000	0 0 6½	107	14	..	..	..	3,060	..	..

Table 3—*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).														
		£		£		£ s. d.	£			Oz.	£	£	£	£
Addison's Gold-mining Company (Limited) ..	28/5/15	7,000	5,029	35,000	45,000	1 0 0	..	37	12	..	..	11,908	..	2,377
Blackwater South Gold-mining Company (Limited)	2/11/14	6,601	3,580	22,500	45,000	0 9 0	226	137	6	..	..	4,967	..	90
Dominion Consolidated Developing Company (Limited)	18/1/11	15,000	7,000	8,000	15,000	1 0 0	..	47	80	..	83,454	80,865	3,750	268
Five-mile Beach Gold-extraction Company (Limited)	16/6/13	16,305	7,625	7,000	16,305	1 0 0	1,578	75	..	..	..	6,204	..	2,472
Mont d'Or Gold-mining and Water-race Company (Limited)	5/7/82	12,000	10,800	..	12,000	0 18 0	..	43	3	38,964	150,037	107,527	57,000	214
Mount Greenland Gold-quartz Mining Company (Limited)	21/11/14	4,359	2,295	855	8,718	0 10 0	88	50	5	..	..	2,390	..	..
Murray Creek Gold-mining Company (Limited)..	30/5/11	30,000	26,117	2,000	45,000	1 0 0	718	122	50	6,118	26,907	66,786	..	2,816
New Big River Gold-mining Company (Limited)	19/8/07	6,000	600	..	24,000	0 0 6	..	62	38	60,642	235,744	142,977	91,200	425
North Blackwater Development Syndicate (Limited)	19/11/15	20,000	4,325	5,000	2,000	8 0 0	..	30	20	..	..	12,464	..	245
Worksop Gold-dredging Company (Limited) ..	20/3/07	12,000	10,500	1,500	12,000	1 0 0	..	88	13	24,031	93,413	53,037	43,350	2,027
OTAGO DISTRICT (INCLUDING SOUTHLAND).														
Anzac Sluicing Company (Limited)	18/3/16	5,000	5,000	..	5,000	1 0 0	60	20	9	110	426	1,582	..	358
Bakery Flat Sluicing Company (Limited) ..	10/9/96	2,500	2,012	..	2,500	0 18 6	..	25	..	4,812	18,212	20,482	1,063	..
Deep Stream Gold-mining Company (Limited) ..	19/11/06	2,500	500	2,000	2,500	1 0 0	..	7	3	2,523	9,692	9,138	2,000	20
Earnscleugh Gold-dredging Company (Limited)..	15/7/01	8	8	10,992	11,000	1 0 0	..	17	25	53,470	205,266	178,928	30,250	404
Electric Gold-dredging Company (Limited) ..	2/9/99	26,000	..	26,000	26,000	1 0 0	..	267	20	61,929	..	113,829	133,892	419
Gabriel's Gully Sluicing Company (Limited) ..	2/5/07	600	180	..	600	0 6 0	..	10	22	9,023	34,866	29,974	9,095	189
Golden Crescent Sluicing Company (Limited) ..	26/11/98	3,500	3,500	..	3,500	1 0 0	..	23	7	9,172	35,735	26,946	11,375	187
Good Chance Dredging Company (Limited) ..	24/3/09	1,250	779	..	1,250	1 0 0	..	52	8	2,258	10,017	10,076	625	343
Havelock Sluicing Company (Limited).. ..	3/3/08	4,000	3,460	600	4,000	1 0 0	..	12	5	6,817	26,149	20,837	9,300	1,560
High Level Sluicing Company (Limited) ..	11/5/15	4,390	2,790	1,600	4,390	1 0 0	..	49	6	..	..	3,232	..	471
Island Block Gold-dredging and Sluicing Company (Limited)	26/2/00	24,030	12,030	12,000	25,000	1 0 0	..	111	4	8,092	31,540	41,701	2,403	1,198
Khaki Dredging Company (Limited)	27/7/15	1,360	969	..	1,360	1 0 0	53	23	9	..	..	..	..	242
Ladysmith Gold-dredging Company (Limited) ..	19/4/00	12,000	3,964	3,000	14,500	0 10 0	..	80	8	12,487	48,121	35,821	16,376	85
Lower Nevis Dredging Company (Limited) ..	29/9/06	600	600	600	1,200	1 0 0	..	7	7	5,943	22,849	21,072	2,970	246
Manila Gravel and Gold-dredging Company (Limited)	24/9/13	5,893	5,893	13,954	32,241	0 4 0	205	51	..	..	..	27,266	..	2,094
Mareburn Gold and Scheelite Mining Company (Limited)	18/4/14	6,000	5,947	..	6,000	1 0 0	52	8	6	221	804	4,990	..	344
Muddy Terrace Sluicing Company (Limited) ..	4/10/06	14,400	14,400	5,550	19,950	1 0 0	..	126	24	10,781	42,819	72,072	..	14,891
Naseby Dredging and Hydraulic Sluicing Company (Limited)	16/10/97	5,000	2,288	2,000	5,000	0 15 3	..	23	3	5,068	19,520	18,750	4,750	46
New Kohinoor Gold-dredging Company (Limited)	27/7/16	975	975	..	975	1 0 0	..	13	6	18	69	1,145	..	133

Ngapapa Gold-dredging Company (Limited) ..	9/9/11	..	..	2,400	3,000	0 16 0	..	10	9	5,659	21,743	18,512	3,525	184
Nokomai Hydraulic Sluicing Company (Limited)	26/3/98	24,000	7,000	17,000	24,000	1 0 0	..	70	36	42,891	160,407	118,951	48,084	389
Olrig Dredging Company (Limited)	13/3/99	9,955	8,955	2,000	2,000	1 0 0	..	70	8	144	566	519	300	..
Ourawera Gold-mining Company (Limited) ..	23/5/95	3,000	3,000	..	3,000	1 0 0	..	17	9	13,635	54,399	44,029	14,215	20
Paterson's Freehold Gold-mining Company (Limited)	15/7/99	12,000	8,000	4,000	12,000	1 0 0	..	32	..	20,702	82,816	90,546	22,200	20
Phœnix Water-race Company (Limited) (Regd.)	12/10/67	1,500	1,500	..	1,000	1 10 0	..	19	1	..	..	1,385	9,312	20
Pukepouri Gold-mining Company (Limited) ..	22/1/14	2,500	1,667	..	2,500	1 0 0	441	24	..	182	687	4,546	..	1,726
Rise-and-Shine Gold-dredging Company (Limited)	24/2/00	10,000	9,746	2,000	12,000	1 0 0	254	152	19	45,412	176,302	133,556	51,900	1,089
Rising Sun Gold-dredging Company (Limited) ..	16/2/01	8,000	5,500	2,500	8,000	1 0 0	..	79	10	22,847	88,443	66,305	23,600	236
Roaring Meg Sluicing Company (Limited) ..	11/8/14	3,100	1,540	1,300	3,280	1 0 0	6	33	..	$\frac{1}{10}$	8s.	1,956	..	69
Round Hill Mining Company (Limited) ..	30/7/02	28,245	6,753	21,492	5,649	5 0 0	..	180	24	43,784	175,206	170,668	12,287	1,200
Sailor's Gully (Waitahuna) Gold-mining Company (Limited)	3/6/96	8,400	200	8,200	8,400	1 0 0	..	24	8	5,789	22,089	18,479	5,000	987
Scandinavian Water-race Company (Limited) ..	10/12/07	7	7	9,750	9,757	1 0 0	..	20	8	7,098	27,001	29,544	..	6,562
Skipper's Sluicing Company (Limited) ..	20/11/11	3,450	345	3,105	3,450	1 0 0	..	30	4	1,165	4,488	4,551	..	157
Stoneburn Mining Company (Limited) ..	2/2/14	4,000	3,625	..	4,000	1 0 0	200	12	6	123	468	3,042	..	675
Success Gold-dredging Company (Limited) ..	25/5/10	10,000	8,000	2,000	10,000	1 0 0	..	127	11	8,867	34,853	38,794	3,500	141
Tallaburn Hydraulic Sluicing Company (Limited)	3/12/04	1,200	1,200	..	12	100 0 0	..	9	2	1,661	6,392	7,625	1,380	190
Teviot-Molyneux Gold-mining Company (Limited)	24/12/09	35,000	25,000	10,000	35,000	*1 0 0	..	23	19	64	245	42,778	..	26,749
Tinker's Gold-mining Company (Limited) ..	29/10/10	11,500	11,500	11,500	11,500	1 0 0	..	20	8	2,151	8,375	10,131	467	1,739
United M. and E. Water-race Company (Regd.)	8/4/72 23/4/72	7,600	7,600	..	152	50 0 0	..	8	3	16,582	63,911	70,076	3,078	357
Vinegar Hill Hydraulic Sluicing Company (Limited)	23/9/00	..	6,000	..	6,000	1 0 0	..	13	4	3,873	14,874	13,700	1,050	231
Waikaka Deep Lead Gold-dredging Company (Limited)	16/6/13	6,000	6,000	..	6,000	1 0 0	..	13	1	3,130	12,520	20,320	300	2,250
FOREIGN MINING COMPANIES.														
Hohonu Diamond Terrace Gold-mining and Water-race Company (Limited)	..	..	..	..	100,000	..	570	..	10	348	1,365	11,360	..	150

* For 25,000.

ANNEXURE E.

EXAMINATIONS FOR MINE-MANAGERS AND BATTERY SUPERINTENDENTS.

At the examinations held in December, 1916, six candidates sat for first-class mine-managers' certificates, one for second-class mine-managers' certificates, and three for battery-managers' certificates. The following were successful: First-class mine-manager—Charles Kingsford, Waihi; second-class mine-manager—George Tilsley; battery superintendent—E. D. White, Karangahake. One candidate for a battery-superintendent's certificate obtained a partial pass.

In addition to the above a second-class service certificate was granted to James Lynch, of Glenorchy, he having satisfied the Board of Examiners that, by virtue of the provisions of section 8 of the Mining Amendment Act, 1910, he was entitled to a service certificate.

The Board of Examiners under the Mining Act as at 31st March, 1917, was constituted as follows: Messrs. Thomas Gilmour, H. A. Gordon, H. P. Hornibrooke, H. S. Molineaux, P. G. Morgan (Chairman), Frank Reed, and E. H. Wilmot.

Since the above date vacancies have been created by the death of Mr. H. A. Gordon, who had been a member of the Board from its inception, and by the resignation of Mr. Thomas Gilmour.

QUESTIONS ASKED AT THE EXAMINATION HELD DURING DECEMBER, 1916, FOR MANAGERS' FIRST AND SECOND CLASS CERTIFICATES OF COMPETENCY UNDER THE MINING ACT.

Subject I.—*Mining.*

1. Describe and sketch the method of timbering a three-compartment rectangular shaft intended for a large output of ore, the first 50 ft. being soft wet country. Show how you would secure the sides and keep back the water.
2. State whether you would use planking or framed sets, giving your reasons, how far apart would you open the levels, and the height of chambers.
3. In driving a crosscut or level through soft country which is liable to swell, show how you would secure the drive with timber.
4. On stoping out a lode 7 ft. wide, how far apart would you place the ore-passes? Describe how you would timber them, the class of timber you would use, and the size in the clear.
5. State where you would place the travelling or ladder road, and the most convenient size for travelling in.
6. Describe how you would put up a rise 100 ft. in ordinary country with safety to the miners working in it.
7. Describe the different methods of stoping and breaking out ore. State which method is the best in your opinion under existing circumstances.
8. Give a list of the different improvements which have been introduced in quartz-mines for breaking ore for the past forty years. State fully what you know about them.
9. In mining phraseology give the meaning of the following terms: "Horse," vug, rearing, stull, gad, and moil.
10. Show by sketch how you would construct a dam in a drive, 7 ft. high by 5 ft. wide, to keep water back safely to a height of 150 ft. from bottom of level. Give the total pressure in tons on the structure when the dam is full. Give the mode of construction, the material you would use, and your reasons for same.
11. State what precaution you would take in driving near an abandoned mine where an accumulation of water was known to exist.
12. Give the comparative strength of dynamite, gelignite, and blasting-powder, and the class of country each is best adapted for.
13. Explain how you would fire a round of holes with safety fuse in a straight drive or stope where you would have to travel, say, 200 ft. to a place of safety.

Subject II.—*Mechanics.*

1. Show by sketch the position of the valves, and the intake and outlet orifices, of a double-acting pump, clearly illustrating the course of the water.
2. A dam in a drive 8 ft. high by 6 ft. wide is required to withstand a head of water 150 ft. high: state how it should be constructed, and give the pressure in pounds in the face of the dam.
3. Describe the safety appliances attached to a steam-boiler to prevent accident or damage to the boiler through excessive steam-pressure or insufficient supply of water.
4. What are the essential requirements of a winding-rope? State formula for calculating the working load of (*a*) flexible-steel ropes, (*b*) iron chains.
5. State fully the advantages and disadvantages of compressed air and electricity as a power for underground work.

6. State the minimum grade at which a self-acting or incline tram 2,000 ft. in length can be satisfactorily worked with a full load of 4,000 lb., and the empty load 2,000 lb.
7. Explain the difference between direct-current and alternating-current generators, and state purposes for which the respective systems may be especially adapted.

SUBJECT III.—*Ventilation: Ventilation of Mines and Knowledge of Mine Gases; Rescue Apparatus used in Mines; Methods of Dealing with Underground Fires.*

1. What are the chemical composition and principal physical properties of marsh-gas, carbon dioxide, and carbon monoxide? Write the formula which shows the chemical reaction which takes place when marsh-gas is burnt in oxygen.
2. Under what conditions are fumes or gases derived from nitro-glycerine compounds and from gunpowder? What fumes or gases are so derived? To become harmless to what proportion must they be reduced?
3. An electrically driven fan has been installed at an upcast shaft previously used as such for natural ventilation; to the fan-motor is attached measuring-instruments: describe how the efficiency of the fan may with accuracy be ascertained. Give an example, with formulæ, to illustrate your answer.
4. An air-course 14 ft. wide, 10 ft. high, and 3,000 ft. long is to be regulated to pass 28,000 cub. ft. per minute; ventilating-pressure is equal to 1 in. water-gauge: find the area of the regulator.
5. Compare the area of equivalent orifice in the two following mines: (*a*) passes 250,000 cub. ft. per minute with 4 in. W.G.; (*b*) 100,000 cub. ft. per minute with 2 in. W.G.
6. What is the object in splitting the air in mines? To what general result is it conducive, and how is it effected?

SUBJECT IV.—*Arithmetic and Law.*

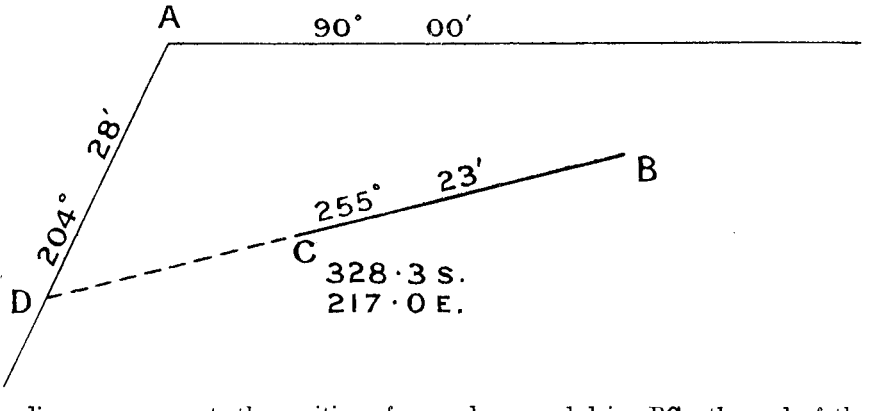
Arithmetic.

1. The cost of cementing the walls of a rectangular tank 21 ft. long, 15 ft. 9 in. wide, and 11 ft. 8 in. deep is £9 12s. 6d.: find the cost of cementing the floor at the same rate.
2. Two cog-wheels, one of 15 and the other of 28 teeth, work together: if the smaller makes 16 revolutions in 1½ seconds, how many revolutions will the larger make in 21 seconds?
3. Ten men begin a work which they could finish in 100 days, but at the end of every 10 days 10 additional men are put on: how long does the work take?
4. Give the value of 1,875 oz. of bullion of 0·3675 in gold, it being alloyed with silver—taking pure gold at £4 4s. per ounce and pure silver at 2s. 4d. per ounce.
5. The distance driven on two levels on a lode is 240 ft., the height of backs between the levels is 1,000 ft. perpendicular, but the lode has an underlie of 23 degrees from vertical, and has an average width of 2 ft. 10 in. at one end and 5 ft. 8 in. at the other end. How many tons of ore is there between the two levels, taking 15 cubic feet to a ton?
6. If you purchased 24 picks at 3s. 4½d. each, 48 shovels at 4s. 5½d. each, and 129 lb. of powder at 8¾d. per pound, state the total amount of purchase.

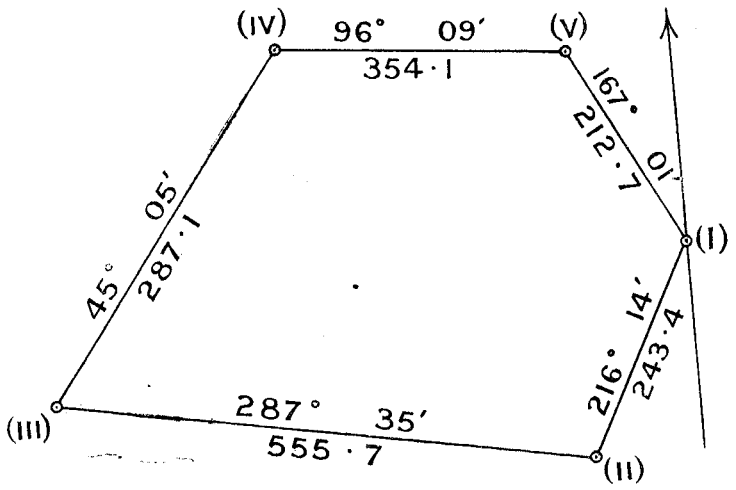
Law.

1. State the requirements with regard to the use and storage of explosives in a quartz-mine.
2. What are the requirements with reference to permanent ladders for the ascent and descent of persons?
3. What is required of the mine-manager with reference to safety appliances or gear?
4. Can instantaneous fuse be used?

SUBJECT V.—*Surveying.*



1. The above diagram represents the position of an underground drive BC; the end of the drive C is 328·3 links south and 217·0 links east from the corner of the claim A: how far will the drive have to be continued to meet the boundary at D?
2. A slope dips 1 ft. in 8 ft. for a distance of 504 ft. measured on the slope: what is the difference in elevation of the ends of the slope, and what is the horizontal distance between them?



3. The above diagram shows the traverse of the boundaries of a mining claim. Compute and tabulate the co-ordinates of the stations (on the form provided), treating station (I) as zero or origin. The total distances on the meridian and perpendicular of all the other stations are to be given also with reference to station (I), so as to show the error of the traverse. The distances are given in links.
4. Describe the methods of transferring the true bearing from the surface to the underground workings of a mine when there is one shaft, and when there are two shafts, giving diagrams.

SUBJECT VI.—*General and Applied Geology.*

1. Define and illustrate by diagrams the following terms: Syncline, anticline, saddle-reef, strike, dip, unconformity.
2. Give a table showing the sequence of the geological formations in New Zealand; *or*, as an alternative, in some other country with which you are acquainted.
3. Describe fully the action of running water in its threefold aspect—erosion, transport, and deposition.
4. An area containing auriferous-quartz lodes is elevated and subjected to denudation on an extensive scale: describe carefully what changes are likely to take place as regards the distribution of gold in the lodes, and state also what will become of the eroded quartz and its gold-content.
5. Give a full account of the auriferous-quartz lodes in any New Zealand or Australian goldfield.
6. Outline the various hypotheses known to you that are intended to explain the formation of auriferous-quartz lodes.
7. Where in New Zealand are found ores or minerals containing antimony, lead, mercury, copper, tungsten, iron, manganese?
8. Give brief descriptions or definitions of any five of the following types of rock: Sandstone, limestone, argillite, greywacke, andesite, rhyolite, diorite, granite.
9. Discuss the question of increase of temperature with depth, and its cause or causes. State how this factor affects the problem of mining at great depths.
10. State what you know about the gases that may invade the workings of metalliferous mines from the enclosing rocks. In particular, state what is the origin or mode of formation of such gases.
11. Give a rule for the recovery of a lode lost by faulting. State clearly the condition necessary for this rule to apply.
12. Describe, with diagrams the various types of faults known to you

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QUESTIONS ASKED AT THE EXAMINATION FOR BATTERY-SUPERINTENDENTS' CERTIFICATES OF COMPETENCY.

SUBJECT I.—*Milling.*

1. State the chief considerations in selecting a site for a stamp mill, and describe fully the work of constructing foundations for a mortar-box.
2. Give the dimensions and the weight of the several parts of a stamp weighing 1,250 lb., and state the method by which those parts are usually attached.
3. Describe fully a Huntingdon mill, and state the means by which the feed is regulated.
4. State briefly the particular work for which Chilian mills, ball mills, and berdan pans are used.
5. It is required to elevate, to a height of 20 ft., 5 tons of tailings per hour: give descriptions of two suitable appliances.

SUBJECT II.—*Amalgamation.*

1. Sketch an amalgamating-table for 5 heads of stamps, giving all dimensions, and angle of inclination, also the area of copper plate.
2. Describe fully (*a*) the method of cleaning up a battery of 5 heads, (*b*) the treatment of amalgam from the time it is obtained from the plates and other sources until the mercury emerges from the retort.
3. State the quantity of water required for an amalgamating-table per ton of ore crushed. By what means would you ascertain that the proper quantity was being supplied ?
4. What are the chief causes of flouring or sickening of mercury ? State how the mercury should be purified.
5. Describe the treatment of magnet iron for the purpose of separating the amalgam.

SUBJECT III.—*Cyanide, Chlorination, and other Chemical Processes.*

1. A parcel of gold-bearing ore has been submitted you for treatment by the cyanide process : state how you would determine the best strength of solution to extract the largest percentage of gold with the smallest consumption of KCN.
2. State how much KCN of 98 per cent. strength should be added to 40 tons of 0·05 per cent. sump solution to bring the working-strength up to 0·25 per cent.
3. State how many tons of a 10-per-cent. solution of KCN should be added to a 0·08-per-cent. sump solution to make up 100 tons of working-solution of 0·25 per cent. strength.
4. State what class of gold-bearing ores are amenable to treatment by chlorination.
5. Describe fully the treatment of a gold-bearing pyritic ore by chlorination.
6. Describe a trustworthy method for the assay of a working cyanide solution (*a*) for gold, (*b*) for gold and silver.
7. State what remedies you would use in the event of a workman being overcome (*a*) by hydrocyanic-acid gas, (*b*) by chlorine gas.

SUBJECT IV.—*Sizing and Concentration.*

1. By means of a flow-sheet describe fully the process of treatment of an ore containing gold and scheelite.
2. State the advantages of sizing the pulp as it comes from the stamps, and describe a machine suitable for this purpose.
3. A scheelite concentrate is found to contain a large percentage of iron-pyrites : state the means by which a separation can be effected.
4. Describe fully the Frue vanner, giving the amount of pulp it is capable of treating.
5. State conditions under which ore is suitable for concentration by jigging. Sketch a jig by which the concentrate and the gangue are automatically discharged.

SUBJECT V.—*Assaying and Elementary Chemistry.*

1. State what charge of fluxes you would use for the 400-grain fire assay of (*a*) a clean quartzose gold-bearing ore, (*b*) a gold-bearing ore containing 4 per cent. of iron-pyrites, (*c*) gold-bearing pyritic concentrates containing 65 per cent. of iron-pyrites.
2. Describe the separation of silver and lead in an aqueous solution of salts of these metals.
3. Give qualitative tests for sulphuric acid, hydrochloric acid, and nitric acid.
4. Complete the following chemical equations :—

   (*a*.) $CaO + 2HCl =$

   (*b*.) $Zn + H_2SO_4 =$

5. A ton of finely pulverized gold-bearing ore has been submitted to you for valuation : describe fully what steps you would take to obtain an average sample for assay.

SUBJECT VI.—*Arithmetic and Law.*

Arithmetic.

1. Calculate the number of tons of quartz in a heap 50 yd. 2 ft. long and 30 yd. 1 ft. broad, the height of the heap being 10 yards from the ground, and the angle of the slope, or the batter of the heap, being 45 degrees.
2. Make up a pay-sheet for a fortnight's wages in connection with a 10-stamp battery which includes a cyanide plant.
3. Find the square root of 258064. Divide 2·6289 by 306·5.
4. Find the weight of a wrought-iron shaft 15 ft. long. 6 in. diameter. (Wrought iron, cubic inches $\times$ ·28 = lb.).
5. A log of timber measures 19 ft. in length, 16 ft. circumference at thicker end and 14 ft. circumference at small end : what is the content in cubic feet ?

Law.

1. What are the requirements of the Mining Act as regards the owner of a machine with which it is desired to work for the purpose of treating metals ?
2. State the information which is required to be entered in the Machine Register-book.

LIST OF MINE-MANAGERS, BATTERY SUPERINTENDENTS, AND DREDGE-MASTERS WHO HOLD 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.
Andrews, T., Thames.
Barclay, T. H., Thames.
Bennett, J., Alexandra.
Black, T., Waiomio.
Burch, W. H., Thames.
Cameron, A., Macetown.
Chapman, J. A., Dunedin.
Davis, J. E., Queenstown.
Edwards, J., Skipper's.
Elliott, J., Macetown.
Evans, J. H., Skipper's.
Frewen, J. B., Queenstown.
Gilbert, J., Reefton.
Gilmour, T., Thames.
Glass, W. M., Naseby.
Harrison, R. H., Coromandel.
Hollis, W., Thames.
Hunter, R., Thames.
James, F., Thames.
Jamieson, A., Coromandel.
Jenkins, M., Wakatipu.
Johnstone, H., Bluespur.
Kelly, J., Lyell.
Kerr, J., Thames.
McCullough, R., Thames.
McGruer, G. N., Karangahake.
McIntosh, D., Bluespur.
McMaster, J., Reefton.
Moore, H. W., Thames.
Morrisby, A. A., Glenorchy.
Newman, W., Naseby.
Polton, A., Karangahake.
Porter, J., Waipori.
Quinn, E., Te Aroha.
Ralph, J. G., Thames.
Rasmussen, C. P., Mokihinui.
Reid, P., Coromandel.
Rooney, F., Reefton.
Scott, T., Waiorongomai.
Smith, J. E., Thames.
Stone, F., Karangahake.
Sturm, A., Waipori.
Todd, C., Heriot.
Treloar, J. S., Reefton.
Watson, T., Reefton.
Wearne, T., Endeavour Inlet.
Williams, J., Skipper'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.
Cochrane, D. L., Reefton.
Colebrook, J. D., Coromandel.
Coombe, J., Reefton.
Crawford, J. J., Thames.
Donaldson, W., Otago.
Fleming, M., Thames.
Harris, W., Thames.
Horn, G. W., Thames.
Horne, W., Coromandel.
Hornick, M., Thames.
Hosking, G. F., Auckland.
Kruizenza, W., Reefton.
Logan, H. F., Wellington.
Mangan, T., Thames.
Mouat, W. G., Dunedin.
Watkins, W. E., Reefton.

Issued on Production of Certificate from a Recognized Authority outside the Dominion under the Mining Acts, 1886, 1891, 1898, 1905, 1908, and 1913.

Argall, W. H., Coromandel.
Beckwith, L. H., Wellington.
Brook, R. H. T., Reefton.
*Cock, J., jun., Ross.
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.
Arscott, R., Waihi.
Bennett, E. P., Thames.
Boydell, H. C., Coromandel.
Bradley, R. J. H., Te Puke.
Carroll, J., Lyell.
Cartwright, E., Thames.
Crabb, J., Reefton.
Evans, H. A., Wellington.
Gilmour, J. L., Thames.
Hodge, J. H., Thames.
Keam, P. E., Thames.
Lawn, C. H., Capleston.
Linck, F. W., Thames.
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.
Robertson, D. B., Stafford.
Ross, Richard, Thames.
Russell, Murray, Dunedin.
Shepherd, H. F., Thames.
Stanford, W. J., Macetown.
Tierney, R., Thames.
Vialoux, F., Coromandel.
Warne, George, Thames.
Waters, D. B., Skipper's.
White, G. H., Thames.
Whitley, A., Thames.
Williams, C., Capleston.

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.
Collier, E., Reefton,
Cooper, J. H., Thames.
Cooper, Thornhill, Waihi.
Cordes, F. M., Karangahake.
Cornes, J. G., Waihi.
Docherty, W. H., Coromandel.
Downey, J. F., Reefton.
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., Macrae's.
Hitchcock, W. E., Barewood.
Hooker, John, Coromandel.
Irwin, Samuel, Waihi.
Jackson, G. T., Waihi.
Johnson, J. H., Coromandel.
Kingsford, C., 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.
McMillan, T., Waihi.
Mitchell, William J., Barewood.
Moore, L. O., Waihi.
Morgan, William, Waihi.
Morrison, William, Waihi.
Moye, Michael, Reefton.
Oats, John, Black's Point, Reefton.
O'Shea, J., Reefton.
O'Sullivan, J. W., Thames.
Rimmer, J. C., Helensville.
Rodden, John, Reefton.
Ruffin, R. C., Reefton.
Saunders, W. H., Reefton.
Scoble, E. J., Waihi.
Sheehan, D., Karangahake.
Smith, Walter, Karangahake.
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.
Wood, P. H., Reefton.
Wotherspoon, James, Waihi.

* Alluvial.

FIRST-CLASS MINE-MANAGERS' CERTIFICATES—*continued.*

Issued under Section 313 of the Mining Act, 1891.

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.
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, William, Karangahake.
Harvey, A. G., Coromandel.
James, Robert, Thames.
Jamieson, John, Reefton.
Johns, Thomas, Waihi.
Kennerley, W. H., Thames.
McCombie, John, Karangahake.
MacDonald, H., Coromandel.
McEnteer, James, Tararu.
McLean, Benjamin J., Waitekauri.
McLean, Charles, Thames.
Meehan, James, Westport.
Moorecraft, Walter, Coromandel.
Morgan, William, Owharoa.
Moyle, Thomas, Thames.
Patton, William, Macetown.
Pearce, Francis, Reefton.
Potter, William H., Thames.
Rillstone, Charles, Waipori.
Somervell, John, Thames.
Thomas, Archelaus, Tapu, Thames.
Turnbull, Thomas A., Whangamata.

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.
Green, E. R., Dunedin.
Hayes, J., Dunedin.
McLaren, J. M., Thames.
Tennent, R., Westport.

SECOND-CLASS MINE-MANAGERS' CERTIFICATES.

Certificates of Service issued under the Mining Act, 1891.

Adams, W. J., Thames.
Agnew, J. A., Coromandel.
Argall, A. E., Coromandel.
Blair, Thomas, Kuaotunu.
Bolitho, James, Reefton.
Bone, William, Reefton.
Bremner, John, Coromandel.
Brokenshire, James, Thames.
Brown, John, Macrae's.
Bunny, Joseph, Thames.
Byrne, John, Karangahake.
Comer, W. W., Thames.
Comer, George, Thames.
Corbett, T., Paeroa.
Crabb, Thomas, Reefton.
Daniel, P. F., Greymouth.
Dobson, John Allen, Kuaotunu.
Edwards, George, Westport.
Ellery, John, Reefton.
Foster, Thomas, Wellington.
Gemmings, Charles, Thames.
Gill, George, Thames.
Goldsworthy, Henry, Thames.
Goldsworthy, William, Mauku, Auckland.
Gribble, James, Norsewood.
Grimmond, Joseph, Ross.
Guthrie, John, Wellington.
Hardman, James Edward, Thames.
Hetherington, William, 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.
Kerr, George, Kamo.
Kirker, Thomas, Thames.
Laughlin, David, Thames.
Law, John, Thames.
Loughlin, S., Thames.
Mackay, William, Nenthorn.
Martin, David, Black's Point.
Martin, James, Reefton.
Mayn, John, Coromandel.
McCombie, John, Karangahake.
McEwen, James, Reefton.
McLean, Charles, Thames.
McNeill, George, Upper Kuaotunu.
Meagher, John, Karangahake.
Morgan, William, Upper Thames.
Moyle, Thomas, Thames.
Newdick, Alfred, Thames.
O'Keefe, M. W. D., Thames.
Page, John, Lyell.
Peebles, Alexander, Kuaotunu.
Pettigrew, Robert, Sydney.
Potts, W. H., Thames.
Primrose, J., Kuaotunu.
Reid, Thomas Groat, Thames.
Rickard, John, Thames.
Richards, A. H., Kuaotunu.
Rogers, William Henry, Kumara.
Shaw, James, Karangahake.
Sligo, Alexander, Nenthorn.
Thomas, James, Thames.
Thomas, A., Thames.
Thomson, John, Dunedin.
Williams, James, Thames.
Williams, John, Thames.
Wilson, J. G., Thames.
White, John S., Karangahake.
Worth, Robert, Waihi.

Issued after Examination under the Mining Acts, 1891, 1898, and 1908.

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.
Mathewson, A., Hyde.
McNeil, A. H., Coromandel.
Tilsley, G., Thames.
White, F. H., Kuaotunu.
White, G. H., Thames.

Issued under Section 313 of the Mining Act, 1891.

Connon, William, Thames.
Edwards, E., 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.
Martin, William, Tararu, Thames.
Murphy, Joseph, Coromandel.
O'Brien, John, Westport.
Prescott, Arthur J., Coromandel.
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.
Lynch, James, Glenorchy.
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.
Hope, John S., Waitekauri.
Hutchison, William, Karangahake.
Margetts, Frederick Ernest, Kuaotunu.
McKenna, T. N., Tararu.
McLellan, William, Waitekauri.
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.

BATTERY SUPERINTENDENTS' CERTIFICATES—*continued.*

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.
Clarke, J. L., Thames.
Clarke, R., Waitekauri.
Clarke, W. J., Waihi.
Day, A. T., Thames.
Dixon, Clement, Waihi.
Fuller, J. P., Kuaotunu.
Gray, J. W., Waihi.
Hayward, F. W., Komata.
Horn, 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.
Chappell, G. A., Karangahake.
Clark, John L., Waihi.
Clarke, Thomas, Waihi.
Coote, J. M., Thames.
Couper, J., Thames.
Cowles, R. K., Crushington.
Crawford, H., Macrae's.
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.
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.
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.
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.
Wearne, W., Reefton.
White, A. S. H., Karangahake.
White, E. D. Karangahake.
Williams, A. C., Waihi.
Williams, James, Reefton.
Williams, Joseph, 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.
Cumming, J. C. Beaumont.
Curtis, Charles, Stillwater.
Cutten, W. H., Dunedin.
Deniston, R. A., Cromwell.
Dewar, John, Alexandra.
Donaldson, J. G. A., Greenstone.
Faithful, William, Greymouth.
Foohy, J. M., Alexandra.
Gibb, William, Croydon Siding.
Gibson, A., Island Block.
Graham, J. M., Gore.
Grogan, William A., Miller's Flat.
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, J., Lowburn Ferry.
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.

DREDGEMASTERS' CERTIFICATES—*continued.*

Issued without Examination under the Mining Act, 1898, and Amendment Acts, 1901 and 1902—continued.

Magnus, A., Roxburgh.
Magnus, Olaf, Box 130A, Christchurch.
Mailer, John, Stillwater.
Maitland, A. E., Miller's Flat.
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.
McLean, D., Waitiri.
McMath, D. C., Ross.
McMath, Thomas, Alexandra.
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.
Smith, Alfred, Inangahua Junction.
Steel, Archibald, Kawarau Gorge.
Steel, Thomas, Dunedin.
Templeton, Ivie, Rongahere.
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.
Weaver, Charles, Alexandra.
Williamson, R., Miller's Flat.
Williamson, Walter, Miller's Flat.
Wilson, S. W., Waikaka Valley.
Wood, R. M., Cromwell.
Woodhouse, W. S., Roxburgh.
Young, Andrew, jun., Roxburgh.

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.
Bate, H. T. G., Greymouth.
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.
Foley, S., Lowburn Ferry.
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.
Monorieff, 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, 26th March, 1917.

I have the honour to present my annual report, together with statistical information, in regard to the coal-mines of the Dominion, for the year ended 31st December, 1916.

The report is divided into the following sections :—

I. Output of Mineral.
II. Persons employed.
III. Accidents.

IV. General Remarks—
(*a.*) Mining Operations.
(*b.*) Ventilation.
(*c.*) Eye Accidents to Coal-hewers from Flying Coal.
(*d.*) Systematic Timbering.

Annexures—
A. Summary of Annual Reports by Inspectors of Mines.
B. Report on the Brunner Fireclay-deposits by Inspectors of Mines, T. O. Bishop and James Newton.
C. Statistics of Workings in Collieries.
D. Examination of Colliery Officials, and List of Certificate-holders.

SECTION I.—OUTPUT.

The output of the several classes of coal mined in each inspection district is summarized as follows :—

Class of Coal.	Output of Coal during 1916.				Total Output to the End of 1916.
	Northern District.	West Coast District.	Southern District.	Total.	
	Tons.	Tons.	Tons.	Tons.	Tons.
Bituminous and semi-bituminous*	126,536	1,295,538	...	**1,422,074**	28,800,708
Brown	359,578	97	294,223	**653,898**	13,145,210
Lignite	...	...	181,163	**181,163**	2,144,253
Totals for 1916 ...	**486,114**	**1,295,635**	**475,386**	**2,257,135**	**44,090,171**
Totals for 1915 ...	460,415	1,278,994	469,215	2,208,624	41,833,036

* Including coal formerly classified as "pitch" coal.

The output for 1916 is, with the exception of 1914, the highest yet attained in the Dominion, but the average output for each person employed underground—viz., 750 tons—constitutes a record for New Zealand, and has only been exceeded in Australia on one occasion—viz., during

1912, when the New South Wales average was 751 tons. These remarkable averages, which greatly exceed those attained in other parts of the Empire, are due to the unusual thickness of the coal-seams generally, which is favourable to coal-mining. An analysis of the total output for 1916 shows that whereas there has been an increase of 10·21 per cent. in tonnage, the number of persons employed at collieries has declined 4 per cent. The increase in tonnage may be attributed to more regular work at the collieries. The decline in the number of miners is due to voluntary enlistment.

The quantity of coal imported into New Zealand during 1916 was 293,956 tons, as compared with 353,471 tons for 1915.

During 1916 no new collieries entered upon the production stage, but preparations to lay down one small colliery were commenced near Avoca, on the Christchurch – Arthur's Pass Railway, a distance of sixty miles by rail from the former, and at an altitude of about 1,800 ft. or more above sea-level. This proposed colliery is the property of a newly formed English company named Mount Torlesse Collieries (Limited). The coal to be worked is a brown coal.

At the following collieries operations ceased during the year owing either to exhaustion or the unprofitable nature of the operations: Ralph's, Mangapapa (Mokau), Springfield, and Allandale.

The output of coal from each coalfield is as follows:—

Coalfield.	Output during 1916.	Total Output to End of 1916.
	Tons.	Tons.
North Auckland	126,506	3,512,634
Waikato (including Mokau)	359,608	4,560,665
Nelson	26,147	308,671
Buller	714,015	14,401,071
Inangahua	11,402	264,509
Grey	544,071	8,710,458
Canterbury	19,465	718,597
Otago	281,552	8,853,137
Southland	174,369	2,760,429
Totals	**2,257,135**	**44,090,171**

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 1916.	Total Output to 31st December, 1916.	Total Number of Persons ordinarily employed.
Northern District.			Tons.	Tons.	
Hikurangi	Hikurangi...	Semi-bituminous	65,522	1,068,014	110
Taupiri Extended and Ralph's ...	Huntly ...	Brown ...	186,623	3,358,212	386
Pukemiro	Pukemiro...	" ...	81,582	92,591	122
Waipa	Glen Massey	" ...	88,105	237,981	108
West Coast District.					
Coalbrookdale	Millerton ...	Bituminous	274,782	4,972,665	424
	Denniston	"	245,659	7,400,638	480
Westport-Stockton	Mangatini	"	189,430	1,036,370	230
State Coal-mines (Point Elizabeth ...	Dunollie ...	Semi-bituminous	140,917	2,136,306	215
State Coal-mines (Liverpool ...	Rewanui ...	Bituminous	136,928	326,615	243
Blackball	Blackball ...	"	203,811	2,455,865	325
Southern District.					
Kaitangata and Castle Hill ...	Kaitangata	Brown ...	119,045	3,400,221	325
Nightcaps	Nightcaps...	" ...	84,166	1,181,011	113
Other New Zealand collieries ...	All coalfields	Various ...	440,565	16,333,682	907
Totals	...	...	**2,257,135**	**44,090,171**	**3,988**

SECTION II.—PERSONS EMPLOYED.

Inspection District.	Average Number of Persons employed during 1916.		
	Above Ground.	Below Ground.	Total.
Northern	209	629	838
West Coast	510	1,711	2,221
Southern	269	660	929
Totals, 1916	**988**	**3,000**	**3,988**
Totals, 1915	1,050	3,106	4,156

The annual decrease in the number of persons employed amounts to 4 per cent., whereas during the previous year it amounted to 13 per cent.

Coal-miners are now exempted from compulsory military service if their appeal is supported by the manager of the colliery at which they are employed.

SECTION III.—ACCIDENTS.

The following is a summary of coal-mining accidents during 1916, with their causes:—

—	Fatal Accidents.		Serious 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 fire-damp or coal-dust	...	...	...	...
Falls of ground	5	5	7	8
Explosives...	...	...	...	...
Haulage	...	...	2	2
Miscellaneous—Underground...	...	...	4	4
On surface ...	1	1	2	2
Totals	**6**	**6**	**15**	**16**

The death-rate from accidents was 1·50 per 1,000 persons employed, or one death per 376,189 tons of coal produced and per 665 persons employed. This compares favourably with other countries where mining is also safeguarded by the law.

Of the six fatal accidents four were due to falls of bituminous coal at West Coast collieries, and possibly three of these would not have occurred if greater care had been shown by the sufferers themselves. The fatal accidents to J. Robinson and E. Dando, however, appear to have been unavoidable by ordinary precautions, being incident to the hazard of the industry.

In the description of these accidents following it will be seen that timber was used in proximity to all the places where fatalities occurred, but it failed to support the ground which fell. The extremely treacherous nature of the West Coast bituminous coal owing to absence of adhesion to the roof and frequency of coal-joints or sooty backs is not sufficiently realized by many miners, for although the law provides for systematic timbering, yet upon inspection cases are found at almost every mine where the specified distance between props and the face is exceeded, for which the miners are generally responsible; it is impracticable for deputies or Inspectors to be ubiquitous. There appears, therefore, small prospect of improvement unless miners are more appreciative of the danger.

The only other fatality occurred to an aged man, H. Holmes, who inadvertently walked in front of a slowly moving railway-wagon under a coal-bin, and was run over.

At North Island collieries, all of which are included in the inspection district of Mr. Boyd Bennie, no fatal accident occurred during 1916. It is also gratifying for me to record that during the past three years and a half there has not been a single fatal accident at the collieries of Canterbury, Otago, and Southland, at which nearly a thousand persons are employed. This is a remarkable record, and is greatly to the credit of the colliery officials and to Mr. E. R. Green, Inspector of Mines for those provincial districts which comprise the southern inspectorate.

The following statement shows the tons of coal and shale raised, persons employed, lives lost, &c., from 1878 to 1916 :—

Year.	Output.	Persons employed.			Tons raised per each Person employed Underground.	Tons raised per Life lost.	Persons employed per Life lost.	Lives lost per Thousand Persons employed.	Number of Deaths.
		Above.	Below.	Total.					
Prior ...	709,931	...	...	...	...	...	...	...	...
1878 ...	162,218	147	366	513	443	*	*	*	0
1879 ...	231,218	...	...	802	...	4,635	23	44·00	35†
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
1913 ...	1,888,005	1,053	3,197	4,250	590	314,667	708	1·38	6
1914 ...	2,275,614	1,176	3,558	4,734	639	46,441	96	10·35	49§
1915 ...	2,208,624	1,050	3,106	4,156	711	245,403	462	2·16	9
1916 ...	2,257,135	988	3,000	3,988	750	376,189	665	1·50	6
Totals ...	**44,104,614**	...	...	...	...	...	...	...	**325**

* No life lost. † Year of Kaitangata explosion. ‡ Year of Brunner explosion. § Year of Ralph's (Huntly) explosion.

The following is a brief description of fatal accidents in connection with coal-mining operations during 1916 :—

Date.	Name and Situation of Mine.	Name, Age, and Occupation of Person killed.	Cause of Accident, Nature of Injuries, and Remarks.
12 Jan. ..	Big River Coal-mine, near Reefton ..	George William Scott (32), miner ..	His skull was fractured by a fall of coal and stone from the roof while he was picking down soft loose coal in a place that was very well timbered, but from which he had unwisely removed the top laths to facilitate getting the coal. Falls occurred when he was underneath the unprotected coal.
13 Jan. ..	Millerton Colliery, Millerton	Joseph Robinson (44), miner	His skull was fractured by a piece of coal weighing about 2 cwt. or 3 cwt. falling upon him while he was trimming down loose coal after a shot had been fired. In trying to escape he slipped and fell, the coal falling upon him. The coal was hard, and the place well supported by props. This appears to be an accident of the unpreventable class.
8 Mar. ..	Blackball Colliery, Blackball	Albert Grindle (30), miner	He and his brother were winning 4 ft. of top coal overlying timber-sets in a bord about 18 ft. wide. A timber-set swung and carried with it the two adjacent sets, spaced approximately 3 ft. apart. The coal and roof-clay fell, immediately burying deceased and crushing him to death. There was no evidence to indicate what caused the timber to collapse, but it is surmised that it was loosened by blasting; it was properly erected in the opinion of deceased's brother and the colliery officials. Immediately before the accident deceased had warned his brother that if he heard any noise from the roof or timber to get back quick; he then said, "Listen! get back quick"; they both jumped away, but too late to save themselves from being buried; the brother was not seriously hurt.
13 Sept. ..	Blackball Colliery, Blackball	John William Hartman (47), miner ..	He and his mate were working in a bord widening a face from 16 ft. to 18 ft. The bord was excellently timbered with sets, but the rib being widened was overhanging and had no sprag. He was standing between the timber and the rib-side when a fall of about 10 cwt. of coal occurred without warning, striking him on the head, causing his death two days later. After the fall a well-defined "sooty back" was exposed. About two hours and a half before the accident a deputy had examined the place and considered it safe. This fatality would not have occurred if the overhanging coal had been properly spragged. No reliance can be placed on so-called "arching" of top coal when the roof is of claystone or sandstone as at the West Coast collieries; bituminous coal is most treacherous. The usual blame is attached to "sooty" and other "backs," when it should be placed on those responsible for adequate support of the coal.
17 Nov. ..	Denniston Colliery, Denniston	Hugh Holmes (70), foreman at screens ..	While crossing one of the railway-wagon lines under the coal-storage bins in the afternoon, presumably on his way to the mine office with the time-book, he was knocked down and run over by an approaching wagon, his thighs being broken; he subsequently stated that he saw the wagon approaching. He died from shock the same evening. No blame appears to be attachable to any one; the deceased, owing to his age, was not active, and misjudged his ability to avoid the wagon.
4 Dec. ..	Brunner Colliery, Brunnerton	Edward Dando (41), miner	John Hart, a shiftman, was putting up a new bar to supplement another that gave signs of breaking, in a level at the corner of a pillar which was being extracted. At about noon deceased, who was working at his place about 20 yards away, came to Hart, and with a deputy rendered assistance by steadying the props while the bar was being wedged to the roof; without warning a large splintered stone, which had been held up by a lath, fell from the roof on to deceased, causing internal injuries from which he died that night. The shiftman and the examining deputy stated at the inquest that there was no indication of danger prior to the fall. The Inspector of Mines had found during recent inspections the locality to be well timbered. The splintering and fall of rock was probably due to "bumping" of the roof as a result of the pillar-extraction.

SECTION IV.—GENERAL REMARKS.

(*a.*) Mining Operations.

North Auckland Coalfield.

No new collieries have been laid down on this coalfield during the year, and those in operation are not extensive. The workable coal-deposits have proved small in area, and this necessitates mining operations in several separate sections at the principal mines near Hikurangi.

Hikurangi Colliery.—There has been a small decline in the annual output. Owing to flooding by surface water collected in swamps, considerable inconvenience has been experienced in the deep workings in the vicinity of the limestone rocks; ventilation also has been impaired. The area remaining unworked does not appear extensive.

Northern Colliery.—The Northern Coal Company has obtained output from three sections—viz., the Northern, the Waro, and the Crown Lease sections. At the Northern section the available coal is being rapidly removed by pillar-extraction, and this section will be exhausted very shortly. The Crown Lease has been let on contract, and has produced a small output. At the Waro section operations have been suspended awaiting the installation of pumps.

Waikato Coalfield.

Ralph's Colliery.—Since the explosion in 1914 at this colliery a large sum of money has been expended on the restoration of the mine and improvement in the ventilating plant and system, and it is to be regretted that, owing to the unprofitable nature of the operations, after an active life of twenty-five years, the mine has now been closed. During this period about 275 acres of coal has been worked by bords, but owing to surface water and the indifferent cover the pillars have not been extracted. A total output of 1,368,236 tons had been obtained at the end of 1916.

Towards the close of operations the area of unworked coal had become restricted. To the northward the mine was bounded by the Taupiri Extended Colliery barrier; to the southward by faulting and erosion of the fireclay cover and by overlying water; to the northward the coal-seam outcropped under pumice sand which in places was waterlogged; to the southward under Lake Waahi the seam thinned. The remaining coal to the southward may be more advantageously worked from the Taupiri Extended Colliery. Before ceasing operations a strong rectangular reinforced-concrete dam was constructed in coal in the single heading connecting the Ralph's and Taupiri West shafts, at a point about 39 chains north-east from Taupiri West shaft; this dam should effectively isolate the workings of Ralph's Colliery from the unworked coal area under Lake Waahi, which is necessary, as falls of cover in Ralph's Colliery have been frequent and have required constant attention; now this attention has ceased, it is therefore only a question of time when the mine-workings will become connected with the River Waikato or its ramifications, and permanent flooding of the workings will result.

Taupiri Extended Colliery.—At this, the most productive colliery of the North Island, there has been a considerable decline in output, possibly owing to shortage of hewers. The mine-workings are now being carried on at a distance of about a mile to the north and west of the shafts and to the dip of the coal-seam; the cost of haulage has become considerable.

Towards the end of the year the seventeen dams referred to in my last annual report were completed. Instead of spherical dams of kauri as originally planned, Mr. James Bishop, the General Manager of the company, constructed rectangular dams of reinforced concrete, well rammed into approved sites excavated in sound brown coal. After the concrete had set, by means of perforated pipe built into the structure at its juncture with the coal-seam, Portland cement was forced at a pressure of about 300 lb. per square inch into any interstices which might exist. These dams have been constructed in accordance with the most modern principles, and in my opinion may be thoroughly relied upon to protect the mine in case of irruption of water in the zone now isolated by them. The ventilation of this colliery has attained a high degree of excellence, and is referred to in detail in my remarks on ventilation contained in this report.

By the Taupiri Coal-mines (Limited), the owners of the Extended and Ralph's Collieries, a new mine is being laid down at Awaroa, on the foothills, about 70 chains to the south of the Huntly to Pukemiro Railway, and at a distance of about six miles from Huntly. An extensive area of brown coal has been proved by outcrops and drilling, the coal-seam varying between 7 ft. and 14 ft. in thickness. A short branch railway line and sidings to connect the proposed mine with the Government railways is being constructed; other preliminary works are also being carried out. Mining operations on this coal area, being on elevated ground, will not be inconvenienced by surface water, as experienced at the other collieries of this company, and pillars may therefore be extracted.

At *Waipa Colliery* the output has declined. Underground development has proved a formidable north and south fault with an upthrow of 160 ft. to the west, at which the mine-workings in the two principal adit sections are now standing, but by means of an inclined surface tramway and short stone drive the coal behind the fault will be worked.

Pukemiro Colliery has considerably increased its annual output. At this colliery the surface arrangements and method of mining adopted are up to date both as regards economy and safety. A new section is being developed across the valley where there is evidence of the existence of a considerable area of unfaulted ground.

Buller Coalfield.

Coalbrookdale Colliery (Denniston).—The annual output continues to decline as the distance of haulage increases, in addition to which shortage of miners has contributed to the decrease. The principal operations are being carried out in the Cascade dip and No. 8 sections, where the

mining is confined to pillar-extraction, and in the Wareatea section, where solid work—*i.e.*, the driving of bords—is in progress. In the last-named section the coal is considerably fractured, and "sooty backs" occur frequently; for this reason it is advisable that props and bars shall be more extensively used in preference to props and cap-pieces.

Iron Bridge Colliery (Denniston).—Development has proved a considerable area of workable coal on the northern side of the Waimangaroa River towards the old Koranui Mine, also in the direction of Mount William. Pillars are being extracted in the older sections of this mine. There still remains a large quantity of high-quality bituminous coal at the Denniston collieries.

Millerton Colliery.—Operations at this, the most productive colliery in the Dominion, have been chiefly carried on at the Old Dip, No. 4 west and No. 6 pillars, and Mangatini sections. The coal reserves on this property are extensive.

Westport-Stockton Colliery.—There has been a large increase in the coal-output, due to a better market for the soft pillar coal contained in the first-worked area adjoining the tunnels in the electric haulage-road. Development in the new eastern area has been fairly satisfactory.

Seddonville State Colliery Reserve.—For the purpose of testing the quality of the coal proved by boring near Charming Creek during 1911 and 1912 (a plan of which accompanies my annual report for 1911), two shafts have recently been sunk to the floor of the coal-seam at sites immediately adjoining boreholes No. 5 and No. 10, 40 chains apart, between Muir Brook and Frank Brook, tributaries of Charming Creek. The first of these shafts entered the coal-seam at a depth of 76 ft., and the thickness of the seam (including an irregular stone band of about 5 in. at 11 ft. from the roof) is 20 ft. 6 in. The coal was hard throughout. About 1,300 gallons of water per hour was encountered in the No. 5 shaft (of 6 ft. by 3 ft. dimensions). In the second shaft, near No. 10 bore (which is 7 ft. by 3 ft.), at a depth of 115 ft., the coal-seam was found to be 20 ft. in thickness, a clay band ½ in. in thickness occurring 11 ft. from the roof. The coal was hard and clean throughout. About 800 gallons of water per hour percolated into the shaft from the sandstone penetrated.

The Dominion Analyst has made the following analyses of coal from the shaft near No. 5 bore:—

——	Top Coal.	Bottom Coal.	General Sample.
Fixed carbon	56·32	54·44	54·65
Volatile hydrocarbons	40·34	43·10	42·23
Water	2·04	1·43	1·37
Ash	1·30	1·03	1·75
	100·00	100·00	100·00
Sulphur, per cent.	4·720	5·350	5·070
Specific gravity	1·280	1·285	1·275
Calories, per gramme	..	..	7,858
B.T.U., per pound	..	..	14,144
Calculated evaporative power per pound ..	..	..	14·66
Practical evaporative power, assuming 60 per cent. efficiency	..	..	8·80

About 200 acres of workable coal has been proved by systematic boring in the Charming Creek basin, and between one and a half to two million tons are obtainable therefrom. It remains to be proved whether the exploitation of this area for a State colliery is warranted.

Grey Coalfield.

Liverpool State Colliery.—Three separate sections are being worked in proximity to the main endless-rope haulage incline. At No. 1 mine, situated at the top of the incline, two coal-seams are being worked, both friable and in places soft. The upper seam probably does not exceed 70 acres in extent, most of which is now standing on pillars, a few having been extracted. The lower, or "Morgan" seam, entered by a cross-measure drift from the upper seam, is of greater extent, about 100 acres having been proved by boreholes and outcrops. This seam averages about 17 ft. in thickness and contains a thick band of stone; mining operations on it have but recently commenced.

No. 3A section is but a small development, about one mile and a quarter south of No. 1 section, on a thin seam of limited extent.

No. 3 section, near the coal-storage and screening plant at the bottom of the incline near Rewanui, has produced coal of greater hardness than that of the other sections of the Liverpool Mine. It showed prospects of developing into a good mine when, during 1916, operations to the north-westward encountered a formidable downthrow fault which reduces the area over which profitable coal was expected.

In equipment and mining methods this is the most up-to-date colliery in the Dominion if not in Australasia. Electrical power drives all machinery. Imperial-permitted explosives and electric miners' lamps only are used. Modern bathhouses with warm-water showers to the British standard are installed at both Nos. 1 and 3 sections. Ventilation is adduced by fans of Sirocco type, with self-recording water-gauges, at every section.

Point Elizabeth State Colliery.—This profitable old colliery is in the last stages of pillar-extraction, and but little coal remains to be won; within a year in all probability the mine will be exhausted of coal.

It is gratifying to report that there has not been a fatal accident at any State colliery since 1912, notwithstanding that an average of about 450 persons have been ordinarily employed. I have always found the ventilation, both as regards quantity and distribution, excellent.

Blackball Colliery.—A small decline in annual output has been experienced. Development has been extended both to the rise and dip of the mine. Water in considerable quantity has hindered mining in No. 2 section. There has been trouble from spontaneous heating, but by the panel system here adopted affected areas have been stopped off and thus isolated. A commodious bathhouse was erected at this colliery during the year.

No other coal-mining of much importance was carried on during 1916 at West Coast collieries.

Broken River Coalfield, Canterbury.

At Broken River, near Avoca Railway-station, on the East and West Coast Railway, sixty miles north-west from Christchurch, the Mount Torlesse Collieries (Limited), an English company, is laying down a colliery to work the brown-coal seam of from 5 ft. to 13 ft. in thickness, for many years known to exist on Cloudesley's freehold which, with other land, has been acquired by the company. A surface haulage tramway three miles and a quarter in length from the mine at Broken River to Avoca Station has been partly constructed. This will consist of four sections, as follows: From the mine for half a mile down the river-bank, locomotive traction, gradient about 1 in 80; thence up an incline 30 chains in length to Avoca Flat, having a gradient of about 1 in 2½, rope-haulage by steam power; thence across Avoca Flat by locomotive traction for about two miles, gradient about 1 in 71; and from thence for 30 chains by endless-rope, self-acting, to the railway-sidings at Avoca Station. The railway-sidings, screening, and power plant have not yet been commenced. The plant is being laid down to handle an output of about 400 tons per day. The above operations are being carried out for the owners by Mr. J. A. C. Bayne, mining engineer, of Roa, Westland.

Otago Coalfields.

Kaitangata No. 1 Colliery.—The principal colliery of the group of three collieries, the property of the New Zealand Coal and Oil Company, is Kaitangata No. 1, where the mine is worked in three sections on the panel system, owing to the great liability to spontaneous heating. The claystone floor of the coal-seam, owing to creep, is a great and constant hindrance to profitable mining. This being the most gaseous colliery in the Dominion, British-permitted explosives and safety-lamps only are used. The coal is of superior quality, and the demand for it greatly exceeds the output. Shortage of miners is a serious problem here. The ventilation at this colliery has greatly improved of late, especially as regards distribution. In the past there seems to have existed a vague opinion that by increasing the air-current fires would be created, whereas the reverse is the case, for the greater the volume of air passing over the exposed coal-surfaces the lower will be the temperature of such surfaces.

Kaitangata No. 2 and *Castle Hill Collieries* are smaller mines worked in a similar manner to No. 1, but less gaseous. At the former colliery heating of coal frequently occurs with consequent reduction of oxygen in the mine-air, in addition to a very bad creep, these being the chief obstacles here contended with. At the Kaitangata collieries the main haulage-roads are lined when passing through heated coal or fire-zones with steel plates lagged with timber slabs supported on frames of heavy steel rails. This steel lining of haulage-roads has proved effective in cases where many thicknesses of brick arching had previously failed; the construction of the latter is therefore now discontinued.

Electricity at Collieries.

During 1916 there has been practically no increase in the number or capacity of electrical installations.

The following is a summary of the annual returns in accordance with Regulation 160 (*c*), regarding electrical apparatus at collieries:—

Number of collieries at which electrical apparatus is installed	13
,, continuous-current installations	10
,, alternating-current installations	2
,, collieries electrically lighted	12
,, collieries using electrical ventilating-machines	7
,, ,, pumping plants	5
,, ,, haulage plants	7
,, ,, screening plants	2
,, ,, miscellaneous plants	3
,, ,, locomotives	1
Total horse-power employed from motors on surface	1,740
,, ,, underground	671

(*b.*) Ventilation.

The ventilation of New Zealand collieries has attained a high standard. The results shown by the accompanying tabulated analyses of the state of ventilation and contents of the mine-air at the two most gaseous mines in the Dominion is of considerable interest which all concerned may justly take credit for.

At Taupiri Extended Colliery, Huntly, in the Auckland Provincial District, fire-damp was detected by safety-lamp and reported by examining officials on thirty-three days during 1916, the largest quantity found at one place being 200 cubic feet of gaseous mixture. The method of mining is bord and pillar; there is no goaf.

At the adjoining Ralph's Colliery a disastrous explosion occurred during 1914 (when naked lights were in use), originating from gas from a blower in an old standing pillar area. A few days after the explosion I measured an accumulation of 350,000 cubic feet of explosive mixture, and took several samples in duplicate therefrom, using an electric safety-lamp for a light. The richest sample contained—Methane, 48·1 per cent.; oxygen, 10·10 per cent.

At Kaitangata No. 1 Colliery, in the Otago Provincial District, fire-damp was detected by safety-lamp and reported by examining officials on forty-four days during 1916, the largest quantity found at one place being 250 cubic feet of gaseous mixture. With falling barometer there occurs an efflux of gas from goaf; there is also apparent liberation of occluded gas at the coal-faces. Bord and pillar on the panel system is here adopted. During 1879, when naked lights were in use, a disastrous explosion occurred at this colliery by reason of a naked light being carried into unexamined old workings, as at Ralph's during 1914, before mentioned.

The brown coal mined in the Waikato and Kaitangata districts has the following composition:—

	Taupiri Extended.	Kaitangata No. 1.
Fixed carbon	44·23	38·00
Hydrocarbon	41·07	39·96
Water	13·14	18·22
Ash	1·56	3·82
Sulphur, per cent.	0·32	0·40

The quantity of air circulating was measured by me by means of two new anemometers of Biram-Davis type; the temperature was taken with the Davis miners' hygrometer. The analyses of mine-air are by J. S. Maclaurin, D.Sc., F.C.S., Dominion Analyst. In these investigations I received valuable assistance from Inspectors Boyd Bennie and E. R. Green in their respective districts.

Analyses of Ventilation and of Mine-air.

Name of Colliery and of Ventilating District.	Total Quantity of Air circulating per Minute.	Number of Persons in District.	Quantity of Air per Person per Minute.*	Temperature, in Degrees F.		Analysis of Return Air.		
				Wet Bulb.	Dry Bulb.	CH_4.	CO_2.	Oxygen.
TAUPIRI EXTENDED COLLIERY. (28/2/17, between 9 a.m. and 3 p.m.)	Cub. Ft.		Cub. Ft.	Deg.	Deg.	Per Cent.	Per Cent.	Per Cent.
North side, No. 5 level east (tail-rope section)	11,328	41	276	67·5	68·5	0·02	0·10	20·73
North side, No. 5 level west	8,096	14	578	66	67	less than 0·02	0·08	20·82
North side, No. 6 level east	3,502	10	350	68	69	..	..	..
North side, No. 6 dip west	5,971	43	139	69	70	less than 0·02	0·10	20·75
West side, No. 4 dip	16,308	45	362	68	69	Ditto	0·10	20·80
West side, No. 4 level	9,243	36	229	70	71	„	0·05	20·86
Total effective in all ventilating districts ..	54,448	..	..	..	..	..	..	..
Scaling and leakage	32,852	24	..	..	..	..	..	..
Main return at upcast shaft	87,300	..	..	69	69·5	..	0·09	20·64
Remarks.—Barometer, 30·10″, rising. Thermometer in shade at surface, 4 p.m.: Wet bulb, 60·5°; dry bulb, 69°. Sirocco fan. Water-gauge, 1·2″. R.P.M. 280.								
KAITANGATA NO. 1 COLLIERY. (16/1/17, 9 a.m. to noon.)								
Main-seam district	5,906	6	984	..	..	0·18 0·20	0·28 0·30	20·68 20·64
Extension district	5,751	13	442	..	..	0·44 0·40	0·22 0·22	20·50 20·53
No. 6 and Mundy's district	11,521	31 (and 2 horses)	332	..	..	..	..	..
Total effective in all ventilating districts ..	23,178	..	..	..	..	..	..	..
Scaling and leakage	9,309	20 (and 9 horses)	195	..	..	..	..	..
Main return at upcast shaft	32,487	..	..	..	..	0·43 0·40	0·30 0·32	20·46 20·48
Remarks.—Barometer, 30·25″, steady. Sirocco fan. Water-gauge, 1·3″.								
KAITANGATA NO. 2 COLLIERY. (17/1/17, 9 a.m. to noon.)								
Main-workings district	8,679	32	271	..	..	..	..	..
Six-foot-seam district	3,040	5 (and 1 horse)	488	..	..	..	..	..
Total effective in all ventilating districts ..	11,719	..	..	..	..	..	..	..
Scaling and leakage	5,451	8 (and 2 horses)	531	..	..	..	..	..
Main return at fan drift	17,170	..	..	..	..	0·22 0·25	0·48 0·48	20·17 20·09
Remarks.—Barometer, 29·84″, falling. Sirocco fan. Heating of coal-seam in evidence.								

* Where horses were employed, a deduction of 600 cubic feet per horse per minute has been made before the quantity per person has been computed.

From a consideration of the foregoing results the following deductions may be made:—

1. That no quantity standard—viz., a minimum of a certain quantity of air per man per minute—is applicable to all mines or to all the ventilating districts of one mine, for it will be seen that in the case of Taupiri Extended No. 6 dip west there was the least air circulating per man per minute in any of the mines—viz., 139 ft.—of all the measurements taken, yet the oxygen-contents of the return air were 20·75 per cent., almost the highest in the series. Obviously any standard should be in the oxygen-contents—*i.e.*, a quality standard.

2. That the New Zealand law (copied from the British law) that no lamp or light other than a locked safety-lamp shall be allowed or used in any seam where the air-current in any return airway from the ventilating district is found normally to contain ½ per centum of inflammable gas is entirely too lax as a qualification for the installation of safety-lamps. It will be seen that in no case at either colliery did the return air contain that quantity of inflammable gas, yet the conditions necessary for a disastrous explosion have occurred at Kaitangata and Ralph's (adjoining the Extended). The statutory provision appears to overlook the possibility of blowers and accumulations of gas in old workings therefrom, and that the contents of the mine-air vary greatly. I generally find an appreciable increase in return air from occluded gas towards the end of a shift—*i.e.*, if much coal has been broken during the shift.

3. The air throughout the Taupiri Extended Colliery is permanently saturated to the extent of at least 94 per cent.*, and the coal contains water to the extent of 13·14 per cent., yet notwithstanding this the dust contained in the mine is so highly inflammable and combustible that after the Ralph's explosion, in which the dust was proved to have taken a very considerable part, without the aid of a microscope it was impossible to find the least trace of charred particles in the mine. Experiments by Dr. Maclaurin to determine the inflammability of Ralph's (and Taupiri Extended) coal proved that the relative distances to which flame was projected by such coaldust in comparison with dust from some other mines were as follows:—

Ralph's or Taupiri Extended (brown coal)	20
Westport-Stockton, New Zealand (bituminous)	16
Aberdare, New South Wales (bituminous)	13
Wales (anthracite)	2½

The sample of the first-named contained 13·14 per cent. water and 1·56 per cent. ash. Notwithstanding the humidity of the mine-air and the hydrous nature of the coal at Ralph's colliery, the subsequent dust-explosion was of great violence, nearly every one of the forty-three bodies recovered being mutilated. These facts may be of interest as serving to prevent undue importance being attached (in England especially) to the alleged advantage of humidity in mine-air as an allayer of coaldust and preventive more or less of coaldust-ignition.

(*c.*) Eye Accidents to Coal-hewers owing to Flying Fragments of Coal.

During 1902 attention was first officially drawn to the prevalence of eye accidents by Mr. E. R. Green, Inspector of Mines for the Southern District, who reported that during 1899, 1900, and 1901 twenty-two coal-miners met with accidents to the eyes, principally resulting in ulceration of the cornea, the eyesight being badly affected in six cases, while in four others the sight of one eye was lost. At that time shields constructed of wire gauze, 8 by 8 mesh (to an inch), and about 5 in. by 3 in., the edges being bound by leather, were occasionally worn by hewers at Kaitangata when flying coal was expected. On the recommendation of Inspector Green a notice *re* eye accidents was printed on calico and exhibited at most of the New Zealand collieries. This notice was drafted by Dr. James Fitzgerald, eye specialist, of Dunedin. Extracts therefrom accompany this report.

The following is a summary of eye accidents owing to flying coal during 1915 and 1916:—

Inspection District.	Number of Eye Accidents causing Loss of Work.		Number of Days off Work.	
	1915.	1916.	Maximum for any Case.	Average per Case.
Northern (North Island)	38	32	171	18·13
West Coast (Nelson and Westland)	8	7	140	26·46
Southern (Canterbury, Otago, and Southland)	12	10	118	33·36
Totals	58	49		

In some cases the total loss of an eye was suffered. In the Northern District the eye accidents amounted to 17·71 per cent. of all accidents at coal-mines during 1915 and 1916.

* The relative humidity of the mine-air is not appreciably due to artificial methods of watering to allay coaldust, the haulage-roads and travelling-roads being only occasionally watered.

The following is a list of the collieries where such accidents occurred during 1915 and 1916 :—

Northern District.		West Coast District.		Southern District.	
Colliery.	Number of Eye Accidents.	Colliery.	Number of Eye Accidents.	Colliery.	Number of Eye Accidents.
Ralph's and Extended ..	54	Millerton ..	4	Kaitangata ..	5
Pukemiro	6	Point Elizabeth ..	1	Nightcaps ..	2
Co-operative (Hikurangi)	1	Liverpool ..	1	Small pits ..	14
Waipa	9	North Cape ..	1		
Hikurangi	1	Stockton ..	4		
		Blackball ..	1		
		Denniston ..	3		
Total	71	Total ..	15	Total ..	21

It will be observed that collieries at which brown coal is mined are those at which eye accidents are most frequent.

Sufferers by eye accidents are entitled under the Workers' Compensation Act to receive, while off work, one-half their average wage (assessed on the twelve months prior to the accident), and if an eye is lost the compensation payable is 30 per cent. of the £500 maximum. In addition, 12s. 6d. per week is paid from the Coal-miners' Relief Fund; also, if the sufferer is a member of a registered benefit society a further payment of 12s. 6d. per week from such society. At the above rates there has been received by sufferers from eye accidents during 1915 and 1916 compensation or relief to the amount of £1,400; but no money payment can compensate for the loss of eyesight, and preventive measures in the form of a gauze shield are necessary. In mines where safety-lamps are required to be used a better light might be obtained if miners' electric lamps were installed. The wearing of such shields is far less an inconvenience than the compulsory (and absolutely necessary) use of water-jets or sprays at metal-mines when machine-drilling in rock. For breaches of this regulation miners have been heavily fined, and the regulation was proposed by the union officials themselves.

At the West Coast collieries, the lignite-pits of Otago and Southland, and at the Hikurangi collieries, eye accidents are so few that any regulation which may be decided upon need not have application at those places.

The following is an extract from the official notice *re* "Eye Accidents," by Dr. James Fitzgerald, of Dunedin :—

Preventive Measures.

1. The wearing of goggles or a shield of wire gauze in places where there is a likelihood of meeting "proud coal."

Note.—A shield of gauze 6½ in. by 5 in., 64-mesh (*i.e.*, 8 by 8) to the square inch, is generally more suitable than goggles. They can be made, bound with a piece of soft leather for the forehead, with tapes for tying, at a cost of about 9d. each.

2. As soon as eye accident received, report to manager, and proceed to nearest medical man at once. Do not say it is trivial, but look on it as a serious affair. There is danger in delay. Do not wait until the shift is over.

Do not hesitate, if working on night shift, to knock up the doctor. The doctor would prefer to attend to the case at once rather than have an anxious attendance of weeks on the case if patient delays seeking aid.

Do not allow any "handy man" about the pit to use penknives, needles, pins, &c., trying to extract bits of coal, fires from pick-point, &c. These knives, &c., as a rule, are unclean and dangerous, and apt to set up mischief in themselves. Avoid the "handy man" and proceed to the surgery at once.

In cases where no medical man is available report at once to the manager of mine.

The manager should have by him the following: (*a*) Boracic-acid lotion (saturated—that is, 1 part to 20); (*b*) perchloride-of-mercury solution (strength, 1 to 4,000); (*c*) solution of hydrochlorate of cocaine, 5 per cent.; (*d*) a dropping-pipette; (*e*) plain absorbent cotton-wool.

The eye should be well bathed with warm solutions of boracic-acid or perchloride-of-mercury solutions.

Manner of bathing: Soak some cotton-wool in lotion and allow the solution to drip into eye, separating the eyelids to allow of this. This should be done frequently, and will ease pain as well as go far to ward off subsequent inflammation.

If much pain experienced with a "pipette," drop one drop of cocaine solution into the eye, and repeat the operation in five minutes, and again in ten minutes.

If no medical man available manager should send patient to the nearest hospital at once.

(*d.*) Systematic Timbering.

The most prolific cause of fatal colliery accidents is fall of ground, especially of top coal, containing "sooty backs" or other concealed joints. To prevent such accidents systematic

timbering is now required by the law. The recommendation contained on page 10 of the Report of the Royal Commission on Mines, 1911, that the members of the Commission "are of opinion that provisions similar to those of the British Coal-mines Act, 1911, on systematic support of roof and sides should be incorporated in the Coal-mines Act of this Dominion" was unanimously endorsed at a conference of all Inspectors of Mines held in Wellington during November, 1914; and after discussion and examination of witnesses by the parliamentary Mines Committee, 1914, the British law regarding systematic timbering was adopted verbatim and became law in regulation 56 under the Coal-mines Act, with an extra clause that an Additional Rules Committee, if set up by the Minister, might have power to vary the regulation, which now provides that where timber is used to support the roof at the working-face, and all parts of a roadway the roof or sides of which require support, shall be systematically and adequately supported at such regular intervals and in such manner as shall be specified in a notice by the mine-manager. It is also provided that if the Inspector considers the system of supporting the roof and sides adopted in any part of a mine is unsatisfactory he may require the manager to fix some less distance or otherwise modify the system, and the manager shall comply with the requisition. If complied with conscientiously the regulation regarding systematic timbering is probably one of the most satisfactory measures ever introduced in this Dominion for the safety of persons employed in our coal-mines. Inspection shows, however, that miners on the West Coast frequently neglect to erect timber within the specified distance of the working-face, with the result that lives are being lost chiefly through the carelessness of the sufferers. Hitherto there has not been any appeal by miners to an Additional Rules Committee to vary the specification regarding the maximum interval and manner of timbering notified by the manager and approved by the Inspector.

The following are the maximum intervals allowed at the principal collieries :—

Systematic Timbering. (*Vide* Regulation 56.)	Name of Colliery.																					
	Millerton and Denniston.		Westport-Stockton.		Blackball.		State Collieries.		North Brunner.		Paparoa.		North Cape.		Puponga.		Hikurangi.		Waipa.		Northern.		Kaitangata and Castle Hill.		Nightcaps.		Freeman's.	
	Ft.	in.	Ft.	in.	Ft.	in.	Ft.	in.	Ft.	in.	Ft.	in.	Ft.	in.	Ft.	in.	Ft.	in.	Ft.	in.	Ft.	in.	Ft.	in.	Ft.	in.	Ft.	in.
Between each row of props ..	6	0	6	0	6	0	6	0	4	0	..		3	6	6	0	4	0	5	0	4	0	6	0	6	0	6	0
Between adjacent props in the same row	6	0	6	0	6	0	6	0	4	0	6	0	3	6	6	0	5	0	6	0	4	0	6	0	5	0	6	0
Between the front row of props and the face	7	6	7	6	7	6	7	6	..		7	6	4	6	6	0	5	0	6	0	4	0	6	0	6	0	8	0

The distance between holing props or sprags, also between face-sprags, is 5 ft. in accordance with Special Rule 36.

The penalty for breaches of the regulations shall for a first offence not exceed £5, and for a second or subsequent offence shall not exceed £10.

I have, &c.,
FRANK REED,
Inspecting Engineer and Chief Inspector of Mines.

ANNEXURE A.

SUMMARY OF REPORTS BY INSPECTORS OF MINES.

Northern Inspection District. (Mr. Boyd Bennie, Inspector.)

Taupiri Extended Mine.—The main workings are located in the south-west and north-west dip sections. The bords are 12 ft. to 16 ft. high, with 5 ft. to 6 ft. of coal left on the roof as a protection against falls. The general working-conditions of the mine are satisfactory.

As a result of the arbitration case, Inspector of Mines *v.* Taupiri Collieries, of November, 1915, and a conference held on the 25th March between the directors and management of the colliery, the Miners' Union representatives, and myself, seventeen concrete dams reinforced with steel rails were built in drives. These dams were completed in December, 1916, and shut off all the disused old workings east of the shafts, including the drives underlying Lake Hakanoa and those adjacent thereto, and including the site of the subsidence under Onslow Street and a triangular section lying under the Waikato River abutting on to the Great North Road, and the Barrier coal pillar between this and Ralph's Mine. These dams have been well constructed, and I am of opinion that they are sufficiently strong for the purpose for which they were built. At one place known as the "Iron Pillars" the drives have been filled with fine coal previously heated so that the danger from spontaneous combustion and noxious gases has been eliminated. The drives adjacent to the subsidence of July, 1915, have also been filled in the same manner.

The numbers of prosecutions of miners and workmen for taking smoking material or matches into the mine has been considerably reduced, and is now almost a negligible quantity.

It is a pleasing feature that no fatal accidents occurred during 1916.

The official reports at the mine show that gas has been found in small quantities, principally in the disused old workings, and has always been removed immediately after its discovery.

Ralph's Colliery.—This colliery was worked with a limited number of men. Early in the year the management decided to discontinue mining at the Ralph's and Taupiri West shafts, believing that the remaining available coal could be more conveniently worked through the Extended Mine or possibly through new shafts. With that end in view work was carried on at the sections known as Bond's Dip on the north side of the mine abutting the Extended coal pillar, and also at the south side (Big Jig), and at the back of a fault-line from No. 3 level. At the latter place, at No. 6 jig, there were met two upthrow faults, and although there is a thick cover overlying the coal-seam, the nature of the rock was such as to be dangerous to work the coal lying beyond the faults and abutting on to the western bank of the Waikato River. The coal lying west of No. 6 level and under Lake Waahi can be worked from Taupiri West shaft or a new shaft adjacent to that pit.

In view of the suspension of work at Ralph's Mine a reinforced-concrete dam has been erected in the heading connecting Ralph's and Taupiri West shafts, and, there being no other connecting-drives, the dam will separate those mines one from the other, and in any future operations south-west of Ralph's Mine dam the Taupiri West shaft may be made use of. The said dam is strongly built, is let into the sides and roof and floor of the drive, and is all in coal. The concrete is 15 ft. wide by 8 ft. high.

In December the rails, pumps, &c., were withdrawn and the mine closed.

No fatal or serious accidents occurred at this mine during 1916. Gas has been found in the old workings on several occasions during the year.

Huntly Brick and Fireclay Company (Limited).—This company is mining coal by open cut on its freehold property for use at the brickworks, no coal being sold. The coal is worked from pillars left in by a former mining company.

Waipa Railway and Colliery Company (Limited).—Nos. 1 and 2 adit levels are worked and well ventilated jointly, while No. 3 level is separate from the others, and is working the coal lying beyond the big upthrow fault. At Nos. 1 and 2 levels most of the first working up to the upthrow fault has been completed and a section of pillar coal extracted. The seam is from 6 ft. to 12 ft. thick, 2 ft. to 3 ft. of coal being left on the roof as a protection against falls.

There was a serious accident in the mine during the year, two men being hurt. I attributed the accident to the bords being driven too wide, and in consequence of the friable coal and roof rock I ordered the width of bords to be reduced and systematic timbering to be adopted, the timbers to be set closer in the rows and the rows to be set closer to each other. Generally I found the mine safely worked.

Pukemiro Colliery.—This mine has worked continuously during the year. I have found the mine safe and well ventilated. The coal is of a hard and good quality, bords being driven 14 ft. wide and from 10 ft. to 16 ft. high, 2 ft. to 4 ft. of coal being left on the roof of the bords as a protection against falls of roof, which is friable clay. No pillar coal has yet been mined.

The mine is opening out very favourably. Eight-yard pillars are left, and the mine is being opened in panel sections, which will tend to safety and greatly assist in efficiency of ventilation, which has been good. Electrically driven endless-rope haulage is installed from the screening plant into No. 2 section, improved rope-clips being in use. Mine-pumps, haulage-winch, and ventilation-fan are electrically driven, the cables being well protected.

No serious accidents occurred in the mine during the year, but one serious accident occurred at the screening plant, when a man named H. Magnall was crushed between two trucks.

Waikato Extended Mine.—This is a small mine being opened on the western bank of the Waikato River, adjacent to the old Waikato Mines. An adit level has been driven and the coal cut into, being from 7 ft. to 8 ft. thick. A ground tram has been constructed half a mile in length from the mine to the wharf on the river-bank. The area of coal available is very small. During the year I visited the mine several times and found the mining and works carried on with care.

Aria Survey District—New Find of Coal.—A short time ago a settler named Morgan discovered an outcrop of coal on his farm three miles from Aria Township. On the 10th January, 1917, I visited the district and examined the coal outcropping at a recent landslip. The coal is apparently of the same age as that found at Mokau. The seam is disturbed by the slip, but it appears to be from 10 ft. to 12 ft. thick, separated into two parts by a band of stone 6 in. thick. The coal is of good quality, and will be a great boon to the district. The settlers and the butter-factory will be able to get their supplies at a reasonable rate. There is a formed road from the township to Mr. Morgan's homestead, but half a mile of new road will have to be made to connect with the proposed mine. The coal-consumption will be very small per annum.

Mangapapa Coal-mine (Mokau).—As a result of heavy rains early in 1916, logs were deposited in the Mokau River and steamers were unable to reach the mine, consequently no mining has been done during the year.

Hikurangi Coal Company (Limited).—The mines have worked continuously during the year. Great inconvenience has been experienced in draining the mine-workings of water from the Hikurangi Swamp owing to limestone boulders overlying the coal-seam, and as a consequence the mines are flooded to an inconvenient degree after heavy rains. During the greater part of the year the deepest workings have been almost continuously flooded. It is unfortunate that in the laying-out of the mine-work no provision was made to effectively deal with the drainage. The class of pump installed was too small, and the corrosive acids in the mine-water have been very destructive to the pumps and pipe-lines. Another feature is that there is a great extent of partly worked pillar coal in the deepest area, and it is almost continuously flooded, and of a necessity the coal more to the rise has been worked first, thus breaking the surface by mine-falls, which allow heavy deposits of surface water to enter the mine. Effective drainage is an urgent problem at this mine. The mine-ventilation has at times been fair, but not up to the usual standard of efficiency maintained at other mines in my district. Too great an area of open workings and openings to the surface have made it difficult to obtain efficient results from the mechanical ventilating machinery installed, which is a small mine-fan. The section known as M 39, Block XVI, is now almost exhausted, and from that area a substantial tonnage of the year's output has been mined.

Northern Coal Company's Northern Mine.—This section of the company's mines has been worked continuously during the year. The coal mined is pillar coal, and is almost exhausted. Three months will completely finish mining here. The company has let to contractors a small section of coal to be mined on Section 24, Tauranga, abutting on to Section 39 N.E., Block XVI, from which a small quantity of coal has been mined by Wallace and party, six men being employed.

Northern Coal Company's Crown Lease.—(Section 2, Block XVI; Little and party, contractors.) Men are employed mining coal beyond the company's Northern Mine workings. The coal-seam is 10 ft. to 12 ft. thick, but the area is limited, and pillar coal is being mined. The mine is carefully worked. There is another small area adjacent in which the coal occurs, being separated from Little's mine by a downthrow fault. A surface tram is being constructed to work this coal, which is estimated to yield 30,000 tons.

Northern Coal Company's Waro Section.—This mine is still closed awaiting the arrival of suitable pumping and haulage machinery, which will be electrically driven.

Northern Coal Company's Kiripaka Section.—During 1915 the company acquired a lease of Crown land adjacent to the mine, which has been bored, and the coal-seam located at a depth of about 100 ft., the coal-seam being from 8 ft. to 10 ft. thick. A dip incline tunnel was driven into the coal. This mine worked from September, 1915, to the beginning of October, 1916, when it was temporarily closed. During the period it was worked 13,164 tons of coal was mined, and an average of forty-two men employed. I visited the mine several times during the year, and found the work carefully carried on, ventilation being satisfactory. The coal-measures at this mine are disturbed by faulting, first by a downthrow fault and later by a sharp upthrow fault. The mine was opened on the upper edge of the coal-deposit, the area being very small, besides being faulted, the coal itself being of poor quality intersected by bands and segregations of stone and inferior coal.

Kerr and Wyatt.—(Crown lease, Section 39 N.E., Block XVI.)—The coal-seam is thin and an irregular deposit. Of the 515 tons of coal mined during 1916, at least 50 per cent. of it was mined by open cut. The mine-drives into the coal show that the coal on this section is only the edge of the thicker coal-deposit on Section M 39, the freehold property of the Hikurangi Mining Company, where the coal was from 12 ft. to 14 ft. thick. I have noticed that the coal has been carefully worked, there being a very small percentage of loss.

Co-operative Colliery.—(Cunningham and Hamilton's Crown lease.) This company's No. 2 mine, on Section 48 N.E., Block XVI, where mining has been carried on during the year, is now nearing exhaustion. The area of coal was small, but it was of good quality, and from 10 ft. to 14 ft. thick. The coal was carefully mined, and the percentage lost in working was very small. I found the mine carefully worked and ventilation good. A good supply of timber was always on hand.

North New Zealand Coal and Cement Company's Mine.—This mine has worked continuously during the year with a small number of men. The workings are to the dip of the main shaft, and as a result the mine-drainage has been expensive and has retarded development. An attempt was made to extend the main dip heading into what is believed to be a better coal-deposit, but

the pumps are too small, and with the corrosive acids in the water they soon perish, and it has been found to be impossible, with the present appliances, to extend the main dip heading. The pumps are steam-driven, and, through the steam-pipe lines being in the intake airway, the air along the drive is saturated with moisture and at a disagreeably high temperature. In view of the applicability of compressed air and electricity to pumps and hauling-engines in mines, I think steps should be taken to prevent the use of steam in coal-mine workings. The coal being worked is pillar coal, and as a result heavy falls of roof rock occur after mining, and the result is more water to pump. With the small output of coal the result financially must be on the wrong side. I found the mine worked carefully and the ventilation satisfactory

Accidents.

It is pleasing to record that no fatal accidents occurred in my inspection district during the year 1916.

Only four accidents which may be classed as serious occurred during 1916. On the 12th June a miner named Charles Westfield, working in the Waipa Colliery, received a broken leg through a fall of roof rock. H. Muir was also severely bruised as a result of the same fall, and was off work for thirty-eight days. On the 13th September a man named William Grant, employed in the Taupiri Extended Mine as a lamp-relighter, was struck by a runaway truck on the main haulage-way and received rather severe injuries. On the 14th December a clipper names James Gibson, employed in the Taupiri Extended Mine, was crushed between two full skips on the main haulage-road, receiving severe crush wounds about the shoulders and body.

West Coast Inspection District. (Mr. James Newton, Inspector.)

New Zealand State Coal-mines.

Liverpool Colliery.—No. 1 Mine: Development in a north-easterly direction has proceeded during the year in the area lying to the east of the Seven-mile Creek. The seam is gradually thinning in the east winning-places, whilst to the west it outcrops into the Seven-mile Creek escarpment. The coal has somewhat improved in hardness going north. On the west side of Seven-mile Creek output has to be won from pillar-extraction, owing to the seam being confined to a narrow strip proceeding north, together with the fact that it thins to an unpayable thickness going west.

The Morgan Seam: This seam was reached by a cross-measure drift approximately 9 chains long. Very little development has taken place during the year. The seam, which is a thick one, is exceedingly friable, and on the eastern side of the drift is split by a thick band of stone. Safety-lamps for lighting purposes have been installed to replace naked lights owing to a trace of fire-damp having been met with. Blasting is done with permitted explosives.

No. 3A Mine: This area is proving disappointing. The seam, as it is being driven upon, is thinning considerably, and unless a change takes place will soon have thinned to such an extent as to be unprofitable. The coal is of good quality and medium hard, and is covered by an excellent hard sandstone roof.

No. 3 Mine: This mine has proved itself to be the best area opened out in the Liverpool Colliery, and at present is producing good hard coal. There is evidence, however, that this portion will in the near future be somewhat crippled by faultings and thinning. The area is cut into two separate workings by two closely adjoining faults running almost due east and west. These have been pierced and a considerable area opened on the north side; the western level, however, is limited in distance by a fault cutting north-east, and probably is a branch of the previous faults mentioned, and should this fault live it will gradually cut all winning-heading to the rise. The eastern workings in this area are in low coal.

Two new Sirocco fans have been installed during the year, one at No. 1 and the other at No. 3 Mine. Each fan is capable of producing more than sufficient ventilation to efficiently keep the air clear of noxious gases and in a healthy condition. No. 1 fan is electrically driven; No. 3 is steam-driven. One bathhouse has been completed and another is under construction. The workmen appreciate and make use of them almost to the fullest extent.

Point Elizabeth Colliery.—The output from both sections, Nos. 1 and 2, has been won exclusively from pillar-extraction, and, excluding the area that has been sealed owing to fire, the percentage of coal won has been satisfactory. The fire area has not given a great deal of trouble beyond the fact that it has been found impossible to win the few pillars sealed off. This area was opened some few months back, but owing to excessive heat it had to be again sealed up. The life of this colliery cannot, I think, be prolonged more than a year.

No fatalities have occurred at the State collieries during the year under review.

The output from Liverpool Colliery shows an increase compared with previous year of 57,465 tons, and Point Elizabeth an increase of 11,290 tons.

Other Mines.

Paparoa Colliery.—Development, which has mostly been in a westerly, north, and north-easterly direction, has now almost ceased, the coal having almost wholly given place to dirt going north-east, and outcropped going west; the coal has shown no improvement during the year, and remains soft and friable. A commencement to win pillars back from the escarpment will be necessary shortly in order to obtain an output. A block of coal lying to the south-east has yet to be exploited.

No fatalities have occurred during the year.

Blackball Colliery.—Development of this colliery has been steadily pursued both to the rise and dip. No further development in the direction of dip in No. 2 has been done owing to difficulties with water. The eastern level, however, is still being driven; the coal here has proved to be somewhat softer than in the other areas. No. 9 dip is opening up in excellent hard coal, and has been driven about 12 chains. Unless prevented by water it is proposed to drive back at a lower level than No. 5 area and the western level of No. 2 dip, which had to be abandoned owing to water, for the purpose of winning the coal lying to the dip of these areas. During the year a new bathhouse has been built. A considerable amount of spontaneous heating has occurred, but in all cases the areas have been sealed off before actual fire broke out.

Two fatalities occurred during the year.

North Brunner.—The output from this colliery is being entirely won from pillar-extraction. This mine is gradually being worked out. No development-work is being undertaken at present. The only future prospect, I think, for this colliery is a small area lying to the south and dip of the present upper workings. A fair amount of fireclay has been won, and is being utilized for the making of bricks, the necessary equipment having been provided for this purpose, and is situated close to coal-storage bins at Stillwater.

Brunner Mine.—No development has been done during the year, the whole of the output having been won from pillar-extraction. There is no hope of further development in the area at present being worked, and it is the intention of the company to try and reach some of the coal left in former years in the old portion of the colliery. The coal mined is almost exclusively used for making coke and gas-production.

Reefton Mines.

There is very little of importance to report with reference to the mines in this district. For the most part only two or three men are employed in each mine, and the output is consumed locally, being used exclusively for household and steam-raising purposes. The output for the year, 11,499 tons, shows a decrease of 738 tons compared with last year. A good deal of soft coal is to be met with in these mines, besides which the areas operated on have proved the seams to be a good deal faulted.

A fatality happened at the Big River Mine during the year.

Westport District.

Coalbrookdale Colliery.—Wareatea section: Driving in this area has proved the existence of a large quantity of excellent coal. The seam in places is faulted, small displacements and splitting being observable.

Cascade dip: This area is extensively faulted. The coal, however, is hard throughout. Development in this area has practically ceased, and the output is being won from pillars.

No. 8 section, Cascade: No further progress is possible in this area owing to the coal outcropping, and all output is being won from pillars.

Iron Bridge Colliery.—A large area of coal awaits exploitation on the north side of the Waimangaroa, and the requirements for the extension of the necessary haulage arrangements are practically completed, but owing to labour being unobtainable development of this area is slow. Towards Mount William operations have steadily advanced, though minor faulting has been met with. The outlook for a steady output from this colliery is assured.

Westport Coal Company (Limited): Millerton Colliery.—This colliery has the largest daily output in the inspection district. Development has steadily proceeded in the various areas, and there yet remains large areas of workable coal. The South Mangatina heading has been driven through barren country for a distance exceeding 20 chains, and still has several chains to go before reaching the coal. Good coal of medium hardness is being won along the eastern boundary of the lease. This area (Mangatina) has been considerably denuded by streams. The coal from this colliery is mostly of a soft nature. In the lower section (dip) a good deal of faulting exists.

Westport-Stockton Colliery.—Old mine: New work has been confined to a small area situated on the left-hand side of the main endless-haulage road and going east. The seam here thins considerably, and the coal varies in quality. There still remains a considerable area to be proved. Development has proceeded southward along the western boundary of the D tunnel. The largest amount of output has been won from pillars from the several tunnels. There still remains a few years' work in these tunnels at the present output.

New mine (E section): Development in this area is proceeding in a south-westerly direction, and is opening up, generally, satisfactory hard coal of good quality, which is being met with especially in the No. 4 winning-headings, after crossing an upthrow fault cutting the country in an east-and-west direction. There yet remains a large tract of country to be worked in this portion of the colliery. A few pillars have been won skirting the eastern outcrop.

Co-operative Mine—No. 4 Old Cardiff, Seddonville.—The seam, which is of varying thickness, is being driven upon around the outskirts of the old workings, and shows an improvement towards Chasm Creek. Only two miners are employed winning coal.

Coal Creek Mine, Mokihinui.—The coal is mostly very soft and dirty. Ventilation has been effected by connecting to the surface with small shafts. This mine is being worked by a small co-operative party.

Collingwood District.

Puponga Colliery.—Development has proceeded slowly in an easterly direction through the medium of a crosscut dip and level therefrom, the seam here being about 9 ft. thick, a section of which shows excellent hard coal 7 ft. thick, underlain by a 5 in. band of stone, then 10 in. of coal, and 9 in. of coal and soft dirt resting on the floor. Before development can be proceeded with to the dip it will be necessary to provide additional power on the surface for pumping.

North Cape Coal-mine.—Development has been confined to the dip workings, and all available coal above free drainage has been won. The seam where cut is approximately 5 ft. thick, but

gradually thins towards the dip until about 3 ft. The levels going west, which have been driven a distance of approximately 20 chains, have also gradually thinned until the seam has become unprofitable to work (20 in.). On the east side of dip the coal thins rapidly to unprofitable thickness, consequently, appearances point in the direction of the property having a short life. A Sirocco fan has been installed to provide ventilation, and compressing plant to provide pumping-power, besides which a direct-haulage equipment has been installed.

Fatalities.

Fatalities to workmen during the year number six, five of which occurred underground. Falls were responsible in each case. One occurred above ground, the result of being run over by a railway-wagon. Reports dealing with the above fatalities have already been forwarded.

Non-fatal (Serious) Accidents.

Point Elizabeth State Colliery (4/4/16): W. Gleave, fracture of both bones in lower leg, caused by fall of coal at working-face.

Paparoa Colliery (4/7/16): J. Muir, fracture of ankle whilst employed jigging timber up an incline on the surface for the purpose of building manager's house. The jig-prop gave way, and the injured man in trying to get clear got his foot down through a hole in the gangway and fell, causing the injury.

Westport-Stockton (13/9/16): J. Watterson, broken leg and ribs, caused by being run over by loco. brake-car whilst training coal.

Millerton Colliery (16/11/16): Mr. Boswell, fractured thigh, caused by fall of coal from roof.

Denniston Iron Bridge Colliery: T. Robinson, fractured skull, caused by being struck with prop, it being knocked out by a piece of coal falling from the face. Besides the above there have been quite a number of simple fractures, all of which have occurred at the working-face.

Ventilation.

The mines without exception have been found adequately ventilated. New fans have been installed at Liverpool and North Cape Collieries.

Southern Inspection District. (Mr. E. R. Green, Inspector.)

Canterbury.

Mount Torlesse Collieries (Limited), Avoca.—A roadway has been constructed from Avoca Railway-station to the mine, a distance of three miles and a half. The haulage tram-line, two miles and a half, has been surveyed and pegged off, and construction with men available just begun. Materials, rails, rope, &c., are on the job and sleepers in transit. Hauling-engines, steam boilers, and machinery arranged for. Manager's residence and workman's cottage are up, and two more cottages are being erected.

Bush Gully Coal-mine, Coalgate.—Mine in good order. Ladders and platforms in position in steep seam travelling-way. Steam jet inadequate for induction of air to workmen in upper levels. Steam-driven fan to be utilized, and mine-manager to write when installed and report result. Magazines (two) approved for storage of explosives used in the mine. (Since this visit the mine-manager reports fan installed and ventilation satisfactory.)

St. Helens Colliery, Whitecliffs.—The new dip will take some three months to complete.

Tripp's Coal-mine, Mount Somers.—Work was commenced on the 5th October. The mine-mouth required attention for safety; also new second outlet to be provided at earliest opportunity.

Albury Coal-mine, Albury.—Dip extended and rise places driven therefrom in coal of good average quality. Roof good and ventilation adequate.

Allanholme Coal-mine, Waihao.—New mine recently opened at Stony Creek on Mainholme Settlement. Shallow workings in good order. Second outlet provided and ventilation good.

Dalgety's Coal-mine, Hakataramea.—A privately owned mine with a very small output.

W. J. and S. J. Carleton, Methven.—Coal lease. No work done other than a little prospecting on an adjoining section at a cost of less than £5.

Te Moana Coal-mine.—A small privately owned mine with a nominal output.

George Bland, Mount Somers.—Prospecting on small grazing-run. Drive, 100 ft. Seam, 5 ft. in thickness; quality, brown coal, same as Mount Somers coal.

North Otago.

St. Andrew's Coal-mine, Papakaio.—Drawing pillars outward. Some trouble caused by heating in waste had been overcome by building sand stoppings, which were cool at the time of visit. Ventilation good.

Prince Alfred Coal-mine, Papakaio.—Air good, no gases. Workings in good order.

Ngapara Coal-mine, Ngapara.—Ventilation good. Magazine approved for storage of 375 lb. of blasting-powder.

Shag Point Coal-mine, Shag Point.—Seam, 2 ft. 6 in. to 5 ft. Roof ripped makes for room on roadway, and convenient stone packing on low sides. Stentons driven for ventilation required to be closer up, as pointed out to the manager.

Shag Point Coal Proprietary Coal-mine.—Mine in good order. Timber systematically used. Seam, 5 ft. to 7 ft. in thickness. Rules posted; required to be renewed owing to weather defacement.

South Otago.

Fernhill Coal-mine, Abbotsford.—Nominal output only on a small scale. Brick-burning and building-sand production forming chief source of supply.

Freeman's Colliery, Abbotsford.—Mine in good working-order. Owing to spontaneous fire the dip portion had been sealed off with brick stoppings, which were well attended to. Heaving bottom, due to creep, continues, consequently roadways low in places. Fan ventilation well conducted to working-faces.

Green Island Colliery, Green Island.—Air brattice required in rise places for clearing powder-smoke, which had been lying an undue time. Otherwise mine in good condition.

Jubilee Colliery, Saddle Hill.—Magazine well stocked with blasting-powder; extra supply said to be a final consignment for some time. Ventilation good; places in safe working-order in solid, and roof-break in pillar and robbing places well up to working-faces.

Christie's Saddle Hill No. 1 and No. 2 Mines.—These mines are connected underground, and through ventilation from No. 2 Mine to No. 1 Mine furnace shaft is in vogue. Drew manager's attention to necessity for closer attention of air-circulation around working-faces for dissemination of powder-smoke after blasting. Brattice should be kept closer up and kept tight. Pillar-robbing places in safe working-order. Blasting-powder safely handled.

East Taieri Coal-mine, Mosgiel.—Air dull with black-damp from old workings, owing to, as stated, unfavourable condition of the atmosphere—adverse wind and low barometer. The air, although imperfect, was not bad enough to have the men withdrawn. Fumes from the oil-engine (kerosene) underground used for dip pumping and haulage permeated the air at near the engine, but a canary kept near by exhibited no symptoms of uneasiness. The permit-holder informed me that the men were withdrawn on the few occasions that the air was unfit to work in. This mine is owned by a party of experienced coal-miners. Creep has begun in the dip, and may be expected to communicate rapidly with other parts of the mine. Although the exhaust from the oil-engine is piped to the return airway, a nuisance is created by the rank smell in the vicinity of the engine. I shall not again willingly consent to the use of an oil-engine underground in a coal-mine.

Brighton Coal-mine, Brighton.—Only a small local trade conducted.

Waronui Coal-mine, Milton.—Mine in good working-order. North side pillars finished and stopped off. Dip workings being developed. Rise pillars being drawn safely. Fire stoppings to gob receiving close attention; one rather warm one had been doubled since my last visit. A larger and more powerful electrical plant for pumping and hauling is being erected.

McGilp's Coal-mine, Milton.—Output continues, but not at work when last visited.

Taratu Colliery, Lovell's Flat.—Ventilation, 14,000 cubic feet per minute. Winding-ropes tested 8th July and following quarters. Manager reports slight bulge in shaft near the bottom owing to earth-movement: not detrimental to winding. Incipient fire from lower-seam workings being attended to.

Hawthornden Coal-mine, Kaitangata.—Small mine worked for local supply.

Longridge Coal-mine, Kaitangata.—Small mine worked for local supply.

Kaitangata No. 1 Mine, Kaitangata.—On the 27th November eight men were withdrawn from rise places in Mundy's dip on account of gas in the air. The shift next day went to work as usual, the places having cleared meanwhile. The barometer had been heavily depressed. The previous withdrawal of men was recorded on the 15th September, 1915. Ventilation was well directed to working-places, and there were no high pillar places. Had to draw attention to brattice being deficient in two places, including Penman's (formerly Bennie and Pilling), and reported same to Mr. Carson on the 6th December, 1916. Mr. Carson subsequently wrote me under date the 22nd that special officials had been detailed to attend to bratticing, and hoping that there would be no cause for future complaint. No. 21 dip "on last legs"—pillar-extraction being safely conducted. Prospecting in old No. 18 and No. 11 dip sections pillar-workings.

Kaitangata No. 2 Mine, Kaitangata.—Ventilation at intake, 21,500 cubic feet per minute; 8 ft. seam; new airway made to main return. Ring-tubbing at bottom of haulage-way completed. Stone drift, cross-measures drive for air-return in 100 ft. Door between intake and return between rings No. 1 winch scaling too much air, as also brattice-cloths between Nos. 1 and 2 winch dip. Overcast presumably losing air, too. Recommended that these receive attention for supply of better quality and quantity air to working-faces. Both rats and mice were seen in this mine when visited. Assistant manager Newburn subsequently reported that the overcast screens and door had been attended to, and that an appreciable improvement had been effected in the air-circulation at the working-faces.

Castle Hill Coal-mine, Kaitangata.—Visited workings in Jordan's and Carson's seams. Brattice kept well up to working-faces. No gas found. North level to No. 7 dip dry and dusty in places. Report-book showed that dust is filled away on occasions, and the underviewer said that a lot of attention was paid to this matter; also that they had to be careful about watering the roadways on account of "creep," to which their steep seams were liable.

Benhar Coal-mine, Stirling.—Ventilation good; air well conducted by brattice to working-places. Seam, 20 ft. in thickness; 8 ft. worked meanwhile. Roof good and timbered where necessary. Fuse regular, 1 yard run in ninety-five seconds.

Mount Wallace Coal-mine, Stirling.—Not at work on date visited; expected to resume at early date if workmen available, being scarce at present.

Mainholme Coal-pit, Pomahaka.—Well stripped ahead of working-face; about to be closed on account of rising bottom and seam thinning to outcrop in all directions. Fuse regular, 1 yard run out in 89½ seconds. Lessee complained that loose blasting-powder appeared to have lost its usual strength. Work at this mine has lately been suspended.

Central Otago.

Coal Creek Coal-mine, Coal Creek Flat.—New drive in from opencast. Mine in good order.

McPherson's Coal-mine, Coal Creek Flat.—The new proprietor is displaying more energy than the prior tenant. The fire in the hill-face has been suppressed by water laid on.

Perseverance Mine, Coal Creek Flat.—Opencast working at present. New inlet will soon be made for haulage convenience, but quite near the creek alongside.

Alexandra Coal-mine, Alexandra South.—The seam northward having improved in quality and extent, application being made for an extended area of 60 acres, at the same time applying for surrender of worked ground, on which reported Warden not aware of any objections from a mining point of view.

Cambrian Coal-mine, Cambrian.—Opencast; in good order; stripping under water-pressure.

Laudervale Coal-mine, Cambrian.—Workings inoperative on account of indisposition of lessee.

St. Bathan's Coal-mine, St. Bathan's.—Lessee and two youths working under an overhanging face. Warned them of dangerous system, and recommended driving underground.

Rough Ridge Coal-mine, Oturehua.—Opencast working; stripping kept well ahead of working-face. Magazine approved for storage of 80 lb. blasting-powder.

Idaburn Coal-pit, Oturehua.—Opencast pit, in good order. Seam dipping, and pumping heavy. Magazine approved for storage of 80 lb. blasting-powder.

Oturehua Coal-mine, Oturehua.—Opencast; pit flooded. No output recently.

Gimmerburn Coal-pit, Gimmerburn.—Private coal-pit.

Shepherd's Creek Mine, Bannockburn.—Only a small output now. Overcast in disrepair; required attention.

Cairmuir Coal-mine, Bannockburn.—Ventilation good. Ladders required on steep places on airway.

Ranfurly Coal-mine, Bannockburn.—The place where formerly heating now cool. Mine-workings in good order.

Cardrona Coal-pit, Cardrona.—Opencast. Deep stripping from mountain-side sluiced away by water, and kept well in advance of the several thin seams, which it is a wonder how it pays to work at this altitude (3,500 ft.), and several miles from the nearest habitation. The market is limited, but without this supply residents of Cardrona would require to go twenty or thirty miles or more further for their coal.

Gibbston Coal-pit, Gibbston.—Pillaring outward; substantial fire stoppings in against the waste.

Nevis Coal-mine, Nevis (per Inspector Whitley).—This mine has been purchased by the Lower Nevis Gold-dredging Company. R. Tom and another have been employed getting coal for the dredge, which uses about 3 tons a day. When visited coal was being mined from a drive 100 ft. from the surface. There was no permit-holder in charge, also no lamp at the mine for gas-testing, and the report-book had not been kept up. R. Thomson, former permit-holder for this mine, was to resume work on the 7th December.

Nevis Crossing Coal-mine (per Inspector Whitley).—Two men employed. The seam has been followed on the dip to a depth of 20 ft. below free-drainage level, and a hydraulic pump installed for dealing with the incoming water. From the bottom of the dip a drive 12 ft. by 4 ft. 6 in. has been driven south on the seam a distance of 50 ft. Timber is used where required. Rules posted and report-book kept. This mine supplies the Nevis Crossing dredge with about 3 tons of coal per day, and also produces most of the coal for household requirements in the district.

Clarke's Coal-mine, Nevis Crossing (per Inspector Whitley).—North side of Galvin's Gully. A seam of crushed coal was followed on the dip to a depth of 15 ft., when a heavy flow of water was met and operations ceased. Mr. Ritchie informed me that he did not intend to resume work.

Dillon's Coal-mine, Blackstone Hill.—A private mine. Output for year only 10 tons.

The New Zealand Gold and Tungsten Mining Company, Mount Highlay (per Inspector Whitley).—One man is employed in the company's lignite-pit. Owing to increasing depth of clay overburden and poor quality of the upper part of the seam the opencast method of working has been abandoned, and the lower part of the seam is being driven out. The dimensions of the drive are 6 ft. by 4 ft. in the clear of timber. It had been driven 20 ft. at date of visit, and was securely timbered.

Southland.

Pukerau Coal-mine, Pukerau.—Only a small local trade.

Whiterigg Coal-mine, East Gore.—Mine in good order. Magazine approved for storage of 200 lb. blasting-powder.

Green's Coal-mine, Gore.—Fan ventilation; places in good working-order. Weather favourable on day of visit to ventilation; return visit to be paid in dull weather to observe clearance of powder-smoke.

Bushy Park Mine, Gore.—Small local mine.

Burnwell Coal-mine, North Chatton.—Work recently resumed after being suspended for winter months. Seam strong and over 30 ft. in thickness.

Ramsay's Coal-mine, North Chatton.—Seam thick and strong. The fire in old opencast workings now out. Water raised by the dam extinguished the remnants of the fire.

Springfield Coal-mine, Waikaka Valley.—Set of timber required at mine-mouth for greater security; also attention to brattice for conduct of air in the mine.

Edge's Coal-mine, Waikaka.—Work now suspended and plant withdrawn.

Rossvale Coal-mine, Waikaia.—Driving to northern boundary. Some bratticing was necessary for circulation of air to the working-places. Magazine approved for storage of 600 lb. of explosives used in blasting coal.

Mataura Collieries, Mataura.—Places and stentons bratticed, but some powder-smoke hanging.

Mataura Lignite-pit, Mataura.—Machine-stripping in advance of opencast working. Underground mining recently begun; parallel drives are in a short distance.

Nightcaps Coal-mine, Nightcaps.—Atmospheric depression prevailing; four men have been withdrawn from No. 2 dip lower seam on account of black-damp in air. In another place air dull on account of workmen having left air-door open, causing short circuit. Mine-manager said, to complain would mean the men leaving their work, which he could not afford, as they were short-handed, also short of output. As it was, one trucker, having given the underviewer "cheek," had been made to apologize, with fear and trembling on the boss's side in case he would not do it. Laying tram, 40 chains, to "Coolgardie," and extension, 40 chains, to new lease, area 200 acres, on School Commissioners' land. Miss-fire shots reported more than usually frequent; Viking used; plugs varied in substance, being hard or soft, or viscous and irregular. Ventilating-fans (two) started at 6 a.m., two hours before workmen enter the mine.

New Brighton Coal-mine, Wairio.—Subleased by S. McMillan. Prospecting now.

Thistle Coal-mine, Nightcaps.—Working backward on pillar and head coal.

Wairio Coal-mine, Wairio.—Workings in good order. Roof, which is bad in places, supported by timber, and care of workmen attended to.

Wairio Railway and Coal Company's Mine, Wairio.—Prospecting with more or less success—chiefly less.

Beaumont Coal-mine, Nightcaps.—Opencast stripping becoming too heavy, and will soon have to resort to underground mining.

Linton Coal-mine, Nightcaps.—Opencast; seam 20 ft. Coal superior brown in quality. Tram-line laid to main road for land-sale pending extension of Nightcaps Railway now being contemplated.

Beattie's Coal-pit, Nightcaps.—Small opencast pit, troubled with water-inflow.

A. A. Townsend, Morley Village, Nightcaps.—Lignite license. Operations newly begun.

Black Diamond Coal-mine, Nightcaps.—New pit, opencast. Loading-stage erected and small area stripped. Seam lying near the surface.

Waikaia Coal-mine, Waikaia.—Resumed recently. Driving for air-return.

Nightcaps Coal Company, Wairio.—New mine. No output yet

The following other small mines have also been visited during the year: Argyle Coal-mine, Waikaia; Waimea Coal-mine, Kingston Crossing (work suspended); Princhester Creek Mine, The Key; Waimumu Coal-mine, Mataura; Heatherlee Coal-mine, Waimumu; Ota Creek Mine, Wyndham; Clarke's Coal-mine, Wyndham; Glenham Mine, Wyndham; Wairaki Coal-mine, Nightcaps (work suspended pending railway-extension); Mossbank Coal-mine, Nightcaps (work suspended); Burrell's Opencast Pit, Nightcaps (closed); Mount Linton Coal-mine, Nightcaps (work suspended); Otto Voight's coal lease, Nightcaps; D. McKenzie's mine, Nightcaps (suspended); Muddy Terrace Shale-mine, Waikaia (work suspended).

Accidents.

The year 1916 was again clear of fatalities in the Southern District.

Serious Non-fatal Accidents.

Ranfurly Coal-mine, Bannockburn (7/2/16): George Crabbe, 36, miner, injury to back, caused by fall of coal. Still off work.

Springfield Colliery, Waikaka (14/4/16): John Duncan, miner, broken arm, fracture of upper arm and ribs (two). Right side struck by coal flying from a light shot ignited at the face, having returned too soon, as stated.

Wairio Coal-mine, Wairio (22/5/16): William Buchanan, miner, bruised back and legs. Struck by piece of coal which fell from face. Still off work.

Brighton Coal-mine, Brighton (9/5/16): Nelson McColl, 26, miner, injury to back. Struck by small piece of coal which fell from low roof. Still off work.

Nightcaps Coal-mine, Nightcaps (29/8/16): Morris Jones, 64, miner, injury to right hand, jammed between two boxes. Still off work.

Kaitangata No. 2 Mine, Kaitangata (19/9/16): John Devine, 31, miner, strain of back. While lifting a lump of coal into box, foot slipped. Still off work.

Castle Hill Mine, Kaitangata (24/11/16): Robert Burgess, miner, fractured rib and bruised back, caused by blow from empty box.

The number of accidents reported for 1916, mainly for the purpose of the Coal-miners' Relief Fund, totalled 117, as against 144 for 1915 and 143 for 1914. Of that number, three claims were disallowed on account of insufficient proof.

ANNEXURE B.

BRUNNER FIRECLAY-DEPOSITS.

REPORT BY T. O. BISHOP AND JAMES NEWTON, INSPECTORS OF MINES.

WE beg to present the following report upon the fireclay-deposits at Brunner. For the information contained herein we are largely indebted to R. Alison, Esq., manager of the Brunner Mine, and to A. P. Harper, Esq., attorney, and J. Armstrong, Esq., manager of the North Brunner Coal Company, who assisted us most courteously.

Distribution and Thickness of Deposits.—To arrive at the probable quantity of fireclay in the Brunner district is a difficult matter, as no search for it outside of the existing coal-mines has been made, and there may be extensive deposits apart from the coal, of which nothing is now known. Our sole reliable sources of information are the mines, and we are therefore able to state only approximate available tonnages in the Brunner coal lease and in the North Brunner leases.

The Brunner Lease.—The fireclay left in the old workings of the Brunner Mines must be left out of all calculations of available tonnage, since the cost of obtaining it would be prohibitive, and the work would probably not be permitted by the Inspector of Mines on the grounds of safety.

Two boreholes have been put down to test the measures below the coal-seam, and these have shown the existence of two workable seams of fireclay at depths of 80 ft. and 100 ft. The upper seam is 4 ft. 6 in. and the lower 7 ft. 3 in. thick. From the position of these bores and the regularity of the measures we think it safe to say that these seams will extend over an area of 10 acres, and that the available clay at Brunner is therefore 284,350 tons. An incline is now being driven to develop these seams.

The North Brunner Leases.—In the North Brunner Mine the average thickness of the clay underlying the coal-seam is 18 in. The clay in sight in present workings is 5,500 tons; the clay proved under coal to the dip, 13,600 tons; the clay mined and stacked at surface, 6,000 tons: total, 25,100 tons. In the coal area partly proved to the east there is probably 50,000 tons of fireclay underlying the coal, and extending to the west as far as the old Brunner workings there is an area of 400 acres which contains clay, and possibly thousands of tons.

Composition.—The following analysis by the Dominion Analyst of shaly fireclay from the St. Kilda section, Brunner Mine, is given in Geological Survey Bulletin No. 13 (1911), page 96:—

Silica	47·22
Alumina	36·68
Ferric oxide	1·20
Lime	0·05
Magnesia	Nil
Alkalies	3·22
Water and organic matter	11·63
	100·00

Samples forwarded from the Tyneside Proprietary (Brunner) in 1915 to the Dominion Analyst upon analysis gave the following results:—

	(1.)	(2.)	(3.)
Silica	66·19	68·07	64·12
Alumina	21·31	20·06	21·53
Iron oxide	1·12	1·92	1·84
Lime	0·10	0·16	Nil
Magnesia	0·23	0·78	0·26
Water at 100° C.	0·46	0·78	0·59
Combined water and organic matter	8·21	5·82	8·40
Alkalies	2·38	2·95	3·26
	100·00	100·00	100·00

The plasticity of sample 2 is good, while that of 1 and 3 is fair, and each is of light colour when burned. Although the percentage of alkalies is rather high, the lime and iron oxide are low, and these may be regarded as fireclays of fair quality. (Forty-ninth Annual Report of the Dominion Laboratory, 1915, page 18.)

Method of Mining.—As above stated, the Brunner Mines Company is now opening up a mine for fireclay only, but up till now the clay has been mined only in conjunction with the coal. The method has been to work the coal first for 6 ft. ahead, and then lift the clay from the bottom before laying the rails.

Output.—The output of fireclay for 1916 was, from North Brunner Mine, 3,893 tons; from Brunner Mine, 2,000 tons; total, 5,893 tons. The total output to date is approximately 100,000 tons.

Cost of Mining.—The cost of clay delivered at the works is stated as, at the Brunner Mine, 7s. per ton; North Brunner Mine, 8s. 3d. per ton.

Number of Men employed.—There are no men employed underground in producing fireclay alone, as it is mined by the colliers with the coal and handled by the coal-truckers. The work done underground, however, is equivalent to the work of six men at North Brunner Mine, and four men at Brunner Mine. The men employed on the surface are, at North Brunner, nine; at Brunner, eleven.

Method of Treatment.—The fireclay on coming from the mine is stacked at the surface and exposed to the weather until it begins to crumble, when it is said to be tempered. It is then crushed under heavy rollers and passed through fine screens. The crushed clay passes into a pug-mill, where it is mixed with water to the necessary consistency for moulding. The moulded bricks or other articles are placed on a heated floor to dry, and when dried they are stacked in kilns and burnt hard.

Classes of Brick, &c., manufactured.—Firebricks are made in all required shapes, also tiles, locomotive-blocks, air-pit fire-grates, flue-covers, &c. Any article required in fireclay can be made.

Plant in Commission.—The plant in use at each mine consists of a set of steam-driven roll screens, elevator and pug-mill, drying-sheds, and kilns. Moulding is at present done by hand.

Estimated Life of the Industry.—The present output of clay from the mines is about 6,000 tons per annum, and if that rate of consumption be maintained there is enough clay proved to last for, say, fifty years; but this will depend upon whether the demand becomes greater or less than at present, and also upon whether the cost of mining clay apart from the coal will prove low enough to enable the industry to be carried on after coal-mining ceases. If our anticipations regarding probable clay be realized the supply of raw material will last for several generations.

ANNEXURE C.

STATISTICS OF WORKINGS IN COAL-MINES, 1916.

Name of Mine and Locality.	Name of Manager.	Number of Years worked.	Quality of Coal.	Number of Seams worked.	Thickness of Seams.	Thickness worked.	System of Underground working.	Number of Shafts.	Total Output for 1916.	Approximate Total Output to 31st December, 1915.	Approximate Total Output to 31st December, 1916.	Number of Men ordinarily employed.			Means of Ventilation.
												Above.	Below.	Total.	
NORTHERN INSPECTION DISTRICT.															
North Auckland Coalfields.									Tons.	Tons.	Tons.				
Whangarei	J. Cadman	6	Semi-bituminous	2	3′ 9″ to 8′	8′	Bord and pillar	2	2,756	15,069	17,825	3	10	13	Natural.
Northern Coal Company (Ltd.)—															
Northern	E. Nelson	19	Ditto	2	3′ to 6′	6′	Ditto		28,154	569,429	597,583	10	18	28	Fan.
Leasehold	G. Doel	⅔	,,	1	5′ to 10′	10′	,,		8,111	..	8,111	1	9	10	Natural.
Kiripaka	E. W. Tattley	1¼	,,	1	4′ to 8′	8′	,,	1	12,043	292,662	304,705	17	25	42	Fan.
Co-operative	J. Boyd	2½	,,	1	11′	10′	,,		9,405	9,912	19,317	1	8	9	Natural.
Kerr and Wyatt's leasehold	F. H. Kells	1	,,	1	3′ to 8′	8′	,,		515	1,469	1,984	1	2	3	,,
Hikurangi	A. H. Taylor	..	,,	1	12′ to 14′	12′	,,		65,522	1,002,519	1,068,041	30	80	110	Fan.
Waikato Coalfield.															
Waipa	T. Thomson	3	Brown	1	11′ 6″	9′	Bord and pillar		88,105	149,876	237,981	22	86	108	Fan.
Taupiri Coal Mines (Limited)—															
Taupiri, Ralph's	A. Penman	25	,,	1	10′ to 60′	20′	Ditto	4	54,048	3,171,589	3,358,212	29	85	114	,,
Taupiri Extended	W. Wood	28	,,	1	10′ to 34′	20′	,,	2	132,575			59	213	272	,,
Pukemiro	A. Burt	1½	,,	1	16′ to 18′	6′ to 14′	,,		81,582	11,009	92,591	32	90	122	,,
Huntly Brick Company	R. Greenwell	4	,,	1	15′	15′	Opencut		3,268	10,418	13,686	3	..	3	Natural.
Waikato Extended	D. Nicholson	⅔	,,	1	7′	7′	Bord and pillar		30	..	30	1	3	4	,,
Output of mines included in previous Statements at which operations are suspended or abandoned									..	2,353,253	2,353,253	..	..	..	..
WEST COAST INSPECTION DISTRICT.															
Nelson Coalfield.															
Puponga Colliery	A. Morris	13	Bituminous	1	9′	Full height	Bord and pillar		16,125	191,843	207,968	20	30	50	Mechanical.
North Cape Colliery	Job Hughes	6	,,	1	3′ 6″ to 5′ 6″	,,	Ditto		10,022	32,544	42,566	33	16	49	Natural.
Buller Coalfield.															
Co-operative Mine	H. Chester (P.)	2	,,	1	10′	7′	Bord and pillar		1,570	1,403	2,973	..	2	2	Natural.
Coal Creek Mine	W. McGuire (P.)	1	,,	..	6′	Full height	Ditto		2,477	..	2,477	2	5	7	,,
Westport-Stockton Colliery	A. K. Broadhead	8	,,	1	8′ to 24′	4′ to 16′	,,		189,430	846,940	1,036,370	100	130	230	Mechanical.

Westport Coal Company (Ltd.)—															
Millerton Colliery	W. McCormack and W. Pearson	25	Bituminous	1	4′ to 40′	12′	Bord and pillar	..	274,782	4,697,883	4,972,665	84	340	424	Mechanical.
Iron Bridge Colliery ..	G. Smith ..	25	,,	2	3′ to 30′	Full height	Ditto ..	..	245,659	7,154,979	7,400,638	23	220	243	,,
Coalbrookdale Colliery ..	N. Milligan ..	36	,,	1	4′ to 20′	,,	,, ..	..				17	230	247	,,
Rocklands Mine	J. P. Burley (P.) ..	15	Brown ..	1	16′ to 20′	9′	,, ..	..	97	6,859	6,956	..	2	2	Natural.
Inangahua Coalfield.															
Coghlan's freehold	J. Coghlan (P.) ..	20	Semi-bituminous	1	10′	Full height	Bord and pillar	..	324	5,514	5,838	1	1	2	,,
Archer's freehold	J. W. Archer (P.) ..	21	Ditto ..	1	10′	,,	Ditto ..	..	710	17,856	18,566	..	2	2	,,
Waitahu Mine	I. Rhodes (P.) ..	14	,, ..	1	14′	8′	,, ..	..	114	4,545	4,659	..	2	2	,,
Burke's Creek Mine	A. Thompson ..	15	,, ..	1	12′ to 15′	10′	,, ..	..	2,701	25,565	28,266	2	4	6	Furnace.
Deep Creek Mine	F. Lockington (P.)	15	,, ..	1	12′	Full height	,, ..	..	227	3,155	3,382	..	2	2	Natural.
Phœnix and Venus Mine ..	W. Knight (P.) ..	35	,, ..	2	25′ to 30′	10′	,, ..	..	1,020	33,735	34,755	2	2	4	,,
Watson and Moyle's Mine ..	G. Ward (P.) ..	8	,, ..	1	12′	Full height	,, ..	..	1,316	8,082	9,398	..	2	2	,,
Lankey's Creek Mine	F. Knight (P.) ..	14	,, ..	1	8′	,,	,, ..	..	1,876	21,307	23,183	1	2	3	,,
Loughnan's Mine	R. L. Kearns (P.) ..	11	,, ..	1	6′	,,	,, ..	..	1,911	11,315	13,226	1	2	3	,,
Big River Mine	W. Kirwin (P.) ..	3	,, ..	1	Variable ..	8′	,, ..	..	855	1,852	2,707	1	2	3	,,
Murray Creek Mine	C. A. Svensen (P.)..	3	,, ..	1	,, ..	Full height	,, ..	..	348	1,125	1,473	2	..	2	,,
Grey Valley Coalfield.															
Paparoa Colliery	H. Talbot ..	8	Bituminous	1	8′ to 25′	Full height	Bord and pillar	..	30,215	196,899	227,114	10	50	60	Mechanical.
Blackball Colliery	J. Watson ..	26	,,	2	15′	,,	Ditto ..	..	203,811	2,252,054	2,455,865	57	268	325	,,
North Brunner Colliery ..	J. Armstrong ..	7	,,	1	3′ to 12′	,,	,, ..	..	21,248	66,076	87,324	14	40	54	,,
Brunner Colliery	R. Allison ..	52	,,	1	12′	,,	,, ..	..	10,952	2,388,364	2,399,316	19	20	39	,,
N.Z. State Collieries—															
Point Elizabeth	J. Coulthard ..	12½	Semi-bituminous	2	4′ to 12′	,,	,, ..	..	140,917	1,995,389	2,136,306	61	154	215	,,
Liverpool Colliery, No. 1 Section	W. Parsonage ..	4	Bituminous	3	3′ to 16′	,,	,, ..	..	136,928	189,687	326,615	60	183	243	,,
Liverpool Colliery, No. 3 Section	G. Duggan ..	..	..	..	..	..	..	..							
Output of mines included in previous Statements at which operations have been abandoned or suspended							..	..	..	2,124,369	2,124,369	..	..	..	..
SOUTHERN INSPECTION DISTRICT.															
Canterbury.															
Bush Gully, Coalgate	J. Gillick.. ..	3	Brown ..	2	7′, 5′	7′, 5′	Bord and pillar	1	15,904	13,014	28,918	11	23	34	5′ steam-driven disc fan.
St. Helens, Whitecliffs ..	J. Sutherland ..	35	,, ..	3	6′, 5′, 3′	5′	Ditto ..	..	783	24,347	25,130	..	..	..	Exhaust steam from pump.
Tripp's, Mount Somers ..	J. McClimont (P.)	50	,, ..	1	40′	15′	,, ..	..	1,511	64,607	66,118	..	2	2	Natural.
Albury, Albury	H. A. Holmes (P.)..	25	,, ..	1	12′	8′	,, ..	1	762	14,201	14,963	1	2	3	,,
Allanholme, Waihao Forks ..	Alex. Todd ..	1	,, ..	1	15′	8′	,, ..	..	411	..	411	..	2	2	,,
Dalgety, Hakataramea ..	C. W. Ensor ..	35	,, ..	1	30′	15′	Semi-vertical levels	..	92	3,478	3,570	..	1	1	,,
Te Moana	G. D. Macfarlane ..	2	,, ..	1	5′	5′	Bord and pillar	..	2	142	144	..	..	..	..
North Otago.															
St. Andrew's, Papakaio ..	T. Nimmo (P.) ..	38	Brown ..	1	7′	6′	Bord and pillar	1	1,476	53,390	54,866	1	4	5	Furnace.
Prince Alfred, Papakaio ..	A. Beardsmore (P.)	47	,, ..	1	9′	7′	Ditto ..	1	1,054	59,969	61,023	1	2	3	Natural.
Ngapara, Ngapara	W. Nimmo (P.) ..	38	,, ..	1	25′	8′	,, ..	1	547	30,102	30,649	1	1	2	,,
Old Shag Point, Shag Point ..	W. Hunt (P.) ..	2	,, ..	1	4′	All	Longwall	1	1,831	406,833	408,664	1	7	8	,,
Shag Point Proprietary, Shag Point	C. E. Twining ..	8	,, ..	1	5′	,,	,,	1	9,363	12,705	22,068	12	17	29	Furnace.

STATISTICS OF WORKINGS IN COAL-MINES, 1916—*continued.*

Name of Mine and Locality.	Name of Manager.	Number of Years worked.	Quality of Coal.	Number of Seams worked.	Thickness of Seams.	Thickness worked.	System of Underground working.	Number of Shafts.	Total Output for 1916.	Approximate Total Output to 31st December, 1915.	Approximate Total Output to 31st December, 1916.	Number of Men ordinarily employed.			Means of Ventilation.
												Above.	Below.	Total.	
SOUTHERN INSPECTION DISTRICT—*continued.*															
									Tons.	Tons.	Tons.				
Central Otago.															
Coal Creek, Roxburgh	J. Barber	46	Lignite	1	20′	7′	Bord and pillar		476	59,955	60,431	1	1	2	Natural.
McPherson's, Coal Creek Flat	J. Weatherall (P.)	46	„	1	60′	All	Open		1,834	67,084	68,918	2		2	„
Perseverance, Coal Creek Flat	J. Craig (P.)	29	„	1	75′	25′	Bord and pillar		783	59,618	60,401	2	2	4	„
Alexandra, Alexandra	A. W. Whittlestone	35	„	1	9′	7′	Ditto	1	3,938	85,769	89,707	1	8	9	Exhaust steam.
Cambrian, Cambrian	M. J. Miller	55	„	1	30′	All	Open		285	48,467	48,752	1		1	
Laudervale, St. Bathan's		12	„	1	12′	„	„			1,225	1,225				
St. Bathan's, St. Bathan's	J. Enright	19	„	1	20′	15′	„		141	5,916	6,057	1		1	
Rough Ridge, Oturehua	J. Beck (P.)	30	„	1	20′	All	„		552	29,277	29,829	1	1	2	
Idaburn, Oturehua	J. White (P.)	46	„	1	20′	„	„		680	44,737	45,417	2		2	
Oturehua, Oturehua	R. Thomas	24	„	1	7′	„	„		210	2,129	2,339	1		1	
Gimmerburn, Gimmerburn	C. Dougherty	60	„	1	12′	„	„		24	3,205	3,229				Private.
Shepherd's Creek, Bannockburn	W. R. Parcell	39	„	1	8′	7′	Bord and pillar		755	82,510	83,265	1	3	4	Exhaust steam.
Cairnmuir, Bannockburn	H. C. Russell (P.)	14	„	1	12′	10′	Ditto		2,994	36,998	39,992	1	6	7	„
Ranfurly, Bannockburn	J. Hodson, jun. (P.)	6	„	1	10′	All	Levels		2,350	5,775	8,125	1	3	4	„
Cardrona, Cardrona	R. McDougall (P.)	32	„	1	10′	„	Open		153	25,627	25,780	2		2	Natural.
Gibbston, Gibbston	John Hodson	30	„	1	15′	10′	Bord and pillar		545	22,167	22,712	1	2	3	„
Nevis, Nevis	R. Thomson	16	„	1	20′	All	Semi-vertical levels		279	5,809	6,088	1	1	2	„
Nevis Crossing, Nevis	R. Ritchie (P.)	13	„	1	16′	16′	Open		843	12,128	12,971		2	2	„
Clarke's, Nevis Crossing, Nevis	J. Ritchie	2	„	1	9′	9′	„		250	180	430	1		1	„
Dillon's, Blackstone Hill	J. Dillon	19	„	1	12′		„		10	264	274				Private.
Mt. Highlay (late Gold and Scheelite Mining Company (Ltd.)), Macrae's	H. P. Gray	10	„	1	10′	6′	Tunnel		80	2,816	2,896	1	1	2	
South Otago.															
Fernhill, Abbotsford	James Gray	39	Lignite	1	15′	12′	Bord and pillar	1	1,293	155,844	157,137	4	4	8	Natural.
Freeman's Coal Company, Abbotsford	J. Sneddon	36	„	1	7′ to 14′	All	Ditto	2	13,278	532,529	545,807	4	21	25	Fan.
Green Island, Green Island	T. Barclay, jun.	29	„	1	10′	8′	„	1	5,180	121,849	127,029	3	5	8	Furnace.
Jubilee, Saddle Hill	T. Barclay, sen.	19	„	1	8′ to 18′	All	„	2	21,532	300,653	322,185	7	21	28	„
Saddle Hill (No. 1), Saddle Hill	Robert Hill	44	„	1	20′	„	„	1	6,666	227,593	234,259	3	7	10	Fan.
Saddle Hill (No. 2), Saddle Hill	Robert Hill	15	„	1	22′	„	„	1	15,434	217,020	232,454	6	19	25	„
East Taieri, Saddle Hill	W. Coulter (P.)	5	„	1	10′	7′	„	1	3,210	8,771	11,981	1	6	7	Natural.
Brighton, Brighton	N. McColl (P.)	1	„	1	6′			1	252	3,207	3,459	1	2	3	„

Waronui, Milton	J. Carruthers	12	Brown	1	18′	8′	Bord and pillar	1	18,242	166,335	184,577	19	20	39	Fan.
McGilp's, Milton	J. J. Cooper (P.)	12	,,	1	22′	15′	Ditto		5,610	26,933	32,543	1	4	5	Natural.
Taratu, Lovell's Flat	Thomas Shore	15	Lignite	1	20′	12′ to 15′	,,	1	32,969	227,970	260,939	15	42	57	Fan.
Mahara (late Hawthorn Den), Kaitangata	J. Davis (P.)	8	Brown	1	9′	7′	,,		331	970	1,301	1	2	3	Natural.
Longridge, Kaitangata	N. Mackie (P.)	8	,,	1	4′	All	,,		318	3,308	3,626	..	2	2	,,
N.Z. Oil and Coal Company (Limited)—															
Kaitangata No. 1	A. S. Gillanders	40	,,	1	30′	,,	,,	1	119,045	3,281,176	3,400,221	67	258	325	Fan.
Kaitangata No. 2	W. Carson	4	,,	1	30′	,,	,,								
Castle Hill, Kaitangata	W. Carson	23	,,	1	30′	,,	,,	1							
Benhar, Stirling	J. Walls (P.)	53	Lignite	1	25′	12′ to 16′	,,	1	5,096	158,175	163,271	1	6	7	Exhaust steam from pump.
Mainholme, Pomahaka	J. G. Drummond (P.)	31	,,	1	20′	All	Open		1,643	66,780	68,423	..	2	2	..
Southland.															
Pukerau, Pukerau	F. A. Junker (P.)	36	Lignite	1	16′	9′	Bord and pillar		758	40,627	41,385	1	1	2	Natural.
Whiterigg (late Heffernan's), East Gore	W. C. Johnston (P.)	38	,,	1	20′	12′	Ditto		2,457	62,040	64,497	1	2	3	,,
Green's, Gore	J. Mason, sen.	28	,,	1	17′	12′	,,	1	11,839	166,225	178,064	2	7	9	Fan.
Bushy Park, Croydon	J. Wilson	11	,,	1	20′	All	Open		585	21,683	22,268	1	..	1	..
Burnwell, North Chatton	W. McIvor (P.)	17	,,	1	20′	12′	Bord and pillar		1,877	36,880	38,757	1	1	2	Natural.
Ramsay's, North Chatton	J. Broome	13	,,	1	20′	15′	Ditto		7,791	72,861	80,652	1	3	4	,,
Springfield, Waikaka Valley	N. Fletcher (P.)	23	,,	1	17′	10′	,,	1	6,259	49,573	55,832	2	3	5	,,
Glenlee, Waikaka	D. T. McGill (P.)	23	,,	1	14′	All	Open		970	14,361	15,331	1	1	2	..
Edge's, Waikaka	A. A. Edge (P.)	17	,,	1	16′	12′	Bord and pillar		161	44,400	44,561	1	1	2	Natural.
Rossvale, Waikaia	R. Craig (P.)	13	,,	1	10′	8′	Ditto	1	2,065	34,762	36,827	1	3	4	,,
Argyle, Waikaia	H. C. Hutton (P.)	25	,,	1	20′	All	Open		574	4,720	5,294	1	..	1	,,
Waimea and Lynch's, Kingston Crossing	J. E. Johnston (P.)	8	,,	1	6′	,,	Bord and pillar		1,016	7,586	8,602	1	1	2	,,
Princhester Creek, The Key	W. O. Kempthorne	14	Brown	1	6′	,,	Open		115	1,498	1,613	1	..	1	,,
Mataura Collieries, Mataura	A. E. Barnes	20	Lignite	1	17′	12′	Bord and pillar	1	6,425	173,378	179,803	3	4	7	,,
Mataura Lignite Pit, Mataura	W. Coster (P.)	40	,,	1	18′	All	Open		10,602	147,950	158,552	8	..	8	..
Waimumu, Mataura	G. W. Williams	17	,,	1	9′	7′	,,		19	30,713	30,732	1	..	1	..
Heatherlee, Waimumu	F. Barber	5	,,	1	10′	8′	,,		123	355	478	1	..	1	..
Ota Creek, Wyndham	E. Genge (P.)	36	,,	1	6′	All	,,		1,030	18,921	19,951	1	1	2	..
Clarke's, Wyndham	P. Farrington	9	,,	1	12′	,,	,,		578	13,471	14,049	2	..	2	..
Nightcaps, Nightcaps	William Barclay	35	Brown	2	26′ in aggregate	24′	Bord and pillar	1	84,166	1,096,845	1,181,011	22	91	113	Two fans.
New Brighton, Nightcaps	A. Cain (P.)	10	,,	1	12′ to 20′	12′	Ditto		7	44,049	44,056	2	..	2	Natural.
Thistle Coal Company, Nightcaps	A. Ferguson (P.)	3	,,	1	9′	7′	,,		2,086	2,152	4,238	1	5	6	,,
Wairio, Nightcaps	C. R. Heycock	11	,,	1	17′	9′	,,		25,125	25,883	51,008	6	22	28	,,
Wairio Rail and Coal Company (Limited), Wairio	C. R. Heycock	2	,,	1	Prospecting				183	972	1,155	..	2	2	..
Wairaki, Nightcaps	W. Excell	3	,,	1	9′	7′	Bord and pillar		..	350	350	1	..	1	Natural.
Beaumont, Nightcaps	William Kyle	8	,,	1	20′	15′	Open		2,578	9,006	11,584	6	..	6	..

STATISTICS OF WORKINGS IN COAL-MINES, 1916—*continued.*

Name of Mine and Locality.	Name of Manager.	Number of Years worked.	Quality of Coal.	Number of Seams worked.	Thickness of Seams.	Thickness worked.	System of Underground working.	Number of Shafts.	Total Output for 1916.	Approximate Total Output to 31st December, 1915.	Approximate Total Output to 31st December, 1916.	Number of Men ordinarily employed.			Means of Ventilation.
												Above.	Below.	Total.	
SOUTHERN INSPECTION DISTRICT—*continued.*															
Southland—continued.									Tons.	Tons.	Tons.				
Mossbank, Nightcaps	William Kyle ..	2	Brown ..	1	9′	7′	Bord and pillar ..	..	..	765	765	..	..	..	..
Mt. Linton, Nightcaps ..	W. J. McGregor ..	22	,, ..	1	20′	15′	Open ..	..	..	3,314	3,314	..	..	..	..
Linton Coal-mine, Nightcaps ..	J. Duncan ..	1	,, ..	1	20′	15′	,, ..	..	2,312	..	2,312	6	..	6	..
Birrell's, Nightcaps	J. Phillips (P.) ..	2	,, ..	1	10′	All	,, ..	..	354	504	858	2	..	2	..
Beattie's, Nightcaps	G. Beattie ..	2	,, ..	1	9′	,,	,, ..	..	15	19	34	1	..	1	..
Diamond-Lignite, Seaward Bush	J. Peterson (P.) ..	14	Lignite ..	1	32′	,,	,, ..	..	1,533	12,542	14,075	2	..	2	..
Lynwood Colliery, Te Anau ..	N.Z. Tourist Dept.	16	,, ..	1	7′	,,	,, ..	..	115	2,169	2,284	1	..	1	..
Wellward Park, Pukerau ..	A. M. Mason ..	15	,, ..	1	7′	,,	,, ..	..	30	319	349	..	..	..	..
Otikerama Station, Pukerau ..	W. J. Voight ..	19	,, ..	1	7′	,,	,, ..	..	12	300	312	..	..	..	..
Riverview, Gore	J. Nichol.. ..	..	,, ..	..	..	,,	,, ..	..	32	1,901	1,933	..	..	..	..
Pinnacle Hill, Gore	S. Woodfield ..	..	,, ..	..	..	..	..	..	40	..	40	..	..	..	..
Glenham, Wyndham	N McEwan ..	..	,, ..	..	..	..	..	..	339	..	339	..	..	..	..
Black Diamond, Nightcaps ..	G. Tinker ..	..	,, ..	..	..	..	..	..	138	..	138	..	..	..	..
Waikaia Coal-mine, Waikaia ..	J. Johnstone ..	..	,, ..	..	..	..	..	..	60	14,441	14,501	..	..	..	..
Output of mines included in previous Statements at which operations are suspended or abandoned ..							..	..	..	2,728,042	2,728,042	..	..	..	..
Totals, Southern District, South Island	..	..	..	..	..	..	..	..	475,386	11,669,134	12,144,520	269	660	929	..
Totals, West Coast District, South Island	..	..	..	..	..	..	..	..	1,295,635	22,279,340	23,574,975	510	1,711	2,221	..
Totals, North Island ..	..	..	..	..	..	..	..	..	486,114	7,587,205	8,073,319	209	629	838	..
Grand totals ..	..	..	..	..	..	..	..	..	2,257,135	41,535,679	43,792,814	988	3,000	3,988	..
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	..	..	..	..
Shale exported, 1914									..	..	21	..	..	..	..
											44,104,614*				

* This total includes 14,443 tons of oil-shale mined prior to 1914.

ANNEXURE D.

EXAMINATIONS FOR COLLIERY MINE-MANAGERS AND OTHER MINE OFFICIALS.

At the examinations held in December, 1916, twelve candidates sat for first-class coal-mine managers' certificates and six for second-class certificates. The following were successful: First-class—William Crowe (Ngakawau), O. J. Davis (Runanga), and J. T. Mosley (Kaitangata). Second-class—W. C. Davies (Huntly), Frank Duffy (Burnett's Face), and G. F. Whittlestone (Abbotsford). Four candidates for first-class coal-mine managers' certificates and three candidates for second-class coal-mine managers' certificates obtained partial passes.

During the twelve months ended 31st March, 1917, a large number of candidates for certificates as underviewers and as firemen and deputies were examined at the various coal-mining centres. Those successful in obtaining certificates of competency as underviewers were: William Ainscough, John Dymond, John Hadcroft, T. G. Hughes, T. H. King, William Lowden, William Maher, John McKernan, Malcolm McLean, Samuel Pendleton, Isaac Powell, James Rodgers, James Thomson, W. R. Williamson, and Joseph Young.

The successful candidates for firemen and deputies' certificates were: George Dinsdale, R. W. Fairhurst, Thomas Hall, E. E. Hill, T. N. Martin, E. McGuinness, David McIvor, B. E. Miles, J. T. Pearson, Alexander Pratt, Henry Reid (Millerton), Henry Reid (Huntly), W. Richardson, A. G. Rogers, W. R. Rutherford, James Scott, J. R. Sharp, W. M. Shore, C. B. Smith, A. G. Tunstall, F. Turner, James Unwin.

The Board of Examiners under the Coal-mines Act as at the 31st March, 1917, was constituted as follows: Messrs. James Bishop, J. C. Brown, Robert Duncan, H. A. Gordon, P. G. Morgan (Chairman), Frank Reed, and E. H. Wilmot. Since the above date a vacancy has been created by the death of Mr. H. A. Gordon.

QUESTIONS ASKED AT THE EXAMINATIONS HELD DURING DECEMBER, 1916, FOR MANAGERS' FIRST-CLASS CERTIFICATES OF COMPETENCY UNDER THE COAL-MINES ACT.

SUBJECT 1.—*Mining: Opening out a Colliery; Working Coal; Timbering; Boring.*

1. Assume that you are required to undertake the development of a colliery in a new field, the seams being overlaid by several hundred feet of cover: give full particulars of the preliminary work you would consider necessary to—
   (*a.*) Prove depth and character of coal-seams; and
   (*b.*) To ascertain the position at which shafts should be sunk; and
   (*c.*) The general conditions which would influence your judgment in favour of or against the opening of a colliery as assumed.
2. Describe how you would sink a shaft through a depth of 70 ft. of running sand or other loose material; the shaft to be rectangular, and the work to be done without iron casing.
3. Suppose a pair of shafts to be sunk 1,200 ft. deep to a seam of coal 8 ft. thick; angle of inclination 10°, line of cleavage at right angles to line of strike, good roof, soft floor: show by sketches what in your opinion is the proper relative position of the shaft, mode of working you would adopt, and size of pillars you would leave for support of the shafts; position of doors between upcast and downcast; stating fully the reasons guiding you.
4. Assuming coal-seam described in preceding question gives off fire-damp freely, how would you ventilate during the time men are holing round shaft-pillars; and what special precautions would you take to prevent accident?
5. State generally your experience of sinking and opening-out of mines, with conditions under which experience gained; also duties and responsibilities of a chargeman of a shaft during sinking.
6. Describe and give sketches showing plan of longwall workings; also section through working-face showing how timbering is done. Assume seam 4 ft. thick, with strong roof and fireclay floor.
7. In working a pitching seam on bord-and-pillar system, in what relative positions would you keep the pillar and solid-coal workings in order to prevent accumulation of gas in the goaf being forced on to the workmen in the solid coal?
8. In pillar-extraction would you have props drawn as coal removed? If so, state the means you would adopt to prevent roof breaking over the working-places, and precautions to be observed by workmen engaged in drawing timber.
9. The roof of a haulage level putting heavy weight on timber, breaking the bars and reducing the width and height to 8 ft. and 4½ ft. respectively, show in detail (by sketches) how you would enlarge the drive to 12 ft. wide and 7 ft. high, and how you would protect the workmen during the operation; traffic to be worked on the road by single line for eight hours each day.
10. Give particulars describing fully any branch of mining-work, including precautions for safety, to which you have given special study.

SUBJECT 2.—*Mechanics: Pumping-appliances and Mine-drainage; Tapping Water and Dam-construction in Mines; Winding in Shafts; Hauling on Underground Planes; Compressed-air and Steam-power Plants; Strength of Materials; Elementary Electricity.*

1. Give sketch of general arrangement of appliances required for the installation of endless-rope haulage, showing driving-gear, tension arrangement, and clips. Assume quantity of coal to be hauled at 600 tons per shift, length of line 1,000 yards, and grade 1 in 10 against the load.
2. Describe and show by sketches the class of steam-boiler you consider most suitable for colliery-work. State reasons for preference.
3. What class of pump would you prefer to install to raise 600 gallons of water per minute from the dip-workings of a colliery? Give detailed description of pump, the driving-medium you would adopt and power required, allowing you obtain 60 per cent. efficiency; the pump to be placed underground one mile from the shaft, the head to be 500 ft.
4. Give sketch showing how a siphon should be erected. State the law which governs the working of this appliance, and advantages derivable from the working of same.
5. If required to transmit energy for application underground, state whether you would prefer electricity or compressed air, reasons for preference, and under what conditions you would install either of these forms of energy in preference to the other.
6. If required to build a dam or dams for resisting water-pressure of 100 lb. per square inch, show by sketch the form of dam, and give description of material and its application to the work. All dimensions to be assumed by candidate.
7. What are the terms applied by electricians to indicate (*a*) electrical pressure, (*b*) electrical quantity, and (*c*) electrical resistance?
8. Having to install a 25 horse-power electric motor (continuous current) at a point in the underground workings 1½ miles from the generating-station, where the voltage is 480, and the line consists of No. 2 standard wire gauge, copper, the total length being 3 miles, what would the drop in voltage be, for what voltage should the motor be constructed, and what power would be required at the generating-station, assuming 60 per cent. efficiency?

SUBJECT 3.—*Ventilation: Ventilation of Mines and Knowledge of Mine-gases; Spontaneous Combustion of Coal, and Methods of Dealing with Underground Fires; Rescue Apparatus; Practical Knowledge of Gas-testing with a Safety-lamp.*

1. Explain the theory of ventilation of mines, and why artificial ventilation is more reliable than natural.
2. Give rules which should be followed in splitting air, and state what is the practical limit to the number of splits, and why.
3. In what velocities of an explosive mixture are certain forms of safety-lamps unsafe?
4. Describe the conditions requiring mines to be worked with locked safety-lamps, and state provision.
5. What means would you adopt to secure the best possible results from a fan of limited capacity and on which the demand is dangerously near the limit?
6. What are the factors determining the quantity of air passing in a mine at any given time?
7. State how you would guard against underground fires, and the means you would adopt in dealing with same, having special regard to the safety of persons employed in connection with the work required to be done.
8. If 20,000 cubic feet of air be produced in an airway 3,000 ft. long, 8 ft. wide, and 5 ft. high, how many feet would be produced if the air was split in three splits, the first airway being as above, the second 3,500 ft. long by 9 ft. wide and 5 ft. high, the third 4,000 ft. by 10 ft. wide and 6 ft. high, the power being unchanged?
9. If water-gauge shows a depression of 3 in. and an anemometer reading taken in main intake, which is 12 ft. by 7 ft., shows a velocity of 985 ft. per minute, what is the horse-power of the ventilating-current?
10. Having a current of 96,000 cubic feet of air circulating in a mine, the water-gauge being 1·2 in., what will be the water-gauge if current increased to 130,000 cubic feet per minute?

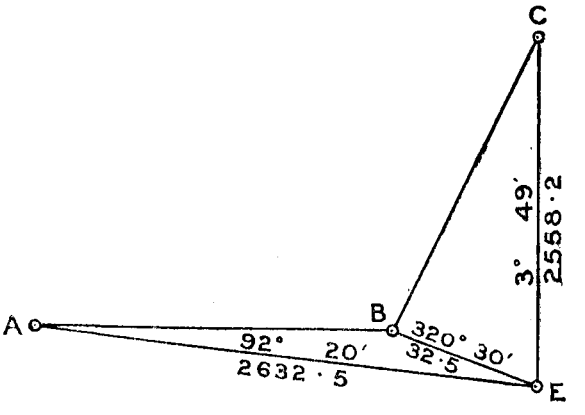
SUBJECT 4.—*Arithmetic and Law: A Knowledge of Mine Accounts; Fractions, Decimals, Percentages, Square Root, Area of Rectangle, Trapezoid, Circle, &c.; Measurement of Timber; Calculation of Workable Coal in a Mine, &c.; a Knowledge of the Coal-mines Act and Amendments.*

1. What are the contents in tons in an area of 20 acres, the seam lying flat and 5 ft. thick; specific gravity, 1·5.
2. Taking the output of a colliery at 9,000 tons per fortnight, of which 15 per cent. is unsaleable, the cost per ton of the gross quantity is 5s. 3·5d.: what is the cost of the net disposable quantity, and what should be the selling-price to return a gain of 12½ per cent.?
3. If pillars are 22 yards by 13 yards, bords 6 yards wide, and headings 4 yards wide, what percentage of the coal is being won in the solid workings?
4. Find the length of a circular fence to enclose 10 acres.
5. Write such a report as may be considered necessary from the manager of a mine to his directors at the end of each fortnight, dealing with the pay-sheets and such features connected with the mine-workings as are, in your opinion, essential for the information of a board of directors.

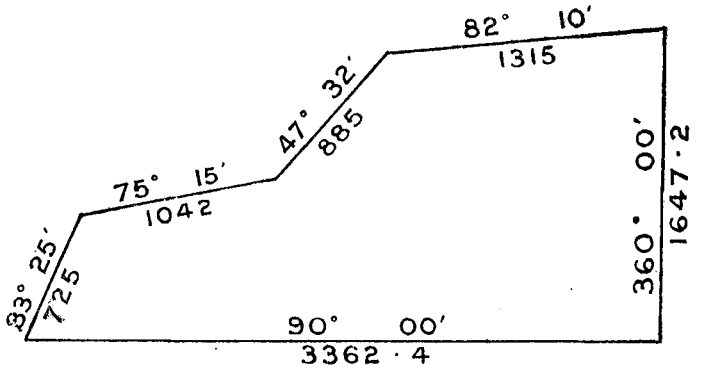
6. State briefly the requirements of the Coal-mines Act and amendments *re*—
   (*a.*) Ventilation of mines and quantity of air.
   (*b.*) Examination of mines before miners enter workings.
   (*c.*) The first duty of miners on entering their working-places.
   (*d.*) The provisions for minimizing the danger from ignition of coaldust owing to blasting or other cause.
   (*e.*) Give brief general outline of duties and responsibilities devolving on the managers of coal-mines and subordinate officers.

   In answering the above the numbers of section in the Act, special rules or regulations applicable, to be given.

SUBJECT V.—*Surveying.*



1. The above diagram shows a traverse survey to fix the position of the boundary-lines AB and BC, with offset to the corner B: compute the bearings and lengths of the boundary-lines AB and BC. (The distances are given in links.)
2. The angles of elevation from A to E and E to C on the above diagram, allowing for height of instrument and signals, are 3° 25′ and 4° 10′ respectively: what is the difference of elevation between the stations A and C in feet?



3. The above diagram shows the survey of a mining claim: compute the area of the claim by the simplest and shortest method known to you. (The distances are given in links.)
4. Describe the methods of transferring the true bearing from the surface to the underground workings of a mine when there is one shaft, and when there are two shafts, giving diagrams.

SUBJECT VI.—*General and Applied Geology.*

1. Define the following terms: Syncline, anticline, unconformity, strike, dip, sedimentary rock, igneous rock. Illustrate your answer by diagrams in the case of the first five terms.
2. Briefly describe the geology of any coalfield with which you are familiar. In your answer give a table showing all the geological formations of the district in proper sequence.
3. Define the various kinds of rock mentioned in your answer to question No. 2.
4. Describe fully the action of running water in its threefold aspect—erosion, transport, and deposition.
5. Explain how strata which have originally been deposited in a horizontal or nearly horizontal position may become tilted, folded, or faulted.
6. Give your views concerning the origin and formation of coal. Illustrate your answer by reference to New Zealand or other coalfields.
7. An area of 980 acres has been shown by boring to contain a horizontal coal-seam, with an average thickness of 10 ft.: calculate the amount of coal in the ground on the basis of 1 cubic foot of coal weighing 80 lb.

8. Coal outcrops at intervals in two New Zealand valleys a mile apart; the overlying strata, sandstone and limestone, appear to be continuous between the two valleys; the outcrops seen are from 6 ft. to 20 ft. thick, with an average of, say, 12 ft.: would you be justified in assuming that workable coal extends through the ground between the valleys? Explain the reasons for your answer, and state what exploration you would undertake before advising a mining company to begin active development.

QUESTIONS FOR MANAGERS' SECOND-CLASS CERTIFICATES OF COMPETENCY.

SUBJECT 1.—*Mining: Opening out a Colliery; Working Coal; Timbering; Boring.*

1. Give sketch of a small section of longwall workings, and of bord-and-pillar workings, showing intake and return air in each.
2. Describe the various forms of timbering used in mines, giving sketches of suitable sets for—
   (*a.*) Places with good roof and soft floor;
   (*b.*) Floor hard, roof and sides weak;
   (*c.*) Show how timber should be set in highly inclined seam.
3. If required to drive towards old workings known to contain water under pressure, describe and show by sketches how you would proceed, giving details of appliances to be used and requirements of the Coal-mines Act.
4. Sketch what in your opinion would be a convenient arrangement of shaft-bottom to deal with 600 tons daily output.
5. On what system would you work a seam of coal 15 ft. thick with tender roof? Explain fully the precautions you would adopt to safeguard the men.
6. What size pillars would you leave to support a shaft 200 yards deep with seam pitching at an angle of 15 degrees?
7. What are the precautions necessary to prevent blown-out shots, and what dangers are to be feared from such occurrences?
8. Do pillar workings demand more attention by mine officials than places advancing in the solid coal, and, if so, why?
9. Under what conditions would you consider coaldust dangerous in mines?

SUBJECT 2.—*Mechanics: Pumping-appliances and Mine-drainage; Tapping Water and Dam-construction in Mines; Winding in Shafts; Hauling on Underground Planes; Compressed-air and Steam-power Plants; Strength of Materials; Elementary Electricity.*

1. What system of haulage do you consider most efficient where large output of coal is required? Give reasons for your preference.
2. What power would be required to haul 500 tons daily over an incline plane 800 yards long with grade against the load of 1 in 6?
3. If required to raise 300 gallons of water per minute to a height of 500 ft., what horse-power would be required, allowing for 65 per cent. efficiency?
4. What are the terms applied to indicate (*a*) electric pressure, (*b*) electric quantity, (*c*) electric resistance? What do you understand is meant by "insulation" in connection with electric plants?
5. What terms are used to indicate the commercial unit of electrical energy?
6. Under what conditions would you consider the installation of electrical power in the underground workings of a coal-mine dangerous?
7. Give your experience in connection with the erection and working of pumping-appliances placed underground.
8. Give sketch of what you consider a useful form of drum for lowering coal on a self-acting incline 20 chains long. Assume suitable grade, and give your estimate of quantity which could be lowered by the arrangement per eight-hours shift.

SUBJECT 3.—*Ventilation: Ventilation of Mines and Knowledge of Mine-gases; Spontaneous Combustion of Coal, and Methods of Dealing with Underground Fires; Rescue Apparatus; Practical Knowledge of Gas-testing with a Safety-lamp.*

1. Indicate briefly the object aimed at in splitting the air in mines.
2. Describe the chemical composition and properties of the various gases met with in coal-mines.
3. What are the chief impediments to the passage of air in mines, and how they can best be removed? What parts of a mine-workings are most easily ventilated?
4. What experience have you had in dealing with mine-fires? Describe how you would deal with an outbreak of this kind, having special regard to the safety of employees.
5. What oil-burning safety-lamps do you consider the best, and state whether in your opinion the electric lamp for miners is in all essentials a safety-lamp?
6. Should the foreman report dangerous conditions owing to gas and dust in a portion of the mine, what precautions should be taken by the manager and underviewer to prevent accident to employees?
7. Why are permitted explosives safer than the usual blasting-powders?
8. Give your experience of the use of blasting-materials, and fully describe the working of the electric system of shot-firing.

SUBJECT 4.—*Arithmetic and Law: A Knowledge of Mine Accounts; Fractions, Decimals, Percentages, Square Root, Area of Rectangle, Trapezoid, Circle, &c.; Measurement of Timber; Calculation of Workable Coal in a Mine, &c.; a Knowledge of the Coal-mines Act and Amendments.*

1. The area of a square being 35·500 square feet, what is the length of its sides ?
2. How much would a miner earn for 11 days' work, filling on an average $4\frac{3}{4}$ tons per day, at 2s. $4\frac{3}{4}$d. per ton ?
3. Multiply $\frac{1}{4}$ of 37 by $\frac{2}{3}$ of 86.
4. In driving a heading 6 ft. 6 in. by 6 ft. by 120 yards long, the men to be paid at 9s. 6d. per cubic yard, how much will the work cost ?
5. How many square yards in a quadrilateral piece of land, one side being 40 yards long, parallel side 60 yards, the sides being 10 yards apart ?

Knowledge of Coal-mines Act.

1. State briefly the provisions of the Coal-mines Act, 1908, and amendments, relating to—
   (*a.*) Ventilation.
   (*b.*) Examination before men enter workings.
   (*c.*) Safety-lamps and their treatment.
   (*d.*) Minimizing dangers from ignition of fire-damp and coaldust.

   In answering above, quote numbers of section or rule referred to.

LIST OF PERSONS WHO HOLD 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.
Binns, G. J., Dunedin.
Bishop, J., Brunnerton.
Cameron, J., Denniston.
Cochrane, N. D., Dunedin.
Collins, W., Taupiri.
Dando, M., Brunnerton.
Gray, J., Abbotsford.
Kerr, G., Kamo.
Lloyd, J., Invercargill.
Love, A., Whangarei.
Mason, J., Nightcaps.
May, J., Greymouth.
Moody, T. P., Kawakawa.
Moore, W. J., Springfield.
Ord, J., Huntly.
Reed, F., Westport.
Shore, T., Orepuki.
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.

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.
Burt, A., Waihi.
Campbell, Peter, Fairfield.
Carruthers, J., Shag Point.
Carson, W., Kaitangata.
Coombe, J., Waihi.
Crockett, S., Millerton.
Crowe, W., Ngakawau.
Davis, O. J., Runanga.
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.
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, Job, Puponga.
Jebson, D., Canterbury.
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.
Mosley, J. T., Kaitangata.
Murray, T., Westport.
Newton, James, Brunnerton.
Parsonage, W., Runanga.
Pearson, W., Waihi.
Penman, A., Huntly.
Scoble, E. J., Waihi.
Smith, George, Fairfield.
Sowerby, H., Denniston.
Talbot, H., Brunnerton.
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.
Hayes, J., Kaitangata.
Hodgson, J. W., Ross.
Reed, F., Wellington.
Tattley, W., Auckland.

Issued to Inspectors of Mines by virtue of Office, under the Coal-mines Acts of 1886 and 1891.

McLaren, J. M., Thames.

Issued under the Coal-mines Acts of 1891, 1905, and 1908, on Production of Certificate from a recognized Authority outside the Dominion.

Alison, J., Mangatini.
Alison, R., Greymouth.
Bayne, J. A. C., Roa.
Clark, W., Blackball.
Davidson, Gavin, Blackball.
Davies, D. J., Ngakawau.
Fletcher, George, Westport.
Frame, Joseph, Kaitangata.
Gillick, J., Kaitangata.
Goold, A. L., Auckland.
Irvine, James, Dunedin.
James, Isaac Angelo, Westport.
Kane, D., Denniston.
Kirkwood, D., Coromandel.
Lamont, J., Devonport.
Lewis, W., Blackball.
Mark, W. S., Kaitangata.
McAvoy, H., Christchurch.
Morris, A., Huntly.
Nelson, E., Hikurangi.
Tennent, R., Brunnerton.
Twining, C. E., Dunedin.
Watson, James, Greymouth.
Watson, John, Blackball.
Wight, E. S., Auckland.
Woods, William, Mokihinui.

Second-class Mine-managers' Certificates.

Issued under the Coal-mines Act, 1891.

Collier, Levi, Kamo.
Clarke, Edward, Shag Point.
Elliot, Joseph, Coal Creek.
Harris, John, Denniston.
Herd, Joseph, Brunnerton.
Howie, James, Kaitangata.
Lobb, Joseph, Mokau
McIntosh, Allan, Shag Point.
McLaren, J. M., Thames.
Murray, Thomas, Denniston.
Radcliffe, William, Reefton.
Sara, James, Reefton.
Smith, Charles, Whangarei.
Thomas, James, Springfield.
Wallace, William, Huntly.
Willetts, John Morris, Papakaio.
Young, William, Waimangaroa.

Issued under the Coal-mines Acts, 1886, 1891, 1905, and 1908, after Examination.

Allan, 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.
Charles, E., Glentunnel.
Cherrie, R. C., Mokau.
Christie, James, Saddle Hill.
Clemo, G., Whangarei.
Craig, John, Coal Creek Flat.
Crockett, S., Millerton.
Dale, E. G., Kaitangata.
Davies, W. C., Huntly.
Dixon, W., jun., Kaitangata.
Doel, G., Lovell's Flat.
Duffy, Frank, Burnett's Face.
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.
Hewitson, W. E. G., Burnett's Face.
Heyes, T., Kaitangata.
Heycock, C. R., Nightcaps.
Hill, R., Abbotsford.
Hodson, John, Kaitangata.
Hughes, Job, Roa.
Hunter, A., Southland.
Kells, F. H., Denniston.
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.
Morganty, Louis, Ngakawau.
Mosley, J. T., Stirling.
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.
Thomson, James, Nightcaps.
Todd, T., Nightcaps.
Waldie, A. B., Mokau.
Watson, A., Soldier's Creek.
Westfield, C., Fairfield, Otago.
Whittlestone, A. W., Shag Point.
Whittlestone, G. F., Abbotsford.

SECOND-CLASS MINE-MANAGERS' CERTIFICATES—*continued.*

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.
Clarkson, S., Kaitangata.
Cross, G., Hikurangi.
Dickinson, W., Gore.
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.
McHardy, A. J., Ferntown.
Moloney, C. V. P., Auckland.
Newburn, F., Roa.
Parsonage, W., Dunollie.
Penman, A., Huntly.
Provan, P., Runanga.
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.
Berry, A. H., Huntly.
Bond, John, Waikaia.
Boustrage, T. Hubert, Brunnerton.
Broome, James, Gore.
Clough, Henry, Millerton.
Davidson, William, Mine Creek.
Davis, William, Runanga.
Donaldson, James, Kaitangata.
Flynn, John, Bannockburn.
Green, Richard, Abbotsford.
Hawthorn, James, Puponga.
Hunter, Peter, Ngakawau.
Johnston, William Crowan, Gore.
Johnstone, Thomas, Denniston.
Levick, Harry, White Cliffs.
Marsh, Charles George, Glentunnel.
Muncaster, William, Runanga.
McAlister, Robert, Kaitangata.
McGrana, 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.

Ainscough, William, Huntly.
Atkinson, John, Puponga.
Bashall, J., Puponga.
Berry, A. H., Huntly.
Boddy, A. J., Rewanui.
Brown, Charles Henry, Denniston.
Carson, F. Kaitangata.
Clark, W. S., State Collieries.
Duffy, F., Burnett's Face.
Dymond, John, Mine Creek.
Griffen, J., Kaitangata.
Hadcroft, John, Dunollie.
Hewitson, W. E. G., Burnett's Face.
Hughes, T. G., Huntly.
Hunter, Peter, Stockton.
Jack, W., Millerton.
Johnston, C. M., Seddonville.
King, T. H., Granity.
Lowden, William, Millerton.
Maher, William, Denniston.
McDonald, Thomas, Ngakawau.
McKernan, John, Millerton.
McLean, Malcolm, Granity.
McLeod, J. G., Millerton.
Morganty, L., Stockton.
Mosley, J. T., Denniston.
Nicholson, D., Huntly.
O'Brien, D. Q., Mangatini.
Peacock, Thomas, Denniston.
Pearson, William, Burnett's Face.
Pendleton, Samuel, Blackball.
Powell, Isaac, Rewanui.
Rogers, James, Ngakawau.
Strongman, C. J., Cobden.
Sweeney, J. L., State Collieries.
Thomson, James, Huntly.
Tucker, J., Kaitangata.
Turnbull, E. V., Thames.
Turner, Alfred, Kiripaka.
Turton, J., Huntly.
White, Edward, Ngaruawahia.
Whittlestone, G. F., Abbotsford.
Williamson, W. R., Rewanui.
Young, Joseph, Huntly.

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.

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Martin, Elias, Ngakawau.
Middleton, Robert, Runanga.

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.
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.
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.
Morganty, Charles, Ngakawau.
Murdoch, Colin McColl, Stirling.
McCaffrey, James, Seddonville.
McCaughern, John, Kaitangata.
McDonald, John T., Millerton.
McGarry, Isaac, Millerton.
McGhee, William, Kaitangata.
McGill, Douglas Thomas, Waikaka.
McGill, John, Huntly.
McKenzie, James, Nightcaps.
Newburn, Robert, Kaitangata.

FIREMEN AND DEPUTIES' CERTIFICATES—*continued.*

Issued under the Coal-mines Amendment Act, 1909—continued.

Newburn, Samuel, Kaitangata.
Nicholas, William, Kaitangata.
Oliver, William, Kaitangata.
Parcell, Henry Clyde, Bannockburn.
Park, Francis, Stirling.
Penman, Robert, Kaitangata.
Richards, James, Brunnerton.
Rodgers, Edwin, Kaitangata.
Sanderson, John, Kurow.
Scott, Charles, Nevis.
Scott, John, Runanga.
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.
Wilson, Walter William, Springfield.
Young, Thomas Gardner, Waikaia.

Issued under the Coal-mines Amendment Act, 1909, after Examination.

Allan, George, Huntly.
Allan, James, Brunnerton.
Anderson, Walter, Blackball.
Armstrong, V., Runanga.
Atkinson, J., Puponga.
Baddeley, Jesse, Dunollie.
Ball, A., Kimihia.
Birchall, J., Burnett's Face.
Blair, Peter, Huntly.
Boddy, Archibald John, Runanga.
Bond, W. T., Huntly.
Brennen, J., Kaitangata.
Broadbent, Samuel, Huntly.
Brown, J., jun., Denniston.
Buchanan, William, Millerton.
Burdon, George, Denniston.
Burt, T., Huntly.
Callaghan, M., Blackball.
Campbell, J. C., Glentunnel.
Carson, Frederick.
Chadwick, A., Millerton.
Chapman, A. E., Kaitangata.
Chippendale, J., Millerton.
Clark, W. S., Dunollie.
Clarke, S., Roa.
Cleveland, F. L., Kaitangata.
Connolly, John, Runanga.
Connolly, John Joseph, Runanga.
Cowan, J., Millerton.
Curragh, A., Burnett's Face.
Curran, James, Ngakawau.
Cuthbertson, John, Glentunnel.
Danks, Peter, Millerton.
Darby, W., Huntly.
Davidson, Thomas, Mine Creek.
Davis, Oliver James, Runanga.
Delaney, J. E., Puponga.
Dinsdale, George, Rewanui.
Dowgray, John, Millerton.
Downes, William Norbury, Cobden.
Duggan, Francis, Runanga.
Dutton, John, Granity.
Dymond, J., Millerton.
Fairhurst, R. W., Huntly.
Fannigan, P., Ngakawau.
Ferguson, A., Kaitangata.
Forrest, John, Runanga.
Gox, Henry John, Blackball.
Gilligan, H., Runanga.
Green, T., Kaitangata.
Griffen, James, Kaitangata.
Hall, R. H., Huntly.
Hall, Thomas, Kaitangata.
Hardie, J., Millerton.
Harvey, D., Huntly.
Hawkins, Joseph, Burnett's Face.
Hendry, John, Millerton.
Hicks, J. R., Kiripaka.
Hill, E. E., Brunnerton.
Hilton, Thomas, Denniston.
Honey, Archibald John, Denniston.
Hopkinson, Joseph, Seddonville.
Hughes, T. E., Huntly.
Innes, Andrew, Runanga.
Isherwood, T., Runanga.
James, F. T., Seddonville.
Johnson, J. H., Hikurangi.
Johnson, Thomas, Huntly.
Jones, B., Millerton.
Jones, J., Hikurangi.
Jones, J., Kimihia.
King, Thomas Henry, Granity.
Lauder, Matt Currie, Runanga.
Lowden, W., Millerton.
McAuley, P., Ngakawau.
McAvoy, William, Ngakawau.
McDonald, J., Ngakawau.
McDonald, Thomas, Burnett's Face.
McGuinness, E., Runanga.
McIvor, David, Runanga.
McKenty, H., Denniston.
McKernan, John, Millerton.
McLaughlin, J. W., Huntly.
McMillan, John, Huntly.
McMillan, John, Kaitangata.
Mackinson, Job, Hikurangi.
Maddison, W., Huntly.
Maher, W., Denniston.
Makepeace, Henry, Runanga.
Martin, T. N., Huntly.
Miles, B. C., Millerton.
Mitchell, A., Seddonville.
Morganti, Louis, Millerton.
Moreland, S., Hikurangi.
Mosley, J. T., Denniston.
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Nicholson, J., State Collieries.
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Nolan, John, Granity.
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O'Brien, Martin, Millerton.
O'Fee, J., Kaitangata.
Parker, Andrew, Greymouth.
Parr, Joseph, Burnett's Face.
Parrott, W., Waiuta.
Paul, James, Seddonville.
Pearson, James Thomas, Mataura.
Pearson, Samuel George, Burnett's Face.
Pearson, William, Burnett's Face.
Pendleton, S., Blackball.
Phillips, J., Puponga.
Ponton, F., Millerton.
Powell, J., Dunollie.
Pratt, Alexander, Millerton.
Ralph, J., Huntly.
Ramsay, J. McK., Kaitangata.
Reed, W. H., Hikurangi.
Reid, Henry, Millerton.
Reid, Henry, Huntly.
Richardson, W., Dunollie.
Robson, W., State Collieries.
Rodgers, J., Ngakawau.
Rogers, A. G., Kaitangata.
Rowse, J., Runanga.
Ruston, Edwin Walter, Huntly
Rutherford, W. R., Kaitangata.
Scott, James, Blackball.
Seddon, William, Huntly.
Sharp, J. R., Kaitangata.
Shore, W. M., Taratu.
Smith, C. B., Dunollie.
Smith, J. A., Seddonville.
Smith, Thomas W., Millerton.
Smith, W. A., Denniston.
Snell, J., Kaitangata.
Southward, William, Runanga.
Strongman, Charles James, Cobden.
Sutherland, J., Millerton.
Sweeney, John Lewis, Runanga.
Tate, Anthony, Seddonville.
Taylor, Christopher, Millerton.
Thawley, William, Denniston.
Thomson, J., Huntly.
Thomson, Thomas, Mine Creek.
Throp, J., Kaitangata.
Tipler, J. H., Blackball.
Tunstall, A. G., Hikurangi.
Tunstall, W., Hikurangi.
Turner, F., Kiripaka.
Turton, John, Huntly.
Unwin, James, Runanga.
Veitch, D., Blackball.
Vurlow, Frederick Alexander, Denniston.
Walker, W. J., Granity.
Wallwork, Moses, Runanga.
Wear, Daniel, Huntly.
Webster, Oliver, Huntly.
White, Edward, Granity.
Williamson, W. R., Rewanui.
Wilson, J. T., Kamo.
Wilson, W., Shag Point.
Woods, A., Millerton.
Wood, W., Huntly.
Worthington, T., Millerton.
Young, Joseph, Huntly.
Young, Thomas, Granity.

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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., Kaitangata.
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.
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Coan, R., Huntly.
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Malcolm, A., Nightcaps.
Quinlan, A. E., ——.
Tucker, J., Kaitangata.

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