1899.

NEW ZEALAND.

THE GOLDFIELDS OF NEW ZEALAND:

REPORT ON ROADS, WATER-RACES, MINING MACHINERY, AND OTHER WORKS IN CONNECTION WITH MINING.

Presented to both Houses of the General Assembly by Command of His Excellency.

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Mr. GEORGE WILSON, Inspecting Engineer, to the Hon. A. J. CADMAN, Minister of Mines.

SIR,— Mines Department, Wellington, 12th May, 1899.

I have the honour to submit my annual report, for the year ending the 31st March last, on the progress of the mining industry, and on different works in connection with the same having a tendency to promote a further development of the mineral wealth of the colony.

SUBSIDISED ROADS AND TRACKS.

The following statement will show the expenditure on subsidy principle authorised for the construction of roads and tracks in the different counties for the year ending the 31st March last, and the liabilities on outstanding authorities on that date:—

Name of Local Body.	Expenditure for the Year ending 31st March, 1899.	Liabilities on Authorities on 31st March, 1899.
	£ s. d.	£ s. d.
Piako County	175 0 0	162 0 0
Coromandel County	250 0 0	550 0 0
Te Aroha Town Board	31 5 0	...
Thames County	39 2 0	155 18 0
Thames Borough	1,043 0 0	45 0 0
Ohinemuri County	894 2 7	825 2 6
Katikati Road Board	153 18 9	5 1 3
Matamata Road Board	...	100 0 0
Picton Road Board	34 0 0	16 0 0
Collingwood County...	...	150 0 0
Pelorus Road Board..	...	30 0 0
Wairau Road Board...	23 3 8	...
Buller County	35 0 0	883 6 8
Inangahua County	...	150 0 0
Grey County	557 5 0	45 15 0
Westland County	25 8 0	47 4 0
Tuapeka County	200 0 0	400 0 0
Taieri County	...	75 0 0
Southland County	575 0 0	80 0 0
Contingencies	150 2 3	...
Totals	4,186 7 3	3,720 7 5

ROADS CONSTRUCTED BY DIRECT GRANTS.

The following statement will show the expenditure and liabilities on authorities issued on roads from direct grants to the several local bodies during the year ending the 31st March, 1899 :—

Name of Local Body.	Expenditure for the Year ending 31st March, 1899.	Liabilities on Authorities on 31st March, 1899.
	£ s. d.	£ s. d.
Te Aroha Borough	200 0 0	...
Te Puke Road Board	...	...
Matamata Road Board	...	...
Bay of Islands County	...	...
Whangarei County	180 0 0	120 0 0
Tauranga County	696 17 5	1,050 0 0
Coromandel County	2,650 0 0	4,300 0 0
Thames County	3,410 12 9	2,695 15 3
Ohinemuri County	3,374 18 2	2,341 4 0
Piako County	...	450 0 0
Pelorus Road Board	97 3 6	461 11 3
Collingwood County	1,273 6 0	2,371 14 0
Wairau Road Board	149 4 7	1,100 0 0
Waimea County	250 0 0	600 0 0
Buller County	4,300 0 0	3,650 0 0
Inangahua County	2,490 17 6	2,060 16 6
Grey County	5,139 15 6	2,742 4 6
Westland County	1,388 7 8	1,417 2 4
Ross Borough Council	160 1 3	100 0 0
Wallace County	250 0 0	250 0 0
Taieri County	500 0 0	...
Lake County	750 0 0	3,344 0 0
Southland County	...	200 0 0
Tuapeka County	2,595 12 0	1,275 0 0
Vincent County	350 0 0	1,050 0 0
Land and Survey Department	8,610 10 10	9,476 10 11
Public Works Department	3,566 1 10	963 10 3
Totals	42,383 9 0	42,019 9 0

PROSPECTING FOR GOLD.

The following statement will show the expenditure and liabilities on authorities issued in subsidies to prospecting associations and parties of miners recommended by the local bodies in the different counties for the year ending the 31st March last :—

Name of County.	Expenditure for Year ending 31st March, 1899.	Liabilities on Authorities on 31st March, 1899.
	£ s. d.	£ s. d.
Bay of Islands County	83 7 3	...
Manukau County	10 10 0	...
Coromandel County	101 10 0	48 10 0
Tauranga County	6 0 0	100 0 0
Buller County	...	90 0 0
Grey County	120 5 6	200 2 0
Inangahua County	114 9 9	...
Westland County	1,550 15 7	578 14 1
Selwyn County	13 10 0	...
Tuapeka County	106 19 0	86 7 0
Southland County	36 7 0	...
Totals	2,143 14 1	1,103 13 1

SCHOOLS OF MINES.

The technical instruction imparted at the various schools of mines throughout the colony is still taken advantage of by a large number of students, notwithstanding the falling-off in the attendance at Reefton and the Thames Schools as compared with that of the preceding year.

The permanent character of operations which have been carried on in several of the mining centres will, however, in the future maintain a more numerous and settled population, and considerable numbers of students will be enabled to take advantage of the technical and practical instruction afforded at the different schools. The present indications point to a continuation of the attendance, and the success of these institutions, which have already done so much for the students in the various fields is assured. Many of the ex-students now occupy leading positions as mine-managers and battery-superintendents, not only in New Zealand, but in many parts of the Australian Colonies and Tasmania.

The schools at which regular classes have been held are the Thames, Waihi, and Coromandel, in the North Island; Westport and Reefton, in the West Coast District of the Middle Island; and Otago University, at Dunedin.

The serious depreciation in the attendance and general lack of interest evinced in connection with the work carried on at the Reefton School for some time past induced the Government to obtain a special report on the condition of affairs; and on the resignation of Mr. R. M. Aitken, who was Director of the school since its inception, it was decided not to reappoint a Director, and that future operations must be carried on under the management of the local committee, subsidies being granted on similar lines to those given to the newly established schools in the Hauraki district.

The school at Nelson is conducted by Mr. Worley, one of the teachers, and is in conjunction with the Central State School. There are other schools, at Kuaotunu and Karangahake, in the North Island, where instruction is imparted at intervals by voluntary instructors and members of the committees; whilst at Denniston, Boatman's, Kumara, and Ross, on the west coast of the Middle Island, and at Miller's Flat and Waipori, in Otago, active work has not been carried on for some time past.

Full particulars are given in the several annual reports which follow:—

THAMES SCHOOL.

Mr. F. B. Allen, M.A., B.Sc., Director of the Thames School of Mines, reports as follows:—

The school has had a busy and successful year, and, although the total number of individual students was less than during the preceding twelve months, the average attendance at each of the classes has been satisfactory, and the results obtained good.

Two changes have been made in the staff. In December, 1898, Mr. W. A. MacLeod, B.Sc., who had discharged the arduous duties of assistant for seventeen months with much credit and success, was offered a lucrative appointment at the Hobart University; and Mr. W. H. Baker, a former student at the Thames School of Mines was appointed as his successor. Mr. Baker proved himself an excellent student. He gained a university scholarship from this school, and studying at the Otago University and the Auckland University College he has gained the degree of Bachelor of Science. During the short time he has held the position of assistant he has shown himself thoroughly qualified, and will, I am sure, discharge his duties in an entirely satisfactory manner.

In June, 1898, Mr. R. B. Vercoe, who for three years and a half had acted as amalgamator and cyanider in the school experimental plant, and had proved himself thoroughly reliable and efficient, accepted the position of battery-manager of the Monowai battery and cyanide plant. While at the school Mr. Vercoe took classes and obtained the Government battery-superintendent's certificate by examination. His position was filled by Mr. P. Grayden, who has also proved himself a capable battery-manager, and has given every satisfaction.

The average number of registered students during 1898–99 was sixty-four, while the average number of individual students attending the school for the same period was 129. This is lower than for the two previous years, when the mining boom was at its height, but the institution has now just about as many students as it can conveniently accommodate without overcrowding, and, as the students now on the roll attend more regularly than formerly, the attendance is quite satisfactory. The fact of there being one school at Waihi and another at Coromandel, and the possibility of obtaining employment near to them, tend to decrease the number of students here, where work is difficult to obtain.

During the past year a considerable number of students have been compelled to leave the district in search of employment, and work is still scarce in the immediate neighbourhood of the institution. Still, it is gratifying to note that the attendance for the first term of 1899 is equal to that of the last term of 1898, and all the more so because the first term of each year is the one usually least well attended.

During 1898 thirty-nine first-class and seventeen second-class mine-managers' certificates were granted in this district without examination to holders of service certificates, and, as this principle is opposed to that of requiring candidates to study at a school of mines and gain a certificate by examination, the result may reasonably be expected to be a falling-off in the number of mining men who attend the school with the object of working up for the examination. Nevertheless, it cannot

be questioned that every mining-man, including those who have been granted certificates without examination, would benefit by a school-of-mines training, and those now working on the field should view matters in this light, and take advantage of the instruction given at the mining classes of the institution.

The following table shows the number of public assays performed during the last twelve months :—

Number of public assays	209
Number of assays in connection with ton-parcels of ore	320
Total assays	529

Most of the samples for assay came from various places in both Islands, at a distance from the Thames. A large number of mines on the peninsula now employ their own assayers, and consequently fewer samples find their way to the school laboratory than formerly.

The separate assay-room for the conduct of public assays, which was built at the end of 1897, has now had fifteen months' trial, and has proved a complete success. It is kept entirely distinct from the laboratory and assay-room used for the instruction of students, and enables public assays to be carefully and accurately performed with a minimum of labour. All public assays are done in duplicate by the assistant lecturer, and every precaution is taken to insure accuracy. It is noteworthy that the majority of assays this year have had a low range in value, many of them showing less than 1s. per ton. Every assay conducted at the Thames School is made in duplicate, in order that, besides the special care taken in manipulation, there may be an independent check on the results.

Besides the usual gold and silver fire-assays, a number of determinations were made on ores of copper and antimony, ferro-manganese, cinnabar, shale, and carbonaceous clay. Various tests were also made in the laboratory as to the applicability of the cyanide process for the extraction of gold and silver, and a series of experiments with the same object were made with the permanganate (chlorination) process introduced by Dr. Black. In the latter the extractions were high, provided that great care was given to obtaining a suitable dead-roast, so as to remove all the sulphides, sulphates, &c., which rapidly deoxidize the solution used, and render the process of no avail.

The alterations completed in the battery twelve months ago have proved a great saving of labour in the actual working of the plant, and have enabled parcels of ore to be treated more expeditiously and satisfactorily than ever before. Although not working up to its full capacity, the plant has been busy with the experimental treatment of test-parcels of ore. Fifty-three parcels, of an aggregate weight of 61,476 lb., or approximately 27½ tons, have been tested, viz.: twenty-eight parcels, aggregating 40,850 lb., by pan-amalgamation; nine parcels, aggregating 10,840 lb., by the cyanide process; and sixteen miscellaneous lots, weighing 9,786 lb., the details of which are given in a tabulated statement further on. The average percentage saving by pan-amalgamation was 82·6 per cent., and by cyanide 63·4 per cent.—much the same as the averages for the two preceding years. The total value of bullion won amounted in round figures to £230, the whole of which was returned to the owners of the respective parcels.

In several instances low extractions have been obtained, but it will be understood that when ore is sent in to the school for treatment it is sometimes accompanied by a request to treat in a particular manner. In such cases arrangements are usually made with the owner that half the parcel shall be treated by the method proposed, and if that is not successful the remainder is tested by other processes at the discretion of the Director. In this way much valuable information is obtained concerning the ore and the proper mode of treatment, especially as in every case of low extraction the ore is subjected to a chemical analysis to determine the nature and quantity of the injurious substance present.

Of the nine parcels treated by the cyanide process, two consisted of tailings, and the extractions were satisfactory. The remaining parcels were quartz, but not one of them gave returns sufficiently encouraging to warrant the process being adopted at the mine. In the majority of cases a certain percentage of coarse gold was present which could not be saved by cyanide treatment, and would necessitate the erection of an amalgamation plant. In the case of the Wentworth, in which an actual bullion extraction of 89·6 per cent. was obtained from an ore worth nearly £20 per ton, this was possible only after a chloridizing roast. Looking at the results of the cyanide tests as a whole for the past few years, it is evident that very few indeed of the ores sent to the school are adapted to direct cyanide treatment. Some required preliminary roasting, others contained coarse gold; and the conclusion is that for similar ores amalgamation plants will have to be erected. In many cases, however, the cyanide process would prove a suitable method of treating the resulting tailings.

Appended hereto is a tabulated statement showing the method of treatment, percentage extraction, and other details relating to the different parcels treated by amalgamation and cyanide.

When the new machinery was erected it was found that the Pelton wheel would not develop power sufficient to drive the pans, &c., when the stamps were running at a high speed, and after a series of experiments by Mr. Parr, B.Sc., and myself it was determined to change the 16 in. driving-pulley for a 21 in. This worked splendidly, and enabled the stamps to be run, if necessary, up to a hundred drops per minute when the other machinery was in motion. (I am forwarding a diagram to illustrate the horse-power developed by a Pelton.)

It is noteworthy that the output of the three stamps is double of that of the previous two-head, and this is explained by the better movement of the pulp in the mortar-box when the odd number of stamps are used.

During the year two meetings of the New Zealand Institute of Mining Engineers have been held at the school, the students gladly availing themselves of the permission to be present. On the 28th June, 1898, Mr. H. A. Gordon, F.G.S., read a paper on "The Source of Gold and other Metals"; and on the 7th March, 1899, Mr. James Park's presidential address, and a paper on "Timbering," by Mr. Robert James, manager of the New Alburnia, were read. All the papers were highly appreciated.

A large number of geological excursions have been made during the last twelve months, both underground into the mines and across country. In the latter case the journeys were made on foot, on horseback, in brakes, and on bicycles, according to circumstances, and many illustrations of the geological features of the district were noted by the students. These excursions are always well attended, and are a valuable aid to the class-work.

Plans and specifications for a School of Mines Mineral Museum have been prepared, and are to be shortly submitted to the department for approval. It is intended to build a large hall, with office and storeroom, on the vacant ground facing Beach Road, which, while forming a handsome addition to the present buildings, will serve an extremely useful purpose. The collection, suitable arrangement, and display of the rocks and minerals characteristic of the district are important matters, and will prove of great assistance to the prospector and the mining community generally.

The museum will be open to the public as well as to the students, and, as the number of specimens increases from year to year, the value of the institution will become progressively greater. Already a large number of samples have been collected, and are in readiness for the new building, and, by exchanges with other districts, it is hoped that minerals representative of other parts of the world will be obtained, and form a feature of the museum.

Thanks are due to the following gentlemen for donations of rock-samples and minerals, viz.: Mr. Alexander McKay, F.G.S., for a large collection of Westland and Hauraki Peninsula rocks; Mr. Richards, Assistant Inspector of Mines, for rock-samples from Westland; Mr. Stevens, for a valuable collection of about a hundred mineral- and rock-samples from Tasmania; Mr. Morgan, for a number of Otago rocks and fossils; Mr. K. M. Barrance, for Otago rocks and fossils; and also to Mr. H. Rabe, for a working model, about 8 ft. high, of poppet-legs and patent safety-cage, exhibited in the Auckland Exhibition.

During the last year I have personally collected some hundreds of rock-samples, mineral specimens, and crystals. A collection of several hundred fossils representative of the different geological formations has been obtained as an addition to the samples used for illustrating the lectures in geology.

The number of students attending the classes during the different terms is given in the following tabulated statement:—

TABLE of ATTENDANCES for Year ending 31st March, 1899.

Name of Subject.	1898.			1899.
	First Term.	Second Term.	Third Term.	First Term.
General and mining geology	12	15	8	8
Mineralogy and blowpipe analysis	13	14	9	8
Land- and mine-surveying	31	33	24	14
Mathematics	11	11	11	11
Mining and applied mechanics	29	32	24	14
Metallurgy of gold and silver	...	...	12	...
Practical chemistry	22	29	20	24
Theoretical chemistry	20	23	17	22
Practical assaying	40	42	28	28
Mechanical drawing	21	21	19	20
Mineralogy and geology (combined course)	14	15	...	...
Total	213	235	172	149
Saturday science class	65	73	45	76
Total attendance at classes	278	308	217	225
Individual registered students	72	83	56	54
Total individual students	137	156	101	130

The annual examinations were held in December, 1898, the papers being set and examined by the following examiners appointed by the Mines Department: Mr. George Wilson, Inspecting Engineer; Mr. H. A. Gordon, F.G.S.; Mr. Alexander McKay, F.G.S., Government Geologist; Mr. William Skey, Government Analyst; Mr. C. H. Pierard; and the Surveyor-General.

Thirty-one candidates presented themselves for examination in eighty-one subjects, and of the certificates granted 41 per cent. were first class; 31 per cent. second class, and 21 per cent. third class.

Mr. E. J. Banks was awarded the President's medal for the highest aggregate in all subjects. His average was 84 per cent., a very creditable performance.

Two candidates for the School of Mines University scholarship were sent up by the Thames School, and one of them—Mr. W. Donovan—secured first place and a scholarship, with an average of 89 per cent. Mr. Banks took second place, and was equal with Mr. Barrance, an old Thames student, who competed for the Otago scholarship.

The former holders of the school of Mines scholarship—viz., Messrs. McLaren and Baker, both of the Thames School of Mines—have received notice that they have this year gained their University degree. Moreover, each of them has gained a Senior University scholarship, one of the chief honours of the University; and that two such prizes as Senior University scholarships should be carried off in the same year by former pupils of this school, while speaking well for the ability and industry of those pupils, shows that the School of Mines scholarships have been worthily bestowed, and have enabled the holders to obtain a valuable University training.

The following table shows the results of the late examinations:—

RESULTS OF ANNUAL EXAMINATIONS, 1898.

Subject of Examination.	First Class.	Second Class.	Third Class.	Failed.	Total.
General and mining geology	1	2	1	1	5
Pumping and winding	1	1	...	...	2
Ventilation and explosives	2	1	...	...	3
Mining and applied mechanics	2	2	...	...	4
Theoretical chemistry (senior)	2	...	1	..	3
Theoretical chemistry (junior)	1	...	...	...	1
Practical chemistry (senior)	2	...	2	...	4
Practical chemistry (junior)	...	2	...	...	2
Practical assaying, dry (senior)	5	6	...	...	11
Practical assaying, dry (junior)	3	2	...	...	5
Practical assaying, wet (senior)	2	4	...	...	6
Surveying (land and mine)	2	...	4	...	6
Map-drawing	1	2	3	...	6
Mineralogy and blowpipe	...	...	2	...	2
Drawing	3	1	1	...	5
Metallurgy	3	1	2	1	7
Science class for schoolboys	3	1	1	4	9
Totals	33	25	17	6	81

During 1898 the following Government certificates were granted to Thames School of Mines students after examination: Six first-class mine-managers' certificates, nine battery superintendents' certificates: making a total for the Thames School up to the end of 1898 of forty-one first-class mine-managers' and nineteen battery superintendents' certificates.

In January, 1899, I supervised the annual Government examination for which there were twenty-three candidates. Eleven of these were Thames students, six sitting for battery superintendents', one for first-class coal-mine manager's, and four for first-class mine-managers' certificates, but the results are not yet available.

The following table shows the details of the experimental tests made on the different parcels of ore forwarded to the school battery for treatment. The determinations in connection with these trial parcels—viz., the assays, melting, and valuation of bullion, &c.—are all done by the Director and the Assistant, in order that accuracy may be insured. Students, however, are permitted, subject to the Director's control, to work in the plant, and are thus enabled to acquire much useful knowledge of the practical details of ore-treatment. Several students have rendered valuable assistance to me in the battery, and I gratefully acknowledge the willing help of Messrs. Banks, Donovan, Graham, Finn, Ferguson, and McLean:—

TABULATED STATEMENT showing PARCELS of ORE treated at Thames School of Mines Experimental Plant during 1898–99.

Name of Mine or Owner and District.	Description of Ore.	Weight of Ore.	Assay-value of Ore per Ton.			Bullion saved.	Value per Ounce.	Percentage saved.		
			Gold.	Silver.	Value.			Gold.	Silver.	Value.
A.—BY PAN-AMALGAMATION.										
		Lb.	Oz. dwt. gr.	Oz. dwt. gr.	£ s. d.	Oz. dwt. gr.	£ s. d.			
Caledonian, Nenthorn ...	Rusty-coloured and clayey, with strings of quartz	2,300	0 2 12	0 0 21	0 10 1	0 3 6	2 17 11	90·8	91·3	90·9
H. Gordon, Tairua ...	Grey-earthy, with little quartz	1,280	0 2 0	0 1 6	0 8 1½	0 1 14	2 11 0	87·1	80·2	86·9
H. Gordon, Tairua ...	Fine earthy rubble, with little quartz ...	1,200	0 3 0	0 1 21	0 12 2	0 2 7	2 10 7	88·9	83·3	88·8
H. Gordon, Tairua ...	Hard flinty quartz, mullocky	1,180	0 3 3	0 2 0	0 12 8½	0 2 8	2 9 9	86·7	82·3	86·5
H. Gordon, Tairua ...	Hard and flinty	410	0 5 1	0 3 18	1 0 6½	0 1 8	2 9 6	88·1	74·3	87·7
H. Gordon, Tairua ...	Earthy, with a little flinty quartz	750	0 1 21	0 1 6	0 7 7½	0 0 20	2 9 0	79·9	78·4	79·8
H. Gordon, Tairua ...	Grey decomposed country, with quartz stringers	1,900	0 12 14	0 8 19	2 11 2	0 18 13	2 1 10½	89·2	90·8	89·2
Chicago, Thames ...	White and glassy quartz and iron-pyrites ...	910	0 3 0	0 1 21	0 12 2	0 1 15	2 11 11	83·6	79·4	83·6
Chicago (south drive) ...	White quartz, with iron-pyrites	1,120	1 6 11	0 15 3	5 7 4	0 18 18	2 10 4½	88·0	89·9	88·0
Chicago (north drive) ...	White quartz, FeS_2, and andesite	1,120	0 18 22	0 11 7	3 16 9	0 13 0	2 9 9	84·2	85·8	84·2
Progress Castle Rock ...	Blue quartz, with Fe and As pyrites	1,800	0 6 17	0 3 18	1 7 3	0 7 12	2 10 11	87·3	88·8	87·2
Progress Castle Rock ...	Blue quartz, with Fe and As pyrites ...	1,380	0 10 2	0 5 16	2 0 11	0 8 12	2 11 6½	87·0	83·0	86·9
E. Godsal, New Plymouth	Quartz stringers, in brown-and-blue mottled country	2,000	0 1 1	0 0 12	0 4 2	0 1 3	2 13 7	79·5	84·7	80·0
E. Godsal, New Plymouth	Blue mottled country, with quartz stringers ...	2,800	0 0 7	0 0 5	0 1 2	0 0 12	...	...	...	...
Young New Zealand ...	White quartz and dense iron-pyrites	900	1 5 5	0 17 13	5 2 7	0 9 0	2 5 4½	49·4	55·4	49·5
Waitaia, Kuaotunu ...	Hard white quartz, mineralised	910	0 1 14	0 1 6	0 6 5½	0 1 0	2 5 1½	85·8	88·0	85·8
Mahara Royal, Tapu ...	Pyritous tailings, acid and clayey	1,800	0 6 7	0 5 21	1 5 9	0 7 12	2 3 5½	78·9	72·7	78·8
H. Gordon, Tairua ...	White quartz, with blue veins	1,420	11 19 12	44 7 6	52 6 8	30 5 0	0 19 9	90·9	80·9	90·0
Waitaia, Kuaotunu ...	Hard white quartz, mineralised	1,200	0 18 19	0 18 19	3 17 0½	0 17 22	1 18 9	84·1	87·1	84·1
J. Hope, Waitekauri ...	Hard white quartz, oxidized	1,200	0 7 3	1 0 4	1 10 6	0 7 0	1 18 7	86·2	32·2	82·6
E. Wigmore, Puru ...	Clay, with quartz stringers	2,000	0 1 21	0 2 0	0 7 8½	0 2 17	2 0 5	79·9	73·8	79·6
E. Wigmore, Puru ...	Hard white quartz, with clay	2,240	0 3 18	0 4 0	0 15 5	0 7 0	2 0 4	91·8	86·1	91·5
Top Valley, Blenheim ...	Hard white quartz	1,080	0 15 3	0 4 9	3 0 11	0 8 14	3 1 8	90·1	90·7	90·1
Top Valley, Blenheim ...	Hard white quartz	910	2 6 15	0 7 13	9 7 3	1 0 0	3 7 5	88·6	83·8	88·6
Wentworth, Whangamata	White quartz, with iron-pyrites and arsenic ...	1,940	4 18 8	3 14 9	20 0 9	4 0 10	2 5 5	52·6	53·5	52·6
Wentworth, Whangamata	White quartz, with pyrites and arsenic ...	840	4 10 18	3 15 15	18 10 6	1 16 6	2 4 7	58·6	37·8	58·2
J. McIsaac, Mercury Bay	Brown-and-black rubble, little quartz ...	3,360	11 14 9	2 11 6	47 2 8	21 9 0	3 3 10	97·5	89·3	97·5
Three Sisters, Tapu ...	Rotten quartz, with brown iron-oxides ...	900	0 16 9	5 13 12	3 16 10	1 1 0	1 4 4	91·8	30·9	82·8
B.—BY CYANIDE.										
H. Reynolds, Coromandel	Blue quartz, with Fe and As pyrites	600	0 8 19	0 4 10	1 15 7	0 2 0	2 12 8	55·1	56·3	55·2
Keep-it-Dark, Reefton ...	Tailings	1,600	0 2 12	...	0 10 0	0 1 2	3 18 0	60·3	...	60·3
Young New Zealand ...	White quartz and dense pyrites	900	1 5 5	0 17 13	5 2 7	0 13 12	2 10 4	82·6	71·9	82·4
Waitaia	Hard white quartz, mineralised	900	0 1 6	0 1 3	0 5 1	0 0 20	2 3 4	79·3	77·8	79·3
Mahara Royal	Tailings, acid and clayey	1,700	0 6 7	0 5 21	1 5 9	0 7 0	2 2 2	75·5	74·7	75·5
Waitaia	Hard white quartz, mineralised	1,200	0 18 19	0 18 19	3 17 0½	0 5 5	2 1 3½	39·1	36·3	39·0
J. Hope, Waitekauri ...	Hard, and oxidized	900	0 7 3	1 0 4	1 10 6	0 7 12	1 0 9	63·2	67·9	63·5
Wentworth, Whangamata	Clean quartz, with pyrites and arsenic ...	2,240	4 3 4	3 10 14	16 19 8	1 12 12	2 13 8	25·9	13·8	25·6
Wentworth, Whangamata	Clean quartz, with pyrites and arsenic ...	800	4 15 19	3 18 3	19 11 0	2 6 22	2 13 4	90·4	50·5	89·6

The following parcels were treated in berdans :—

—	Owner.	District.	Weight in Pounds.	Retorted Bullion.	Value per Ounce.
				Oz. dwt. gr.	£ s. d.
1	J. Adams ...	Thames ...	450	0 10 0	2 15 0
2	W. Marris ...	Thames ...	500	20 5 0	0 12 0
3	Hon. Mr. McCullough	Thames ...	6	0 17 4	3 0 9

The following were crushed in the battery preparatory to treatment, but after the assay-value had been obtained the treatment was discontinued :—

—	Owner.	District.	Weight in Pounds.	Assay-value.
				£ s. d.
1	E. Isaac	Te Parenga ...	300	0 1 0
2	E. Isaac	Te Parenga ...	560	0 1 1
3	Albert, G. M.	Tairua	1,000	1 5 7
4	Albert, G. M.	Tairua	1,000	0 10 6
5	E. Isaac and Thomson...	Te Parenga ...	200	Nil.
6			200	
7			200	
8	H. Reynolds	Coromandel ...	2,000	1 0 5
9	H. Reynolds	Coromandel ..	2,000	0 10 2
10	Te Puke Reefs ...	Te Puke ...	135	0 17 7
11	Te Puke Reefs ...	Te Puke ...	135	0 8 5
12	Waitara	..	1,200	Nil.
13	Waitara	...	900	Nil.

A parcel of 109½ oz. of amalgam from the Chicago Gold-mining Company, Tararu Creek, Thames, was retorted at the school for a yield of 24 oz. 7½ dwt. of bullion, worth £2 15s. per ounce.

Work performed by Students.

A large number of analyses have been made by the students, the Director, and his Assistant (Mr. W. A. MacLeod), and among them the following may be noticed as of interest :—

Crystals from Una Hill (analysed by Mr. W. A. MacLeod).

Carbonate of iron, 18·7 per cent.; carbonate of magnesia, 25·9 per cent.; carbonate of lime, 55·2 per cent.: total, 99·8 per cent. This was a milky-white specimen crystallizing in rhombohedrons, and affording excellent examples of twinning. The usual name given to the specimen on this field is calcite. It is sometimes called pearlspar, but, containing as it does a large percentage of carbonate of iron, it is rather ankerite, a mixture of brown and pearl spar. The samples on exposure rapidly weather and turn brown, due to the iron they contain.

Waitekauri Quartz.

SiO_2, 87·75 per cent.; MuO_2, 1·83 per cent.; Fe_2O_3, 4·54 per cent.; Al_2O_3, 5·01 per cent.; cobalt, trace; nickel, doubtful: total, 99·13 per cent. From this quartz, which was the ordinary material going to the battery, the cyanide process extracted an appreciable quantity of cobalt, which coloured the slags in the melt a deep blue, and caused a certain amount of trouble.

Mineral found 450ft. below sea-level, Thames (analysed by Mr. W. H. Baker, and Mr. K. M. Graham.)

MgO, 14·1 per cent.; MnO, 3·8 per cent.; H_2O, 49·2 per cent.; SO_3, 32·5 per cent.: total 99·6 per cent. Name: Epsomsite, containing manganese. This was bitter to the taste, coloured a faint-reddish colour, due to the manganese, and was found in incrustations 2 in. or 3 in. in thickness. The mineral is soft, H. about 2½, and effloresces on the outside. It is completely soluble in water.

Mineral found at Waitekauri (analysed by Mr. F. B. Allen).

This mineral was found in thin incrustations, with a mammillary structure, and in some instances an appearance of stalactitic forms. Resinous, brown, and honey-yellow in colour; soft and brittle. Powder white—It proved to contain on analysis Al_2O_3, 40·2 per cent.; SiO_2, 22·7 per cent.; H_2O, 36·6 per cent.: total 99·5 per cent. Name: Allophane.

Bullion Table.

Herewith I forward a table for ascertaining the value of any kind of bullion by an inspection of the tables, obviating the necessity of making an arithmetical calculation for every degree of fineness as it occurs. The prices given by the banks at the Thames are £4 per ounce for gold, and 2s. per ounce for silver, and the tables have been constructed accordingly :—

GOLD BULLION.—Value per Ounce for a Given Fineness in Gold (taking Gold at £4 per Ounce).

—	0d.	1d.	2d.	3d.	4d.	5d.	6d.	7d.	8d.	9d.	10d.	11d.
£ s.												
0 0	0000	0010	0021	0031	0042	0052	0063	0073	0083	0094	0104	0115
0 1	0125	0135	0146	0156	0167	0177	0188	0198	0208	0219	0229	0240
0 2	0250	0260	0271	0281	0292	0302	0313	0323	0333	0344	0354	0365
0 3	0375	0385	0396	0406	0417	0427	0438	0448	0458	0469	0479	0490
0 4	0500	0510	0521	0531	0542	0552	0563	0573	0583	0594	0604	0615
0 5	0625	0635	0646	0656	0667	0677	0688	0698	0708	0719	0729	0740
0 6	0750	0760	0771	0781	0792	0802	0813	0823	0833	0844	0854	0865
0 7	0875	0885	0896	0906	0917	0927	0938	0948	0958	0969	0979	0990
0 8	1000	1010	1021	1031	1042	1052	1063	1073	1083	1094	1104	1115
0 9	1125	1135	1146	1156	1167	1177	1188	1198	1208	1219	1229	1240
0 10	1250	1260	1271	1281	1292	1302	1313	1323	1333	1344	1354	1365
0 11	1375	1385	1396	1406	1417	1427	1438	1448	1458	1469	1479	1490
0 12	1500	1510	1521	1531	1542	1552	1563	1573	1583	1594	1604	1615
0 13	1625	1635	1646	1656	1667	1677	1688	1698	1708	1719	1729	1740
0 14	1750	1760	1771	1781	1792	1802	1813	1823	1833	1844	1854	1865
0 15	1875	1885	1896	1906	1917	1927	1938	1948	1958	1969	1979	1990
0 16	2000	2010	2021	2031	2042	2052	2063	2073	2083	2094	2104	2115
0 17	2125	2135	2146	2156	2167	2177	2188	2198	2208	2219	2229	2240
0 18	2250	2260	2271	2281	2292	2302	2313	2323	2333	2344	2354	2365
0 19	2375	2385	2396	2406	2417	2427	2438	2448	2458	2469	2479	2490
1 0	2500	2510	2521	2531	2542	2552	2563	2573	2583	2594	2604	2615
1 1	2625	2635	2646	2656	2667	2677	2688	2698	2708	2719	2729	2740
1 2	2750	2760	2771	2781	2792	2802	2813	2823	2833	2844	2854	2865
1 3	2875	2885	2896	2906	2917	2927	2938	2948	2958	2969	2979	2990
1 4	3000	3010	3021	3031	3042	3052	3063	3073	3083	3094	3104	3115
1 5	3125	3135	3146	3156	3167	3177	3188	3198	3208	3219	3229	3240
1 6	3250	3260	3271	3281	3292	3302	3313	3323	3333	3344	3354	3365
1 7	3375	3385	3396	3406	3417	3427	3438	3448	3458	3469	3479	3490
1 8	3500	3510	3521	3531	3542	3552	3563	3573	3583	3594	3604	3615
1 9	3625	3635	3646	3656	3667	3677	3688	3698	3708	3719	3729	3740
1 10	3750	3760	3771	3781	3792	3802	3813	3823	3833	3844	3854	3865
1 11	3875	3885	3896	3906	3917	3927	3938	3948	3958	3969	3979	3990
1 12	4000	4010	4021	4031	4042	4052	4063	4073	4083	4094	4104	4115
1 13	4125	4135	4146	4156	4167	4177	4188	4198	4208	4219	4229	4240
1 14	4250	4260	4271	4281	4292	4302	4313	4323	4333	4344	4354	4365
1 15	4375	4385	4396	4406	4417	4427	4438	4448	4458	4469	4479	4490
1 16	4500	4510	4521	4531	4542	4552	4563	4573	4583	4594	4604	4615
1 17	4625	4635	4646	4656	4667	4677	4688	4698	4708	4719	4729	4740
1 18	4750	4760	4771	4781	4792	4802	4813	4823	4833	4844	4854	4865
1 19	4875	4885	4896	4906	4917	4927	4938	4948	4958	4969	4979	4990
2 0	5000	...	...	...	...	...	...	...	...	...	...	...

SILVER BULLION.—Value per Ounce for a Given Fineness in Silver (taking Silver at 1s. 9d. per ounce).

—	0d.	1d.	2d.	3d.	4d.	5d.	6d.	7d.	8d.	9d.	10d.	11d.
£ s.												
0 0	0000	0476	0952	1429	1905	2381	2857	3333	3810	4286	4762	5238
0 1	5714	6190	6667	7143	7619	8095	8571	9048	9524	1·0000	...	...

Example: Required the value of bullion 0·4907 fine in gold and 0·4761 fine in silver when gold is £4 per ounce and silver 1s. 9d. per ounce.

	£ s. d.
Gold, 0·4907	1 19 3
Silver, 0·4761	0 0 10
Value of bullion	£2 0 1 per ounce.

GOLD BULLION.—Value per Ounce for a Given Fineness in Gold (taking Gold at £4 per Ounce).

—	0d.	1d.	2d.	3d.	4d.	5d.	6d.	7d.	8d.	9d.	10d..	11d.
£ s.												
2 0	5000	5010	5021	5031	5042	5052	5063	5073	5083	5094	5104	5115
2 1	5125	5135	5146	5156	5167	5177	5188	5198	5208	5219	5229	5240
2 2	5250	5260	5271	5281	5292	5302	5313	5323	5333	5344	5354	5365
2 3	5375	5385	5396	5406	5417	5427	5438	5448	5458	5469	5479	5490
2 4	5500	5510	5521	5531	5542	5552	5563	5573	5583	5594	5604	5615
2 5	5625	5635	5646	5656	5667	5677	5688	5698	5708	5719	5729	5740
2 6	5750	5760	5771	5781	5792	5802	5813	5823	5833	5844	5854	5865
2 7	5875	5885	5896	5906	5917	5927	5938	5948	5958	5969	5979	5990
2 8	6000	6010	6021	6031	6042	6052	6063	6073	6083	6094	6104	6115
2 9	6125	6135	6146	6156	6167	6177	6188	6198	6208	6219	6229	6240
2 10	6250	6260	6271	6281	6292	6302	6313	6323	6333	6344	6354	6365
2 11	6375	6385	6396	6406	6417	6427	6438	6448	6458	6469	6479	6490
2 12	6500	6510	6521	6531	6542	6552	6563	6573	6583	6594	6604	6615
2 13	6625	6635	6646	6656	6667	6677	6688	6698	6708	6719	6729	6740
2 14	6750	6760	6771	6781	6792	6802	6813	6823	6833	6844	6854	6865
2 15	6875	6885	6896	6906	6917	6927	6938	6948	6958	6969	6979	6990
2 16	7000	7010	7021	7031	7042	7052	7063	7073	7083	7094	7104	7115
2 17	7125	7135	7146	7156	7167	7177	7188	7198	7208	7219	7229	7240
2 18	7250	7260	7271	7281	7292	7302	7313	7323	7333	7344	7354	7365
2 19	7375	7385	7396	7406	7417	7427	7438	7448	7458	7469	7479	7490
3 0	7500	7510	7521	7531	7542	7552	7563	7573	7583	7594	7604	7615
3 1	7625	7635	7646	7656	7667	7677	7688	7698	7708	7719	7729	7740
3 2	7750	7760	7771	7781	7792	7802	7813	7823	7833	7844	7854	7865
3 3	7875	7885	7896	7906	7917	7927	7938	7948	7958	7969	7979	7990
3 4	8000	8010	8021	8031	8042	8052	8063	8073	8083	8094	8104	8115
3 5	8125	8135	8146	8156	8167	8177	8188	8198	8208	8219	8229	8240
3 6	8250	8260	8271	8281	8292	8302	8313	8323	8333	8344	8354	8365
3 7	8375	8385	8396	8406	8417	8427	8438	8448	8458	8469	8479	8490
3 8	8500	8510	8521	8531	8542	8552	8563	8573	8583	8594	8604	8615
3 9	8625	8635	8646	8656	8667	8677	8688	8698	8708	8719	8729	8740
3 10	8750	8760	8771	8781	8792	8802	8813	8823	8833	8844	8854	8865
3 11	8875	8885	8896	8906	8917	8927	8938	8948	8958	8969	8979	8990
3 12	9000	9010	9021	9031	9042	9052	9063	9073	9083	9094	9104	9115
3 13	9125	9135	9146	9156	9167	9177	9188	9198	9208	9219	9229	9240
3 14	9250	9260	9271	9281	9292	9302	9313	9323	9333	9344	9354	9365
3 15	9375	9385	9396	9406	9417	9427	9438	9448	9458	9469	9479	9490
3 16	9500	9510	9521	9531	9542	9552	9563	9573	9583	9594	9604	9615
3 17	9625	9635	9646	9656	9667	9677	9688	9698	9708	9719	9729	9740
3 18	9750	9760	9771	9781	9792	9802	9813	9823	9833	9844	9854	9865
3 19	9875	9885	9896	9906	9917	9927	9938	9948	9958	9969	9979	9990
4 0	1·0000	...	...	...	...	...	...	...	...	...	...	...

SILVER BULLION.—Value per Ounce for a Given Fineness in Silver (taking Silver at 2s. per Ounce).

—	0d.	1d.	2d.	3d.	4d.	5d.	6d.	7d.	8d.	9d.	10d.	11d.
£ s.												
0 0	0000	0417	0833	1250	1667	2083	2500	2917	3333	3750	4167	4583
0 1	5000	5417	5833	6250	6667	7083	7500	7917	8333	8750	9167	9583
0 2	1.0000	...	...	...	...	...	...	...	...	...	...	...

Example: Required the value of bullion 0·6958 fine in gold and 0·2917 fine in silver when gold is worth £4 per ounce and silver 2s. per ounce.

	£	s.	d.	
Gold, 0·6958	2	15	8	
Silver, 0·2917	0	0	7	
Value of bullion	2	16	3	per ounce.

Pelton Wheel.

The Pelton at the Thames School of Mines is 3 ft. in diameter, and is driven by water delivered under a pressure of 62 lb. by 1,200 ft. of 9 in. pipes. It was originally fitted with a 16 in. driving-pulley, but as it was found not to develop sufficient power along with high velocity, experiments by Mr. J. Parr, B.Sc., and myself demonstrated the necessity of a 21 in. driving-pulley. This allows the Pelton itself to run at a slower speed—*i.e.*, less than 287 revolutions per minute—and there is a consequent increase in the horse-power available, while the speed of the machinery is the same as before, and can be regulated as required. The diagram attached clearly illustrates the fact that if a Pelton runs at too high a speed the horse-power developed diminishes, and this is due to flooding. The diagram enables the horse-power to be ascertained at a glance when the number of revolutions and the size of nozzle are known; and similar diagrams for the different-sized Peltons used in connection with mining would, if constructed, prove extremely useful to those in charge of the machinery.

Appointments held by Students at the Thames School of Mines.

During the last twelve months several of the Thames School of Mines Students have received appointments, as follows:—

—	Name.	Position.	Present Address, 31st March, 1899.	Approximate Salary per Annum.
				£
1	J. Rickard ...	Mine-manager, Nonpareil	Thames ...	200
2	R. Bradley ...	Assayer, Te Puke Reefs	Te Puke ...	150
3	F. Williams ...	Clerk and assayer, Ethel Reefs	Thames ...	200
4	P. E. Keam ...	Mine-manager, Preservation Inlet	...	300
5	D. Hughes ...	(Mine-manager) Shift-boss, Preservation Inlet	...	175
6	F. Kidd ...	Battery superintendent, Waihi-Silverton Gold-mining Company	Waihi ...	150
7	R. Vercoe ...	Battery superintendent, Monowai Gold-mining Company	Thames ...	250
8	J. Trelease ...	Manager, Puru Consolidated	...	200

It is difficult to obtain records of the movements of past students, but among those who have received further and new appointments during the last twelve months may be mentioned:—

—	Name.	Position.
1	W. H. Baker ...	Assistant, Thames School of Mines.
2	W. Baker ...	Mine-manager, Saxon-May Queen.
3	E. Cartwright ..	Mine-manager, Moanataiari.
4	G. H. White ...	Mine-manager, Monowai Gold-mining Company.
5	R. Tierney ...	Mine-manager, Ethel Reefs.
6	H. McKenzie ...	(Mine-manager and battery superintendent) supervisor to a New South Wales syndicate
7	R. Clarke ...	Battery superintendent, Waitekauri Gold-mining Company.
8	W. Morrin ...	Battery superintendent, Waitekauri Cross.

Syllabus of Instruction.

The following is the syllabus of instruction followed during 1898–99:—

General and Mining Geology.—(Lecturer, the Director, Mr. F. B. Allen, M.A., B.Sc.).

Physical Geology.—The earth as a planet, its form and motions; geological climate; the atmosphere; ocean; solid crust; the interior of the earth.

Dynamical Geology.—Metamorphism; agencies modifying the crust of the earth—atmospheric, aqueous, chemical; weathering; sedimentation; classification of deposits—mechanical, aqueous, organic, and chemical; denudation and erosion.

Structural Geology.—Stratification; jointage; contortion; faults; conformity; unconformity; dip and strike; cleavage; metamorphic rocks; intrusive sheets, bosses, dykes, fissures; formation of quartz veins, lodes, and metallic deposits; dynamics of lodes; recovery of lost lodes.

Geological Surveying.—The practice of running natural sections; noting dip, strike, and inclination of strata and lodes; mapping geological formations; collection of mineral and rock specimens.

Stratigraphical Geology.—Classification of plants and animals; fossils; blending of species; geological record; the study of characteristic life, and distribution of formations from archæan to recent times, with special reference to the geology of New Zealand.

Mineralogy and Blowpipe Determination.—(Lecturer and Instructor, the Director.)

Systematic Mineralogy.—(1.) Physical properties of minerals, their hardness, S.G., &c. (2.) Optical properties: Refraction, reflection, polarisation, lustre, phosphorescence. (3.) Chemical properties. (4.) The application of the blowpipe, colour-tests, &c. (5.) Isomorphism, pseudomorphism, and allotropy. (6.) Distribution and paragenesis of minerals. (7.) Classification of minerals—chemical, economic.

Descriptive Mineralogy.—(1.) Non-metallic division: Carbon group, &c. (2.) Metallic division: A description of the principal ores of the common metals, and their New Zealand localities and modes of occurrence.

Crystallography.—(1.) The six systems, their axes, typical forms, modified forms, &c. (2.) Holohedral and hemihedral forms. (3.) Reading of faces.

Mathematics.—(Lecturer and Instructor, Mr. W. H. Baker, B.Sc.)

Arithmetic (including the simple rules).—Weights and measures (those bearing on mining and assaying), greatest common measure, least common multiple, vulgar fractions, decimal fractions, proportion, problems.

Algebra (Hall and Knight's Algebra).—The meaning and use of the various signs and symbols, the simple rules, greatest common measure, least common multiple, fractions, factors, symmetry, problems containing one unknown, simultaneous equations, quadratic equations, simultaneous equations with more than one unknown, problems involving quadratics and the use of several unknowns, practice in the use of formulæ and their transposition.

Euclid.—The first four books (Todhunter), including the definitions and axioms.

Land- and Mine-surveying.—(Lecturer and Instructor, the Director.)

Adjustments of theodolite, dial, level; chain and steel tapes; traversing with theodolite and dial; connecting survey with standing meridian; ranging lines; division of land; computation of areas by latitudes and departures; reduction of slope measurements; off-sets; chaining, computation of co-ordinates; balancing survey; plotting survey and off-sets; obstacles to alignment.

Mine-surveying.—Different methods of connecting underground with surface meridian; magnetic variation; to reduce magnetic meridian to true meridian; conducting underground traverse with theodolite and dial; correcting magnetic survey by method of back- and fore-sights; holing.

Mathematics.—Equations; logarithms; plane trigonometry; solutions of triangles; calculation of last or connecting line; of distance from working-face to nearest point on boundary of lease.

Levelling.—Recording levels; practice with level and staff; grading roads, tramways, and water-races; plotting and striking grades; calculation of contents of earthworks by prismodal formula; grading with Abney or reflecting level.

Mining, Applied Mechanics, and Hydraulics.—(Lecturer, the Director.)

Mining.—Shafts: Selection of site, size; modes of excavation, in dry and wet rock, wet sand, and swamp; timbering of shafts; ladders; chambers—size, excavation timbering; levels and drives—size, excavation, timbering; securing sets on inclines; modes of stoping, height and timbering of stopes; main passes—size, timbering, division; mullock-passes—size, timbering, distance apart.

Pumping and Pit-work —Pumps and engines used in metal-mining, force-pumps, plunger-pump, draw-lift, fixing pump-pieces, bearers, friction-rollers, V-bobs, balance-bobs, main rods, flat rods, clacks, buckets, bucket-rod, catches, staples and glands; thickness of pipes; capacity of pumps.

Ventilation.—Atmospheric pressure, vapour density; ventilation of drives and underground workings by natural and artificial means; furnaces, water-blasts, fans; division of air-courses; noxious gases met with in metal- and coal-mines, their composition and detection.

Explosives.—Their use in quarries and mines, relative strengths, action, gases evolved, composition; charging boreholes; firing explosives; quantity to be used.

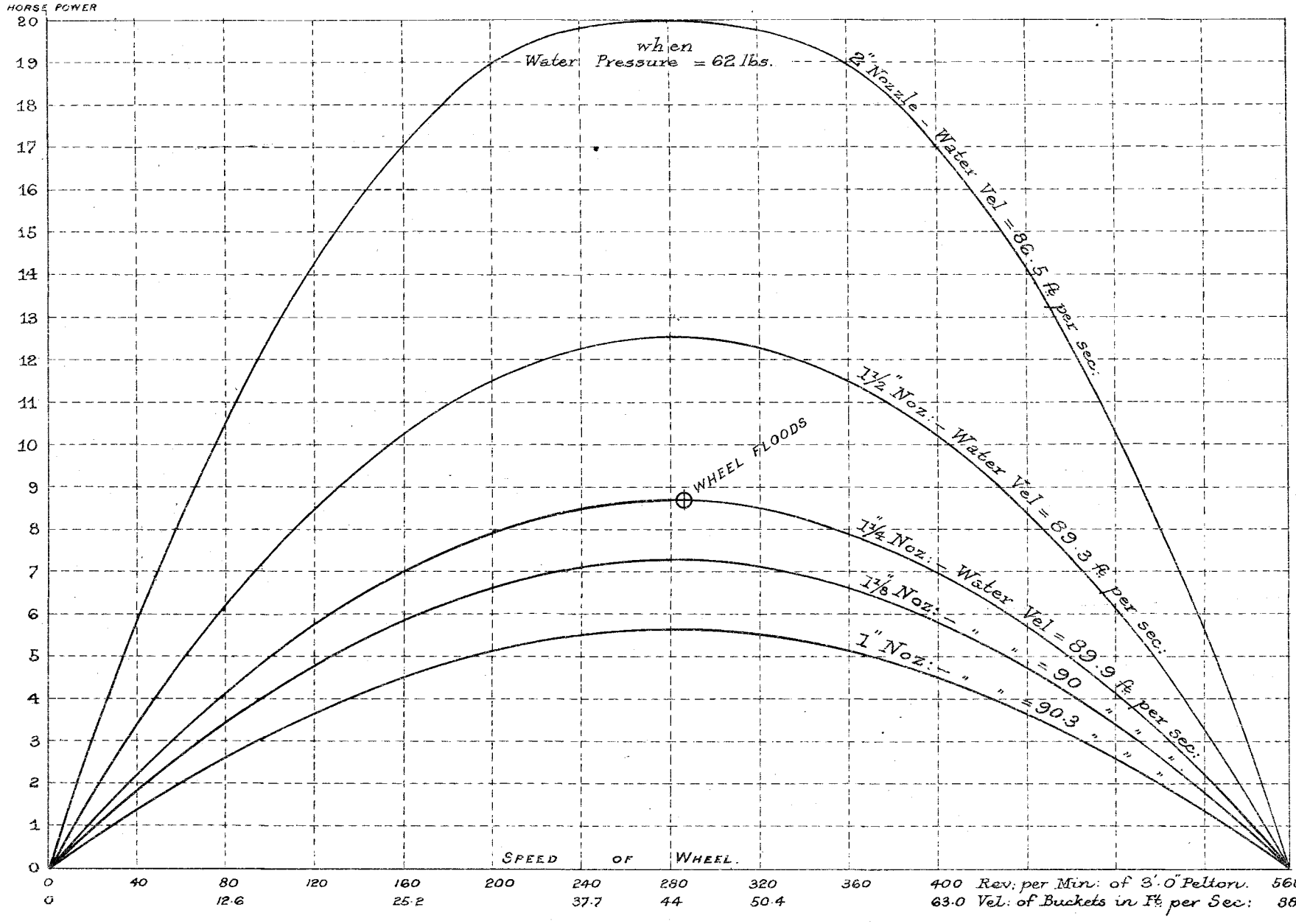
Hauling and Winding.—Safety-cages; man-engines; strength of ropes; strength of timbers.

Water-power.—Turbines, Pelton wheels, calculation of horse-power and flow of water from boxes and nozzles.

Text-book used: Gordon's "Mining and Engineering," 10s., Government Printer.

Practical Assaying.—(Lecturers and Instructors, the Director and Assistant.)

Dry Assaying.—(1.) The furnaces and appliances used in fire-assaying, with sketches. (2.) The fluxes, their properties and uses. (3.) The reducers and their reducing-powers. (4.) Fuels, and other reagents, as salt, iron, sheet and granulated lead, glass-powder, &c. (5.) Preparation of pure silver for parting gold and silver. (6.) Preparation of nitric acid solutions for parting. (7.) Preliminary assays of ores and bullion, their use and application. (8.) Volatility of gold and silver—the influence of different temperatures in different parts of muffle; also of time in muffle. (9.) The operations in fire-assaying—*a*, powdering the ore; *b*, sampling the dry pulp; *c*, preparing the charge; *d*, fusing the charge, and extracting the lead-button; *e*, cupelling the lead-button; *f*, weighing the bullion; *g*, parting and calculating the value of the bullion. (10.) Probable sources of error in fire-assaying. (11.) Keeping note-books and proper record of results. (12.) The assay of litharge and red-lead. (13.) The assay of gold- and silver-ores—*a*, in clean quartz; *b*, in pyritous quartz; *c*, in concentrates and tailings; *d*, in roasted ores; *e*, by amalgamation assay; *f*, by scorification assay. (14.) The retorting and melting of bullion. (15.) The refining of base bullion. (16.) The assay of bullion—*a*, weighing the assay; *b*, cupelling for base; *c*, adding pure silver for parting; *d*, rolling the "cornet"; *e*, parting the "cornet";



— DIAGRAM —
— shewing power given out by —
— PELTON WHEEL —
with different Nozzles & at different Speeds.

f, calculating the value. (17.) The calculation of results obtained in batteries from treatment of gold- and siver-ores. (18.) The assay of galena and cerussite; the valuation of lead, gold, and silver. (19.) The valuation of lead bullion. (20.) The assay of tin-ore (cassiterite).

Text-book: Park's "Laboratory Instructions in Assaying and Practical Chemistry," 7s. 6d.

Wet Assaying.—(21.) Operations—*a*, solution; *b*, crystallization; *c*, precipitation; *d*, filtration; *e*, decantation; *f*, washing; *g*, evaporation; *h*, distillation; *i*, ignition; *j*, sublimation; *k*, fusion; *l*, use of blowpipe; *m*, the use of spirit- and gas-lamps; *n*, the preparation of reagents and tests of purity, &c.; *o*, the preparation of fluxes; *p*, test-papers; *q*, the balance, weights, operations of weighing; *r*, preservation of platinum crucibles. (22.) The assay of iron-ores—*a*, gravimetric; *b*, volumetric. (23.) The assay of copper-ores—*a*, as oxide; *b*, as metal by electrolysis; *c*, volumetric; *d*, colorimetric. (24.) The assay of antimonite. (25.) The assay of bismuth glance. (26.) The assay of cinnabar. (27.) The assay of galena. (28.) The assay of zinc-ores. (29.) The assay of manganese-ores. (30.) The assay of nickel-ores. (31.) The assay of cobalt-ores. (32.) The assay of chromite of iron. (33.) The assay of arsenic-ores. (34.) The assay of silver-ores—*a*, volumetric; *b*, gravimetric. (35.) The valuation of specimens.

Text-book: Park's "Assaying and Practical Chemistry," 7s. 6d.

Practical Chemistry.—(Lecturer and Instructor, Mr. W. H. Baker, B.Sc.)

Junior Class.—(1.) Operations (these are the same as for wet assaying). (2.) The separation of the metals into groups. (3.) Qualitative tests for the different metals. (4.) The separation of silver, lead, mercury. (5.) The separation of copper, bismuth, arsenic, and antimony. (6.) The separation of iron and alumina, iron and zinc, iron and manganese, iron and chromium. (7.) The separation of calcium and magnesium. (8.) The separation of barium, strontium, and calcium. (9.) The separation of potassium and sodium. (10.) Qualitative tests for the acid-radicals (inorganic)—*a*, H_2S, HCl, HBr, HI; *b*, HNO_3, $HClO_3$; *c*, HBO_2, H_2CO_3, H_2CrO_4, HF, H_3PO_4, H_4SiO_4, H_2SO_4, H_3AsO_4.

(Lecturer and Instructor, the Director.)

Senior Class.—(1.) The estimation of chlorine. (2.) The estimation of sulphuric acid and sulphur. (3.) The estimation of phosphoric acid. (4.) The analysis of limestones and calcareous freestone. (5.) The analysis of coals, coke, charcoal, and shales. (6.) The analysis of barytes. (7.) The analysis of fluor-spar. (8.) The analysis of scheelite and wolfram. (9.) The analysis of rocks (including estimation of K_2O and Na_2O). (10.) The analysis of fireclays. (11.) The analysis of soils. (12.) The analysis of complex sulphide ores. (13.) The analysis of milk. (14.) The analysis of waters. (15.) The analysis of bone-dust and bone-ash, with estimation of nitrogen. (16.) The analysis of guanos and apatite. (17.) The analysis of superphosphates. (18.) The estimation of alcohol—*a*, by weight; *b*, by volume. (19.) Volumetric analysis: The estimation of—alkaline hydrates; alkaline carbonates; acids, HCl, H_2SO_4, HNO_3, $HC_2H_3O_2$, $H_2C_4H_4O_6$; haloid salts, HCN, KCN, I, As_2O_3, SO_2 ($Na_2S_2O_8 + 5H_2O$).

Text-book: Park's "Laboratory Instructions in Assaying and Practical Chemistry," 7s. 6d.

Theoretical Chemistry.—(Lecturer, Mr. W. H. Baker, B.Sc.)

Principles of Chemistry and Chemical Philosophy.—Atoms, molecules, vapour-density, quantivalence, chemical formulæ.

The Elements.—(1.) Their history, occurrence, preparation, properties, uses. (2.) Compounds of the elements, their history, preparation, properties, uses, &c.

Metallurgy of Gold and Silver.—(Lecturer, the Director.)

(1.) Ore-crushing and pulverising machinery—*a*, rock-breakers; *b*, stamps; *c*, mills, rolls, &c. (2.) Metallurgy of gold—*a*, amalgamation on copper plates, in pans, &c.; *b*, chlorination processes and operations; *c*, leaching processes (Cassels', &c.). (3.) Metallurgy of silver—*a*, smelting and amalgamating ores; *b*, smelting—reduction with lead and fluxes; *c*, amalgamation in pans with mercury—use of chemicals; *d*, leaching with solvents—sea-water or brine, ammonia, sodium hyposulphite, alkaline cyanides; *e*, oxidizing and chloridizing roasting.

Text-books: Eissler's "Metallurgy of Gold and Silver." Gordon's "Mining and Engineering."

Physics.—(Lecturer, the Director.)

Fundamental ideas of matter and energy; conditions of matter; gravitation; mechanical powers; sound; light; heat; magnetism; electricity; chemistry; physiology and health.

Practical Astronomy.—(Lecturer and Instructor, the Director.)

The ecliptic; equinoxes; meridians; longitude; latitude; altitude; declination; right ascension; azimuth; use of Nautical Almanac; polar distance; zenith distance; hour-angle; sidereal time; mean time; solar time; parallax; refraction; retardation; acceleration; convergency of meridian; determination of meridian by star-and-sun observations, by single altitudes and greatest elongation of circumpolar stars; use of star-charts; calculation of hour-angle, azimuth, and altitude of celestial bodies for any time and place; determination of latitude by meridian altitudes; determination of time by star-transits and sun-observations.

Mechanical Drawing.—(Instructor, Mr. E. J. Williams.)

Use of scales; printing and lettering; outline drawing; shading; colouring; drawing to scale from copies and objects, portions of machinery, and woodwork, showing plans, elevation, and sections.

Special Classes are held for the instruction of candidates for the Government mine-managers', battery superintendents', and engine-drivers' certificates. First term, first Monday in February to 30th April; second term, 9th May to 20th August; third term, 9th September to 20th December. Registration of membership, 10s. per annum; class-fees, 5s. per term for each subject taken up.

Scale of Charges for Public Assays and Analyses.

	£	s.	d.
Bullion assays	0	5	0
Assays of quartz, tailings, or concentrates	0	5	0
Examination and determination of rocks and minerals	0	5	0
Assay of lead- and tin-ores, each	0	5	0
" iron- and manganese-ores	0	10	0
" copper- and antimony-ores	0	10	0
" zinc-, mercury-, and bismuth-ores	0	10	0
" gold- and silver-ores, with parting assay	0	5	0
Analysis of limestone and calcareous freestone (complete)	1	0	0
Analysis of limestone and calcareous freestone (partial)	0	10	0
" coals and fuels, each	0	10	0
" rocks and soils (complete)	2	0	0
" rocks and soils (partial)	1	0	0
" fireclays and slags	1	0	0
" manures	2	0	0
" waters (complete)	3	0	0
" waters (partial)	2	0	0
" nickel-, cobalt-, and chrome-ores	0	10	0
" concentrates	1	10	0
" complex sulphide ores, &c.	1	10	0

Experimental Plant.

Report of working-tests of parcels of gold- and silver-ores, concentrates, and tailings, from 1 to 3 tons:—

(1.) By Cassel cyanide process: Wet or dry crushing—*a*, by percolation; *b*, by agitation. (2.) By amalgamated copper plates. (3.) By amalgamation in pans: Wet or dry crushing—*a*, by raw amalgamation in charges; *b*, by Washoe process with chemicals (1, hot pan-amalgamation; 2, after chloridizing roasting). (4.) Chlorination: Small barrel tests.

Cost of treatment (minimum charge): £5 per parcel not exceeding 1 ton.

Students are permitted to work in the experimental plant under special conditions.

Distribution of Prizes and Certificates.

The annual distribution of prizes and certificates gained as a result of the Government examinations in December was conducted by Mr. James McGowan, M.H.R., President of the school, in the school-building, and was attended by the students and their friends.

Governing Body.

At the annual general meeting held on the 22nd February, 1899, the following officers and members of the Council were elected for the ensuing year: President, Mr. James McGowan, M.H.R.; Vice-President, Mr. T. A. Dunlop; Treasurer, Mr. J. Hague-Smith; Council, Messrs. W. Baker, E. F. Adams, W. H. Paltridge, R. James, L. Melhose, G. Denby, M. Paul (the latter two being nominated by the students); Hon. Secretary, Mr. Albert Bruce.

COROMANDEL SCHOOL.

Mr. J. M. McLaren, M.A., Director of the Coromandel School of Mines, reports as follows:—

I have the honour to report as follows on the work and progress of the school for the past year:—

Lectures were commenced on the 22nd February, and were well attended throughout. Sixty-three students were enrolled during the first term, the largest classes being mining and surveying, with a membership of thirty-two. The roll-number of the second term showed a slight diminution to fifty-six, and this was reduced in the third term to forty-six. This diminution was due entirely to students leaving the district in search of work. Our losses in this respect have been very heavy during the Christmas vacation, but this, I think, will be compensated for by new students, ten of whom have already enrolled.

The mining and surveying classes are arranged to suit candidates for mine-managers' examinations, and were attended by students who intend to sit at the end of this year.

The mathematics class, under the able supervision of Mr. A. J. Litten, has been of inestimable service to students. Your Committee, recognising the prime importance of mathematics in a school-of-mines course, has decided to make this subject compulsory for students taking mining or surveying lectures, granting at the same time Mr. Litten and myself the power of giving exemption to sufficiently advanced students.

Metallurgical lectures, covering the questions asked in the battery superintendents' examinations, were held during the second and third terms, and were the most popular and best attended of any in our course. I trust that before very long, students taking this course will have an opportunity for practical experience in the battery that we hope shortly to have attached to the school.

The geology and mineralogy lectures did not meet with the support the importance of the subjects warranted. I trust, however, to see an improvement in this respect this year. We have,

or the purposes of this class, a very fair collection of minerals and rocks, which, in fact, gained us a first-class award at the recent Auckland Industrial and Mining Exhibition.

Mr. Harrison's class in mechanical drawing has been but poorly attended during the year, and unless half a dozen students, at any rate, signify their intention of taking up the class I cannot recommend that Mr. Harrison be asked to inconvenience himself for the benefit of one or two students. At the same time it is inexplicable to me that residents, other than miners, have not thought it advisable to attend this valuable course.

At the annual Government examinations held in December last, twelve students were presented, gaining nine first-class, nine second-class, and seven third-class certificates. Considering that the examination papers are set for second-year students, this may be taken as a very satisfactory result indeed at the end of our first year. In one subject—viz., theoretical chemistry—a Coromandel student was several marks ahead of any other candidate.

WAIHI SCHOOL.

Mr. P. G. Morgan, M.A., Director of the Waihi School of Mines, reports as follows:—

I have the honour to submit the following report of the Waihi School of Mines for the year ending 31st March, 1899:—

During this period the school has made satisfactory progress, and though the enthusiasm shown at the first opening of the school may have somewhat abated, the majority of the students have applied themselves to their studies in a way which is deserving of the greatest credit, considering the disadvantages under which most of them labour. The chief of these disadvantages perhaps is the lack of general education, but amongst others may be mentioned the hardships of their daily occupation, the weekly change of shift (which seriously interferes with the work of the classes), and the discomforts of living in a comparatively new place like Waihi.

The attendance at the various classes has been well maintained throughout the year, as is shown by the subjoined table:—

TABLE OF ATTENDANCES for the Year ending 31st March, 1899.

	1898.			1899.
	First Term.	Second Term.	Third Term.	First Term.
Mining	22	24	15	13
Mathematics	23	22	13	10
Theoretical surveying	17	20	14	14
Practical surveying	...	...	14	8
Mineralogy and geology	6	5	4	12
Theoretical chemistry	4	8	6	21
Practical chemistry	9	13	16	24
Assaying	10	13	17	30
Metallurgy	10	8	6	11
Drawing	...	...	6	5
Total attendance at classes	101	113	111	148
Individual registered students	44	45	41	49

From the above table it will be seen that the average number of students during 1898 was forty-three, with a class-attendance of 108; and that during the first term of 1899 the number of students has increased to forty-nine, and the class-attendance to 148. From present appearances this number will be more than maintained during the rest of the year. Though the attendance in the mining and mathematical classes has decreased, this has been more than counterbalanced by the large increase in the assaying and chemistry classes.

The teaching of such a multiplicity of subjects, coupled with the substantial increase in the number of students, and in the laboratory-work, taxes the energies of one teacher to the uttermost, and I trust it will not be long before the Government grants the Committee the financial assistance necessary to enable the teaching-staff to be increased, and to provide the chemical apparatus, instruments, models, geological specimens, &c., needed for the proper teaching of the various classes.

The following is a syllabus of the work done during 1898 in the several classes:—

Mining and Mining Geology.—(*a.*) Methods of breaking down mineral and rock. (*b.*) Explosives—their use, composition, and relative strengths. (*c.*) Opening out mineral deposits by means of quarries, adit-levels, and shafts. (*d.*) Exploitation of mineral deposits. (*e.*) The timbering of shafts and mine-workings; the use of iron and masonry; filling in. (*f.*) Transportation of mineral—hauling-and-winding machinery. (*g.*) The ventilation of mines. (*h.*) Damming back water, and the construction of dams. (*i.*) Pumping and pumping machinery. (*j.*) Strength of materials used in mines. (*k.*) Nature and mode of occurrence of mineral deposits. (*l.*) Formation of lodes. (*m.*) Dynamics of lodes.

Text-book: Gordon's "Mining and Engineering."

Mathematics.—(*a.*) Arithmetic—the whole subject. (*b.*) Algebra—elementary rules; simple equations; use of formulæ; problems.

Text-books: Hudson and Smith's "Arithmetic"; Hall and Knight's "Elementary Algebra."

Surveying.—Nature and use of logarithms; the trigonometrical ratios; solution of triangles; adjustments of theodolite and miners' dial; chaining; traversing; connecting underground and surface meridians; calculation of traverses; plotting survey.

Mineralogy and Blowpipe Analysis.—(*a.*) The six crystallographic systems. (*b.*) Physical and chemical properties of minerals. (*c.*) Use of the blowpipe; tests for simple minerals. (*d.*) Classification of minerals.

Text-book: Collins's "Mineralogy."

Geology.—(*a.*) Physical and dynamical geology. (*b.*) Classification and mode of formation of rocks. (*c.*) The geological periods.

Text-book: Boulger's "Geology."

Theoretical Chemistry.—Fundamental principles; the non-metallic elements; the alkali metals.

Text-book: Roscoe's "Elementary Chemistry."

Practical Chemistry.—(*a.*) Qualitative tests for metals and acids. (*b.*) Separation of metals. (*c.*) Manipulation of chemical apparatus, and the various operations connected with chemical analysis, such as solution, precipitation, filtration, washing, drying, ignition, weighing, &c. (*d.*) Analysis of simple substances.

Text-book: Park's "Assaying and Practical Chemistry."

Assaying.—(*a.*) Furnaces, materials, and appliances used. (*b.*) Dry assays of gold, silver, tin, lead, copper, and antimony ores. (*c.*) Assay of gold and silver bullion. (*d.*) Problems and calculations. (*e.*) Gravimetric assays of silver, lead, antimony, copper, iron, zinc, manganese, mercury, chromium, nickel, and cobalt. (*f.*) Volumetric assays of copper, iron, and potassium cyanide. (*g.*) Colorimetric assay of copper.

Text-book: Park's "Assaying and Practical Chemistry."

Metallurgy of Gold and Silver.—(*a.*) Ore-crushing machinery. (*b.*) Concentrating machinery. (*c.*) Amalgamation processes. (*d.*) Chlorination process. (*e.*) Cyanide process. (*f.*) Miscellaneous lixiviation processes. (*g.*) Smelting processes. (*h.*) Chemistry of the various processes. (*i.*) Roasting- and smelting-furnaces.

Text-books: Eissler's "Metallurgy of Gold"; Rose's "Metallurgy of Gold"; Park's "Cyanide Process."

Drawing.—Use of drawing instruments; use of scales; plan-drawing.

The school-year is divided into three terms, corresponding to those of the Thames School of Mines, as follows: First term, from the first Monday in February to the 30th April; second term, 9th May to 20th August; third term, 9th September to 20th December.

In mathematics, practical surveying, theoretical surveying, theoretical chemistry, mineralogy and geology, and in drawing the class-fee is 5s. for each class per term; in mining, practical chemistry, assaying, and metallurgy the fee is 7s. 6d. for each class per term. In addition to the class-fees a membership-fee of £1 per annum is charged.

During November, 1898, our accommodation was doubled by the addition of a new class-room and a balance-room to the school-building, the assay-room being at the same time enlarged. The cost of these additions was met by a Government grant of £150. This increase in floor-space has given the assaying and chemistry classes greater facilities for the practical work, and has been one of the causes of the increased attendance.

At the end of last year examination-papers in the various subjects were sent up from Wellington, but only three candidates—E. P. Hargraves, R. Arscott, and E. Johnson—presented themselves. Each was successful in gaining a second-class certificate. After making full allowance for the fact that the school had been established for only eighteen months, it is rather disappointing that more candidates did not present themselves, particularly from the mining class, which is composed of practical men, some with many years' experience.

During the past year two students—Messrs. Gilmour and Hughes—from this school have obtained first-class mine-managers' certificates, and one—Mr. G. Winslow—the battery superintendent's certificate. In addition to these, eight of our students sat for the mine-managers' and battery superintendents' examinations held here under my supervision last January. The results are, however, not yet known.

In the course of the year fifty-four assays and analyses have been made by me for the public. Two of these were analyses of coal; one was a water analysis for Mr. T. Perham, Water Conservation Engineer; and the remainder were fire-assays for gold and silver. The average value per ton of the stone tested was £8 4s. 2d. In addition, a number of determinations of minerals have been made free of charge.

A considerable number of mineral and geological specimens have been acquired from various sources during the past year; but the want of proper show-cases at present greatly detracts from their value.

In conclusion, I have to express my thanks to the Committee, who have been untiring in their efforts to promote the interests of the school; to the local mine-managers and battery superintendents, whom I have always found ready to assist and give information; to Mr. F. B. Allen, Director of the Thames School of Mines; to Mr. F. B. Stephens, lecturer in assaying and metallurgy at the University of Otago, for the gift of mineral ores and specimens; and to the Mines Department, who have forwarded a number of mining reports and papers.

NELSON SCHOOL.

Mr. W. F. Worley reports as follows:—

I have the honour to submit the following annual report of School of Mines work done in Nelson for the year ending the 31st March, 1899:—

The work done comprises the teaching of blowpipe analysis to boys in the State school, the assaying of ores and smelting of bullion for the public, the teaching of agricultural chemistry to a class of young men, and the delivery of public lectures on chemistry subjects.

Blowpipe-analysis Class.

The work of this class for the past year has been better than usual. The improvement was caused by the adoption of printed notes in place of manuscript ones. My former practice was to write notes on the blackboard and have them copied into exercise-books. This part of the work took up a good deal of time, and when done was not very satisfactory. To avoid this difficulty a much condensed set of notes was drawn up and printed in such a way as to appeal more directly to the eye than the manuscript notes did. The result has been eminently satisfactory; time has been saved, and better work done.

The scope of the work has been much the same as in past years, attention being chiefly given to ores of commercial importance. Thirty-three boys have belonged to the class during the year, and most of them have attended regularly and worked well. The class was divided into two sections, an upper and a lower. The chief work of the lower class was the acquirement of manipulative skill, while the upper class went through a systematic course of tests. The substances tested by this class were antimony, arsenic, tin, zinc, bismuth, lead, copper, chrome, iron, nickel, cobalt, manganese, gold, silver, platinum, sodium, potassium, strontium, barium, lime, sulphur, and titanium.

The boys in the upper division were examined on the 24th March. Nine boys were present at the examination, and all of them succeeded sufficiently well to qualify for a first-grade certificate, which was duly presented to each. Bernard Harris, who named correctly all the test-substances given, was awarded a blowpipe cabinet.

Some difficulty is experienced in getting test-substances for this class. We are badly in want of ores of tin, lead, antimony, arsenic, zinc, bismuth, nickel, cobalt, and manganese. Some heavy spar would also be acceptable.

Assaying.

During the year thirty-eight assays were made for the public, being an increase of eleven on the number for last year. Several samples of gold were refined and assayed, upwards of 150 oz. being treated. The greater part of this gold was from Taitapu. One parcel of silver, weighing 33 oz., was refined for a local jeweller. The smallness of the laboratory in which the assaying is done is still a great inconvenience.

Agricultural Chemistry.

A class for the study of agricultural chemistry was started early in the year. Only three young men joined, but they were such earnest students, and kept up their enthusiasm so well, that there was no lack of interest in the work. All three were school-teachers. Two of them, by the knowledge gained in this class, have already passed the agricultural-science section of the teachers' examination; the other did not sit for examination, but was equally well prepared. As these young men will, in all probability, become teachers of country schools, the knowledge they have gained will be passed on to hundreds. The work undertaken in this class comprised the chemistry of the elements found in plants, soils, and manures; the partial analysis of plant-substances; the microscopic examination of starches; the analysing of soils; the analysing of manures; and the manufacture of superphosphate.

Lectures.

Two gratuitous public lectures in connection with young men's institutes were given in the winter months. These lectures were well attended and highly appreciated. Oxygen, its preparation and properties, formed the subject of one of these lectures, hydrogen being similarly treated for the other lecture.

Conclusion.

The foregoing is a brief outline of the work that is being done here. Much more might be done if one had more time and a suitable building for carrying on class-work with young men. There would not be much difficulty in starting two or three classes for young men, but the extra work it would entail would interfere with the rightful discharge of my ordinary vocation. Having carried on this work for some years, it would be gratifying to know what are its permanent results. In Nelson this information is very difficult to obtain. Most of the young men leave here for distant parts of the colony, and are lost sight of. There are, however, at least four of my former students engaged in mining—three of them in New Zealand, and one in South Africa. Several of my blowpipe-class pupils have become teachers, and are teaching science to their scholars in a more practical way than they would otherwise have done. Other members of my classes have found, and gratefully acknowledged, that the work done with me has helped them in their study of science at college. Apart from these more or less tangible results, there has been brought about by the teaching of science a mental awakening in scores of boys the results of which cannot be traced. There are many imperfections in the work that is being done, but each year some slight improvement is made; and steady, uninterrupted progress has characterized the work from the first.

KUAOTUNU SCHOOL.

Mr. Thomas M. Cahill, honorary secretary of the Kuaotunu School of Mines, reports as follows:—

I have the honour to report on the progress of the Kuaotunu School of Mines during the year ending March, 1899, as follows:—

During the first part of the year a good number of students attended, but the difficulty lay in getting efficient instructors. At a meeting held in the School of Mines on the 3rd May, 1898, I was instructed to open up correspondence with the Coromandel School of Mines, with a view of getting Mr. McLaren to instruct our school, say, one week in the month. They replied that, as Mr.

McLaren's time was fully taken up, he could not come over, but that his vacations were at his own disposal. We thought this would not work very well, on account of the long space of time between vacations.

Mr. McLaren however, came over and gave the students some valuable lectures. In the meantime, until 15th August, the school was idle. Mr. A. A. Adams, assayer and metallurgist to the Great Mercury Mine, came to Kuaotunu, and arrangements were made with him to conduct classes in metallurgy, chemistry, and assaying, which have continued to date. Mr. John Carrol also gave instruction in mathematics from that date, and is still conducting the class, with every prospect of fair results.

Since the beginning of this year Mr. G. W. Horn, first-class mine-manager, and assayer to the Mariposa Gold-mining Company, has started what is termed a "mining class." Instruction is given in field-surveying, working theodolite, chaining, &c., plotting, putting on plan, and calculation of areas, &c.

The attendance at classes is as follows:—

	Number of Students.	Average.
Metallurgy	20	14
Chemistry }	20	12
Assaying }		
Mathematics	20	17
Mining	8	6

In conclusion, I may state that the funds of the school are not very flourishing, depending wholly on students' and members' subscriptions and class-fees. While we give Mr. Adams a nominal salary, Messrs. Carrol and Horn give their services gratuitously. I expect that the depressed state of mining here in this district will greatly reduce the attendance, as the school depends entirely on the miners as students. Two students—Messrs. G. W. Horn and Fred White—went up for examination at the Thames School of Mines last January for a battery superintendent's and mine-manager's certificate respectively.

WESTPORT SCHOOL.

Mr. Bradley, Chairman of the Committee, reports as follows:—

The Committee have the honour to report on the progress of the institution for the past year as follows:—

Owing to the mining depression, the local subscriptions have not been so large as formerly, but the Mines Department have granted a subsidy of £50, and the county and borough £15 and £1 0 respectively, which, with the local revenue, have enabled us to go on, and there is still a balance of £25 18s. 5d. in hand. The attendance of the pupils has not been so numerous as could be wished, but still the Committee feel satisfied that the work done has been of a practical and lasting character, and are pleased to be able to report that one of the pupils, Mr. T. Mullan, has left Westport to complete his scientific studies at the Technical Institute, Sydney. Other two of the most promising pupils have also left for Invercargill, and we have no doubt that the course of study commenced in Westport will be carried on there.

It is the earnest desire of the Committee that the opportunities of instruction afforded by this institution should be taken full advantage of by the pupils attending the District High School, and we anticipate obtaining a large number of pupils from this source. The Committee have reduced the class-fees to a minimum, to encourage the attendance of junior pupils. The Government has lately granted us a site for a building, and your Committee must appeal at once to the public for funds towards the erection of a school. The department has promised pound-for-pound assistance up to £150 of subsidy, and the rent of the present premises is a heavy burden on our finances. The engagement with Mr. James as instructor came to an end last August, but that gentleman has since generously conducted the classes free of charge, and the Committee have to record their thanks for this service. Thanks are also due to Mr. A. H. Richards, Assistant Inspector of Mines, for his valuable aid in the collection of mineral specimens.

Instructor's Report.

The Instructor (Mr. C. H. James) reports as follows:—

I beg to report that the course of instruction in mineralogy, chemistry, and assaying has been continued throughout the past year, and am pleased to be able to state that very good progress was made up to the end of that term, especially in the mineralogy classes, the work of several of the students showing a thorough insight into the elementary principles of systematic and determinative mineralogy.

The classes have somewhat fallen off this term owing to four of the more advanced students having left the district, but it is very probable that almost immediately their places will be filled.

During the year many specimens and samples have been submitted to me for determination, and in this respect alone the institution is proving a very great benefit to the district.

The text-books are the same as those used during last year, with the addition of Park's "Assaying" and Collins's "Mineralogy."

Instead of closing the school during the long holidays I thought it best to carry on the classes, in order to keep them together as much as possible. This was done at midwinter and midsummer.

Several additions have been made to the mineral collection, and a small experimental chlorination plant was fitted for the metallurgy class early in the year.

In conclusion, I might state that the prospects of the school were never more promising since I have been connected with it than during the past term.

REEFTON SCHOOL.

The Director of this school (Mr. R. M. Aitken) reports as follows:—

Having resigned my position as Director of the Reefton School of Mines, I have the honour to report on the work done at the school during the past nine months ending 31st December, 1898.

Although the classes were kept going constantly throughout the year, and students given every chance of instruction, I regret to say that the attendance was not good. The students do not come to the various classes regularly, which so interferes with the work that it is almost impossible to show any good results.

There is not the slightest doubt that the school has not received the support from the Reefton public which it deserves, but at the same time the closing of the school would cause great inconvenience to many, and I think, even though classes are discontinued, the laboratory should be kept open for the benefit of prospectors and others.

Classes in the following subjects have been held:—

Mining and Mathematics.—This class, although at one time the most popular, was not so well attended as last year. The instruction given is most useful to those connected with mining operations, and those who generally attend are desirous of obtaining certificates as mine-managers, engine-drivers, &c.

Land- and Mine-surveying.—The work done was all theoretical, owing to the want of instruments. The attendance was poor, about the same as mining and mathematics. A knowledge of surveying is most important to those engaged in mining, and a little practical work would no doubt have kept the class together.

Practical and Theoretical Chemistry.—These are subjects which all assayers and metallurgists should have a knowledge of, especially those connected with the treatment of ores. The attendance during the past year was poor.

Assaying and Metallurgy.—These classes were fairly well attended, but the want of chemicals and apparatus did not give it much chance of improving. When the school is depending on the small fees charged it is difficult to keep up the stock. The work done was similar to that of previous years.

Reefton School.—There have been no improvements added to the school during the past year, as the members' and students' fees have been so small, and the school has had to exist on the test fees, &c.

The methods of crushing and preparing samples for assay with the present appliances take a lot of time and labour, and could be greatly improved on. A good assay-balance is urgently needed if it is intended to carry on the school, as in many cases fine work is required, and accurate returns must be given.

Examinations.—Very few of our students have competed at the annual examinations, but those who did sit obtained high percentages and did good work. During the eight years and a half I have been instructor no less than thirty-eight students have successfully passed the Government examinations for first-class mine-managers, twenty-four under the Mining Act and fourteen under the Coal-mines Act. Most of these now hold good positions as mine-managers. Many others have been successfully prepared for engine-drivers' and other examinations.

The Laboratory.—In this department there has always been a fair amount of work to be done, a lot of which is done free of charge, so as to encourage prospectors to have stone tested in a proper manner. During the past nine months 422 assays and analyses have been performed, made up as follows: Fire-assays, 354; amalgamation tests, 3; bullion assays and meltings, 30; cyanide tests, 30; analyses ores and coals, 5.

The following list will show the number of tests and assays I have made at the Reefton School of Mines during the eight years and a half I have been in charge: Fire-assays, 2,414; berdan amalgamation tests, 255; bullion assays and smeltings, 117; cyanide tests, 150; analyses ores and coals, 52; assays other metals, &c., 74; total, 3,062.

The above is evidence of the amount of work done in this department, and shows that people now recognise the necessity of having their samples tested in a proper manner. In all the testing and assaying great care has always been taken, and the school now enjoys the reputation of furnishing accurate and thoroughly reliable returns. Of course, assayers are frequently blamed for mistakes, but in most cases the fault lies with the person who takes the samples, and unless the sample is properly taken the assay is not only worthless, but misleading.

Had a small testing-plant been erected it would no doubt have been well supported in the past, for on many occasions I have been asked to treat large samples.

This being my final report, I think it my duty to point out the conditions under which I have had to carry on this school during the past two years and a half, which have been anything but favourable. The total amount received for members' and students' fees during the above period was about £40, while the test-fees amounted to over £230. The usual Government subsidies were not applied for by the secretary, although proper balance-sheets, &c., were prepared.

The annual meeting of subscribers was not held last year, and the Committee did not meet during the past nine months, until there was some talk of closing the school, after I had resigned my position.

Where so little interest is taken in the affairs of the school, and the necessary funds are not available, you can quite understand that it is impossible for any one to carry on the work and classes to advantage.

Should the school be closed it will simply mean to undo the work that has already been done; so I hope in the future that the public will subscribe more liberally and support an institution which should be in every important mining district.

Having accepted an engagement under a mining company in this district, I shall be only too pleased to render whatever assistance I am able in carrying on the classes, &c., and shall continue to take the same interest in the school as I have done in the past.

OTAGO SCHOOL.

The following is the annual report of Professor Ulrich, Director of the Otago School of Mines, to the Otago University Council:—

Herewith I have the honour to submit my annual report regarding the attendance, work, and results of the annual examination of the School of Mines during the past session (1898), together with remarks on practical teaching facilities, requirements, and other points affecting the future progress of the school.

The number of old students on the register expected to continue their studies during the past session was thirty-seven, and sixteen new ones entered, bringing the expected attendance-number up to fifty-three. However, five of the old students did not return, a sixth, after a few days' attendance, became seriously ill and died, and of the new students one, after a few weeks' irregular attendance, was compelled on account of illness to give up further studies, while a second gave up the school after three months' attendance, thus reducing the total number of regular students to forty-five; and if to this number be added two—namely, one student who only took the evening class in assaying; the other, H. Black, who, although having gone through the whole of the curricula of mining and metallurgy last year, as mentioned in my report, attended classes in several subjects a second time (thus enabling him to convert the third-class examination certificates he previously obtained in the respective subjects into first- and second-class ones)—the attendance-number of students during the past session was forty-seven.

Owing to the prevalent epidemics of influenza and measles, which attacked a number of the students, especially during the first part of the session, the various classes were not so well attended as in previous years, which accounts, no doubt, for a number of the failures in several subjects at the recent examinations, as shown in the table further on. With regard to these failures I cannot, however, omit to remark that I consider most to be due, on the part of some of the students, to insufficient preliminary knowledge at entry of the school; on the part of others to inattention at lectures and want of proper study; and on the part of yet another section to insufficient study through having taken too many subjects—*i.e.*, more than those prescribed—with the intention of securing during a three years' course, besides the diploma in mining, the certificate of metallurgical chemist and assayer. The recent decision of the Council of requiring the passing of an entrance examination, and of an attendance of four years in the case of students desiring to obtain more than one diploma or certificate, will doubtless check the number of failures in future.

Of the sixteen new students who, as previously explained, were reduced to fourteen, one, working for the B.Sc. degree of the University of New Zealand, took only general geology with the intention of taking other mining classes afterwards, and another attended only three subjects—namely, practical and theoretical chemistry and general geology—in the two latter of which he failed; whilst a third student attended all the classes of the first year's curriculum, but did not sit for examination in any other subject but practical chemistry, in which he passed. The other eleven students all attended the first year's classes, and, with the exception of two, who failed in mathematics, passed all the examinations. The thirty-one older students consisted of fourteen who, having passed last year in mathematics and chemistry, adhered mostly to the prescribed curriculum for the second year's course, but in the recent examinations one failed in mining, theoretical mechanics, theoretical physics, and surveying; another failed in mining, mineralogy, theoretical physics, and general and special metallurgy; a third failed in mineralogy and surveying; a fourth failed in theoretical physics and general metallurgy; and two failed in mining. Amongst the seventeen remaining older students were four who, through failure in mathematics at last year's examinations, were prevented from attending several of the classes of the second year's course; whilst the other thirteen consisted of students of three, four, and five years' standing, most of whom should have completed their studies this year. But some did not attend all the prescribed lecture courses, whilst others failed in the examinations, probably through having taken more than the prescribed classes. Some have even failed a second time in the same subjects. Thus it happens that only four of the thirteen can leave the school as having successfully completed their studies for the chosen divisions, whilst the other nine students, in order to obtain certificates, will have to return—some for attending classes they missed, some for re-examination in the subjects they failed in, or for attending the respective classes a second time.

The four students who are leaving the school are as under:—

Francis A. Cutten.—He passed well in all the subjects of the mining, metallurgical, and geological divisions, and that of metallurgical chemist and assayer, and he is at present entitled to claim the diploma of Associate in Geology and the certificate of metallurgical chemist and assayer. For obtaining the diplomas of Associate in Mining and Metallurgy he still requires, however, to do nearly all the practical work in mines and metallurgical establishments prescribed for these divisions. In the recent examinations he distinguished himself in securing first-classes in six and good second-classes in two of the eight subjects he required to attend for finishing his studies.

Ormsly G. Adams.—This student passed the examinations in all the subjects of the mining division and that of metallurgical chemist and assayer, having shown special ability and application in accomplishing this work during three years' attendance at the school. In the recent examination he distinguished himself in gaining first-classes in six and good second-classes in two of the eight subjects he required to attend to finish his course. He is entitled to claim the certificate of metallurgical chemist and assayer, but requires to engage for several months more in practical mining work for qualifying him to claim the diploma of Associate in Mining. During the past session he satisfactorily acted as my assistant in the classes of mineralogy and petrography.

Geoffrey G. Sale.—By passing well all the prescribed examinations for the mining division, and of that of metallurgical chemist and assayer, he is at present entitled to claim the certificate of the latter division; but he requires still to engage for two or three months more in practical mining work in order to qualify him for obtaining the diploma of Associateship in Mining.

Adam Hay.—Having passed the examinations in all the subjects of the mining division, and that of metallurgical chemist and assayer, he is entitled to claim the certificate of metallurgical chemist and assayer; but he has still to engage for several months more in practical mine-work before he becomes qualified for obtaining the diploma of Associateship in Mining. He showed ability and application in finishing his studies for two certificates in the course of three years.

The numerical attendance at all the classes, and the results of the recent examinations are shown in the following table :—

Subjects.	Attendance.	Entered for Examination.	Results of Examinations.			
			First Class.	Second Class.	Third Class.	Failures.
General (University)—						
Mathematics	17	16	...	3	8	5
Theoretical mechanics	15	15	...	...	12	3
Theoretical physics	12	12	...	...	5	7
Practical physics	12	12	1	2	7	2
Theoretical chemistry	13	13	5	4	3	1
Practical chemistry	13	13	6	5	2	...
Quantitative chemical analysis ...	11	11	3	7	1	..
Theoretical biology	1	1	1	...	...	...
Practical biology	1	1	1	...	...	...
Special (School of Mines)—						
Mining, first course	28	28	...	8	9	11
Mining geology...	12	11	4	5	2	...
General geology	16	15	9	4	1	1
Palæontology	1	1	...	1	...	...
Mineralogy	17	17	1	3	10	3
Petrography	9	9	...	5	4	...
General metallurgy	18	18	7	3	7	1
Special metallurgy	18	18	4	4	4	6
Practical assaying, first course ...	17	17	10	7	...	...
Practical assaying, second course ...	6	6	3	...	3	...
Blowpipe analysis	20	20	8	5	7	...
Applied mechanics	11	11	2	2	7	...
Surveying, first course	15	15	1	3	5	6
Surveying, second course ...	9	8	2	3	3	...
Drawing—						
Model	12	12	6	6	...	...
Practical plane geometry ...	12	12	8	4	...	...
Solid geometry	14	14	5	5	3	1
Machine	19	19	5	5	7	2
Totals	...	...	92	94	110	49

All the new students who entered for the first year's course, and some of the older ones, who had not previously taken ambulance, attended the evening class established by the St. John Ambulance Association, and by successfully passing the examination gained certificates of first aid, as required by the regulations.

Only one occasional student, as before mentioned, attended an arranged evening class in assaying, but only for a short time.

Nearly all the students requiring to engage in practical mining and metallurgical work during the vacation, in order to complete the stipulated working terms of twelve and nine months respectively, have, so far as I could ascertain, found working-places in coal- and gold-mines and cyanide establishments, partly in Otago, partly on the West Coast, and some in the Hauraki goldfields (North Island), while two have gone to the Mount Bischoff Tin-mine, Tasmania. And, as in previous years, it requires thankfully to be acknowledged that the General Manager of the Union Steamship Company granted those students who had to travel by sea a liberal reduction in the cost of a return ticket, and extended the time of the latter to six months.

With regard to the number of students likely to attend classes next session, only an uncertain forecast can be made. Supposing that all those return who have completed their first and second year's courses, and, in addition, those older ones who, according to the register, have not quite finished their studies for any diploma or certificate, the number would be forty-one, and as three applications for entry of new students have already reached the Registrar the number would come to forty-four. It is, however, very likely that some four or five of the older students who did so badly in the recent examinations will not return, a decrease which would leave thirty-nine or forty, to be increased again by the uncertain number of other new students applying for entry before the commencement of next session. Thus there is strong probability that the attendance-number next session will not fall short and may perhaps exceed that of the past session—*i.e.*, forty-five to fifty.

As in previous years, Dr. Don, the lecturer in general geology, arranged to make with his students three geological field excursions, but bad weather prevented the second, to the Green Island coalfields. However, to make up for this, an additional day was devoted to the third excursion.

The first excursion embraced the examination of the volcanic rocks of the Otago Peninsula around Portobello; whilst the other, occupying three days, comprised the inspection of the sedimentary rocks of Moeraki, Hampden, and of the Oamaru district. Dr. Don has still further improved the arrangements for illustrating his lectures by the preparation of about two hundred additional optical lantern-slides and by a collection of fossils and rock-specimens, chiefly from the Oamaru district. The examination of his class of sixteen students proved highly satisfactory resulting in nine first-classes, four second-classes, one third-class, one failure, and one absent.

The rearrangement of tables, working-benches, and more so the addition of two smelting and three cupelling furnaces, with separate iron chimneys, and the provision of twenty-four lockers for use of the assaying students, has been of the greatest advantage in the carrying-on of the large assaying classes by the lecturer, Mr. Stephens. One important defect in the laboratory needs still to be supplied—*i.e.*, certain additional apparatus for the class in advanced assaying, of which Mr. Stephens has already sent in notice, with specification.

Through the sad death, after a long and painful illness, of a very promising second-year's student, the son of the Hon. Lee Smith, the assay laboratory, at his dying request, has been presented by Mr. Smith with the private assaying plant used by the deceased. It includes, besides crucibles, chemicals, tools, &c., a small assay-furnace and two balances, one of which, of a very good make, supplies a long-felt want in the laboratory.

The classes in surveying have now become so large—and will become still larger next session—that Mr. Begg, the lecturer, has informed me of his inability to carry on these classes properly with the use of only one theodolite. The necessity of providing a second instrument of this kind has been seriously felt for several sessions past, but I have now to bring it under the notice of the Council at Mr. Begg's urgent request. The cost of an instrument such as required would be about £16.

Regarding my own classes in mineralogy and petrography, more especially the latter, I beg to inform the Council that, from the experience I gained with a class of nine students during the past session, it will be quite impossible for me to carry on classes of fourteen or more students during the next and succeeding sessions under the same conditions and circumstances. It might have been thought that the attendance of the class would fall off after next session, and that during the latter additional assistance might meet the difficulties of carrying the class on under the same conditions as before; but the decrease in the number of new students, if it should happen, would certainly not have any effect upon this class for the next two or three years; and additional assistance could not do away with insufficiency of light and free space for moving about. In fact, with the class of nine students during the past session, the space available for the use of eight miscroscopes, with the light from only three windows, and for the working of two section-grinding machines, proved so inadequate that the moving about of myself and an assistant from one student to another without disturbing others in their work was hardly possible, whilst through double-banking of several microscopes, which had to be resorted to, there was a constant scramble for light, and thereby hindrance of proper progress in the subject. Besides this, there is always danger that through working of the grinding-machines emery dust and splashes may reach the nearest microscopes and injure them, whilst the students' sitting benches and desks, as well as the mineral cases in close proximity, become dirtied all over with splashes from these machines. The only way, in my opinion, to meet the difficulties mentioned is an addition to the building—*i.e.*, a lean-to of about 6 ft. in width all along the gable wall of the large and small lecture-rooms, with a number of windows, or, still better, a glass front facing the lawn-tennis court. This would be a permanent improvement, and serve for more than fourteen students, whilst also giving more light to the far end of the large lecture-room, where during dark winter mornings it proved hitherto rather deficient.

Another serious defect requiring removal before next session is that through several years' working of the seven students' microscopes the Nicol prisms of all have more or less come out of their proper positions, and can only be readjusted by an optical expert under my direction. There is fortunately such a man in Dunedin, whom I have interviewed, and whom it would be necessary to engage for the work.

I may also point out another expense which requires to be faced in the near future—namely, the replacement of a number of drawings of mining machinery and appliances, necessary for the mining lectures, as the present ones, through over fifteen years' use in copying by the students, are now becoming too much soiled and torn for serving much longer.

The new grinding-machine constructed by Schlaadt Brothers, engineers, Dunedin, has proved a great success, and less in cost than if a new machine of the old type had been procured from Berlin, Germany.

The Otago School of Mines Association, about the formation of which I reported last year, has, to my knowledge, not made any progress since, and one of the main objects of the association—viz., that of preparing a register of the addresses and positions of old past students—has consequently not been accomplished. I may, therefore, as I did in previous years, mention what I ascertained during the year about the careers of some of these associates of our school. Edward Paterson, in the service as consulting expert of an English mining syndicate, and last year in Auckland, is at present in a similar position in British Columbia; P. Fitzgerald, our former lecturer in metallurgy, is in charge of large cyanide-works at Brown Hill, Western Australia; Herbert Stephens is manager of cyanide-works at the Lachlan goldfields, New South Wales; Arthur Mosley has the management of cyanide-works at Reefton, New South Wales; Sheddan Brugh has a good post in the Queensland Smelting Company, Maryborough, Queensland; H. C. Boydell is in charge of a metallurgical laboratory in Sydney, New South Wales; D. B. Waters is mine-manager of the Shotover Quartz-mining Company, Otago; D. V. Allen is battery-manager of the Morning Star Reef Company, Preservation Inlet; A. Purdie has the position of lecturer in the University and Technical School, Adelaide, South Australia; Thomas Esdaile is lecturer in the School of Mines, Bendigo, Victoria. Most of the other associates seem to be still in their old positions, as mentioned in former reports.

The limited extent to which the testing plant—four parcels treated—has been made use of by mining men during the year is, as it was last year, doubtless due to the boom in dredging enterprises, which for the time have driven prospecting for auriferous quartz-reefs into the background. There is, however, some hope for an early improvement in this respect.

Among those who sent donations to the mining museum are mentioned Messrs. P. G. Morgan (Director of School of Mines at Waihi), F. B. Allen (Director, Thames School of Mines), A. Sligo, H. Walcott (Curator, Melbourne Industrial Museum), F. Kayser (manager, Mount Bischoff Mine), Smith (Chairman, Industrial Exhibition Mining Committee), Herbert Buckland, J. M. McLaren (Director, Coromandel School of Mines), Charles Rilstone (manager, O.P.Q. Mine), and Captain Malcolm.

EXPENDITURE ON SCHOOLS OF MINES.

The following table shows the expenditure by the Government on schools of mines since their inauguration, 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 Sums paid by the Department towards the Schools of Mines.
	£ s. d.	£ s. d.	£	£ s. d.	£ s. d.
1885–86 ...	...	36 19 9	...	1,223 9 10	1,260 9 7
1886–87 ...	257 16 6	409 1 4	...	2,716 9 3	3,383 7 1
1887–88 ...	253 15 9	253 14 1	...	1,714 9 6	2,221 19 4
1888–89 ...	42 10 0	6 12 9	...	1,139 4 1	1,188 6 10
1889–90 ...	142 2 0	181 14 10	...	716 3 10	1,040 0 8
1890–91 ...	217 6 6	54 8 0	...	620 9 9	892 4 3
1891–92 ...	181 14 0	...	...	689 5 9	870 19 9
1892–93 ...	312 3 4	...	...	670 1 0	982 4 4
1893–94 ...	197 0 5	...	...	858 19 4	1,055 19 9
1894–95 ...	390 0 0	45 10 10	...	773 17 8	1,209 8 6
1895–96 ...	820 0 0	...	50	849 3 0	1,719 3 0
1896–97 ...	352 14 11	58 18 6	100	834 12 8	1,346 6 1
1897–98 ...	1,089 18 6	29 19 9	100	780 19 0	2,000 17 3
1898–99 ...	740 15 2	32 19 7	50	729 10 11	1,553 5 8
Totals ...	4,997 17 1	1,109 19 5	300	14,316 15 7	20,724 12 1

The above statement shows the amount expended on the different schools of mines throughout the colony; but, in addition to this, the sum of £7,303 6s. 2d. has to be added, as that has been paid to the School of Mines attached to the University of Otago, £553 6s. 2d. being paid last year towards maintaining the school, which makes the total expenditure up to the 31st March last to be £28,027 18s. 3d. This expenditure has extended over a period of fourteen years.

WATER-RACES.

Waimea Water-race.

The quantity of water obtained from this race is equal to present requirements, and even when the necessary extensions to connect with the claims to be worked from the Waimea Main Tail-race are completed it is anticipated that the supply will still be ample. A storage-dam will be required in connection with the supply for the claims that will be worked through the main tail-race, and a suitable area has been secured for that purpose.

The following statement will show the receipts and cost of maintenance of the Waimea Race for the year ended 31st March last, together with the approximate quantity of gold obtained by those using water for working claims from that supply:—

Month.	Sales of Water.	Cash received for Sales of Water.	Expenditure.	Outstanding Moneys at the End of each Month.	Number of Men employed.	Approximate Quantity of Gold obtained.	Value of Gold obtained.
1898.	£ s. d.	£ s. d.	£ s. d.	£ s. d.		Oz.	£ s. d.
April	53 14 7	52 15 6	57 19 2	14 13 8	44	165	643 10 0
May	74 2 9	86 15 6	52 19 2	11 19 3	42	222	865 16 0
June	64 18 4	56 12 0	74 13 9	11 19 3	40	197	768 6 0
July	64 12 6	56 17 9	55 14 2	15 15 5	47	199	776 2 0
August	65 17 11	81 3 6	56 9 2	11 19 3	41	205	799 10 0
September	66 15 10	48 13 9	59 14 2	14 19 8	48	203	791 14 0
October	61 9 2	64 0 0	76 9 2	14 1 10	46	195	760 10 0
November	67 12 11	51 19 6	103 12 9	20 3 9	48	204	795 12 0
December..	50 10 0	57 11 0	83 19 2	14 6 5	49	155	604 10 0
1899.							
January	30 11 8	42 1 0	85 9 2	14 6 5	36	93	362 14 0
February	30 3 9	26 7 6	73 4 2	14 6 5	34	91	354 18 0
March	64 6 8	54 0 9	61 14 2	..	38	193	752 14 0
Totals	694 16 1	678 17 9	841 18 2	..	42·75 (average)	2,122	8,275 16 0

It will be seen from the foregoing statement that the value of the sales of water for the year amounted to £694 16s. 1d., as against £787 18s. 7d. for the previous year, while the cost of maintenance amounted to £841 18s. 2d., as against £677 1s. 6d. for the former year; thus showing an increase in the cost of maintenance of £164 16s. 8d., and a decrease in the value of the sales of water of £93 2s. 6d., from the previous year.

The average number of men employed in claims worked with water from this supply last year was 42·75, and the approximate quantity of gold obtained by them was 2,122 oz., representing a value of £8,275 16s. Deducting the value of the sales of water from the value of the gold obtained, it leaves the average earnings of the men to be £176 7s. 6d. per man per annum, or £3 8s. per week.

Callaghan's Branch Water-race.

The siphon and water-race conveying the water to Callaghan's and Italian's are in good order, and capable of supplying water for the use of a larger number of miners than are at present availing themselves of it. When the advantages to be derived from the use of the water from this race become more fully appreciated a considerable extent of auriferous country can, and no doubt will, be worked in the near future.

The following statement shows the receipts and cost of maintenance of this race, and also the quantity and value of gold obtained by those using the water :—

Month.	Sales of Water.	Cash received for Sales of Water.	Expenditure.	Outstanding Moneys at the End of each Month.	Number of Men employed.	Approximate Quantity of Gold obtained.	Value of Gold obtained.
1898.	s. d.	£ s. d.	£ s. d.			Oz.	£ s. d.
April	..	..	11 15 0	..	..	..	..
May	27 0 0	42 0 0	10 0 0	..	10	54	210 12 0
June	15 0 0	..	10 0 0	..	10	35	136 10 0
July	..	..	10 0 0	..	..	..	..
August	32 12 6	57 2 6	10 0 0	..	10	85	331 10 0
September	30 10 0	6 0 0	27 5 0	..	10	81	315 18 0
October	25 5 0	25 5 0	10 0 0	..	10	66	257 8 0
November	19 5 0	19 5 0	10 0 0	..	10	55	214 10 0
December	..	..	28 0 0	..	..	..	..
1899.							
January	26 10 0	42 0 0	12 0 0	..	10	75	292 10 0
February	15 10 0	..	14 0 0	..	10	40	156 0 0
March	..	..	10 12 6	..	..	..	..
Totals	191 12 6	191 12 6	163 12 6	..	10 (average)	491	1,914 18 0

It will be seen from the foregoing statement that the value of the sales of water for the year amounted to £191 12s. 6d., and that the cost of maintenance was £163 12s. 6d. The average number of men employed was ten, and the gold obtained by them 491 oz., of the value of £1,914 18s. Deducting the value of the sales of water from the value of the gold will show the average earnings to have been £172 per man for the year, or £3 6s. per week.

Kumara Water-race.

The Kumara district is largely dependent on the water supplied from this race, the whole of the field being supplied, with the exception of the Long Tunnel Company, and McGrath's and Moynihan's claims, which obtain their water from other sources. Provision has been made to further add to the Loop-line Dam supply by constructing a race that will convey the water from a branch creek and form a large catchwater area into the main dam. The Loop-line Dam, which is now capable of storing a largely increased quantity since the raising of the by-wash, has materially augmented the supply necessary for sluicing purposes on the Kumara field, and tended to meet the requirements of the miners during the drier months of the year.

Repairs have been effected in the tunnel through which the water is conveyed from the Little Dam to the field, and this part of the race is now capable of carrying an increased quantity.

The Little Dam, which has been made to store a quantity of water equal to three or four days consumption, cannot be said to be of such stability as was the case when the timber of which it is built was new and fresh. At the present time decay has set in, and several of the heavy timbers and struts are partially rotten. It will shortly be found necessary to strengthen this dam, and it is suggested that the structure be backed up by rough stonework, for which the larger boulders can be obtained from the claims at Larrikin's. If this were done the faced sheathing or planking, which, on the whole, is in fairly good condition, would suffice for several years to come, and with such permanent support, could readily be removed when required.

The Loop-line Dam, which is now made capable of holding from 18 in. to 2 ft. of water through the raising of the by-wash, might possibly be endangered should a heavy rainfall or a sudden melting of snow occur at a time when the water is at its highest level. To provide against any danger to the structure through the present by-wash failing to carry off a sudden increase of water, it is contemplated to construct a second by-wash at a place where the dam-bank is of small dimensions and the ground solid. This could be made of such width as to enable a vast quantity of water to flow away if the depth of water on the by-wash should only be 2 in. or 3 in. With these improvements, and the Wainihinihi branch complete, the race and dams will be capable of carrying and storing a much greater quantity of water than hitherto, and at a slight increase in the cost of maintenance.

Year by year it is found that the yield of gold from every yard of gravel that is being sluiced away is becoming less, and consequently the miners are less able to pay a high price for the water.

SUMMARY showing the RESULT of WORKING the KUMARA WATER-RACE for Sixteen Years, from 1st April, 1883, to 31st March, 1899.

Water supplied.	Year.	Rate per Sluice-head per Week.	April.	May.	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.	Total Value of Water sold.	Total Value Free for Assistance.	Total Value Free for Deviations.	Total for Construction of No. 3 Channel.	Total Value Water supplied.	Average Number of Sluice-heads supplied Daily.	Expenditure.
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.		£ s. d.
Water sold ..	1883–84	3 0 0	371 16 5	465 2 1	700 2 6	583 9 7	702 7 6	626 16 3	808 10 5	777 3 9	774 17 11	698 2 6	1,064 0 0	774 6 0	8,346 14 11	..	..	..	..	..	..
Free	1883–84	..	46 2 6	44 5 0	183 11 8	108 19 2	108 0 0	85 7 6	244 7 6	172 18 9	63 12 6	103 9 2	86 5 0	139 3 4	..	1,386 2 1	..	..	..	..	..
			417 18 11	509 7 1	883 14 2	692 8 9	810 7 6	712 3 9	1,052 17 11	950 2 6	838 10 5	801 11 8	1,150 5 0	913 9 4	..	..	..	..	9,732 17 0	46·35	2,153 5 5
Water sold ..	1884–85	3 0 0	580 4 4	937 19 4	667 3 11	906 16 10	882 6 10	997 1 5	919 12 3	1,126 11 10	819 17 3	289 4 2	756 9 2	821 0 10	9,704 8 2	..	..	..	..	..	..
Free	1884–85	..	92 5 0	56 19 7	78 18 9	55 13 9	149 0 10	18 11 3	145 13 4	69 3 9	39 15 0	26 12 6	45 3 9	2 16 8	..	780 14 2	..	..	..	..	..
			672 9 4	994 18 11	746 2 8	962 10 7	1,031 7 8	1,015 12 8	1,065 5 7	1,195 15 7	859 12 3	315 16 8	801 12 11	823 17 6	..	..	..	..	10,485 2 4	49·92	1,656 0 1
Water sold ..	1885–86	2 10 0	665 16 0	796 6 9	893 5 3	745 19 7	773 19 10	943 13 5	953 15 6	997 7 8	697 13 5	686 4 0	708 15 8	935 19 7	9,788 16 8	..	..	..	..	..	..
Free	1885–86	..	24 13 9	9 2 0	..	..	23 15 0	31 3 4	22 1 3	18 11 10	18 7 2	49 1 4	1 5 0	13 2 6	..	221 3 2	..	..	..	..	..
			690 9 9	805 8 9	893 5 3	745 19 7	797 14 10	974 16 9	975 16 9	1,015 19 6	716 0 7	735 5 4	710 0 8	949 2 1	..	..	..	..	10,009 19 10	57·20	1,454 19 5
Water sold ..	1886–87	2 10 0	758 0 4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Water sold ..	1886–87	2 0 0	..	19 10 8	488 3 9	315 7 11	599 5 0	643 7 11	682 8 9	686 7 5	562 0 10	345 12 7	673 0 0	747 9 2	6,470 14 4	..	..	..	..	..	..
Free	1886–87	..	..	776 0 11	242 0 11	40 13 9	120 9 7	83 15 10	74 5 0	45 9 2	32 15 0	46 8 9	49 16 8	36 3 4	..	1,547 18 11	..	..	..	..	..
			758 0 4	795 11 7	730 4 8	356 1 8	719 14 7	727 3 9	706 13 9	731 16 7	594 15 10	392 1 4	722 16 8	783 12 6	..	..	..	..	8,018 13 3	56·19	1,398 18 10
Water sold ..	1887–88	2 0 0	535 5 10	679 7 8	167 10 10	656 4 7	684 16 1	694 5 0	591 12 1	710 0 0	535 10 10	519 15 5	670 17 6	734 4 5	7,169 10 3	..	..	..	..	..	..
Free	1887–88	..	26 11 8	40 19 2	15 13 9	23 10 0	47 7 11	4 11 8	34 16 8	42 10 0	27 10 0	28 6 8	19 11 8	15 17 3	..	347 6 5	..	..	..	..	..
			561 17 6	720 6 10	183 4 7	679 14 7	732 4 0	698 16 8	626 8 9	752 10 0	553 0 10	548 2 1	690 9 2	750 1 8	..	..	..	..	7,516 16 8	53·68	982 12 0
Water sold ..	1888–89	2 0 0	490 6 8	338 7 7	532 1 1	626 19 10	667 8 3	542 8 4	702 12 6	664 1 7	395 12 3	465 2 1	623 18 4	667 8 4	6,716 6 10	..	..	..	..	..	..
Free	1888–89	..	107 17 3	90 18 0	87 1 4	75 1 10	32 10 0	16 9 5	38 1 4	13 0 0	34 9 2	58 6 8	90 10 10	74 13 4	..	492 0 0	227 0 0	..	..	..	..
			598 3 11	429 5 7	619 2 5	702 1 8	699 18 3	558 17 9	740 13 10	667 1 7	430 1 5	523 9 7	714 9 2	742 1 8	..	..	..	..	7,435 6 10	53·10	1,024 1 9
Water sold ..	1889–90	2 0 0	401 13 4	495 16 4	256 16 8	377 16 3	353 4 2	237 7 11	318 10 10	293 8 4	159 18 9	219 15 10	248 19 7	186 16 8	3,550 4 8	..	..	..	..	..	..
Free	1889–90	..	45 15 0	55 3 4	43 0 0	92 15 0	105 15 0	93 1 8	41 10 0	103 18 4	105 13 4	48 17 6	54 8 4	71 5 0	..	396 2 6	465 0 0	..	..	..	..
Free, No. 3 Channel	1889–90	..	..	..	..	..	122 19 1	335 1 3	330 11 8	275 8 0	97 13 4	6 0 0	221 18 1	102 11 5	..	..	..	1,492 2 10	..	..	..
			447 8 4	550 19 8	299 16 8	470 11 3	581 18 3	665 10 10	690 12 6	672 14 8	363 5 5	274 13 4	525 6 0	360 13 1	..	..	..	..	5,903 10 0	42·16	1,424 13 3
Water sold ..	1890–91	2 0 0	300 12 6	355 11 11	368 3 2	423 9 0	622 17 11	666 7 1	720 16 1	701 5 10	578 1 8	546 17 11	691 17 11	689 11 8	6,665 12 8	..	..	..	..	..	..
Free	1890–91	..	113 5 0	119 14 2	70 7 11	71 17 6	82 9 7	110 16 8	93 13 9	106 0 10	57 5 5	113 6 8	133 2 6	130 5 10	..	409 5 5	793 0 5	..	..	..	..
Free, No. 3 Channel	1890–91	..	272 11 11	247 3 6	246 17 10	115 2 11	32 2 2	..	..	..	..	..	..	..	..	..	..	913 18 4	..	..	..
			686 9 5	722 9 7	685 8 11	610 9 5	737 9 8	777 3 9	814 9 10	807 6 8	635 7 1	660 4 7	825 0 5	819 17 6	..	..	..	..	8,781 16 10	62·72	1,766 4 3
Water sold ..	1891–92	2 0 0	616 5 10	655 4 11	542 9 1	179 11 11	426 16 1	769 15 5	784 13 8	642 4 2	469 10 0	291 3 9	543 7 6	724 8 8	6,645 11 0	..	..	..	..	..	..
Free	1891–92	..	143 11 5	191 16 8	44 3 6	..	82 16 11	151 14 7	118 10 1	233 1 8	213 11 3	137 0 10	64 11 8	28 9 2	..	996 4 5	413 3 4	..	..	..	..
			759 17 3	847 1 7	586 12 7	179 11 11	509 13 0	921 10 0	903 3 9	875 5 10	683 1 3	428 4 7	607 19 2	752 17 10	..	..	..	..	8,054 18 9	57·53	1,584 10 11
Water sold ..	1892–93	2 0 0	495 17 1	505 12 11	493 5 10	495 13 6	602 2 8	635 1 3	571 1 8	458 7 1	382 2 1	390 19 2	450 7 6	308 10 0	5,789 0 9	..	..	..	..	..	..
Free	1892–93	..	44 18 9	80 2 6	72 4 2	61 2 1	43 5 10	38 2 6	44 0 10	66 2 6	157 6 8	94 4 2	77 10 10	64 2 6	..	444 15 8	398 7 8	..	..	..	..
			540 15 10	585 15 5	565 10 0	556 15 7	645 8 6	673 3 9	615 2 6	524 9 7	539 8 9	485 3 4	527 18 4	372 12 6	..	..	..	..	6,632 4 1	47·35	1,782 11 0
Water sold ..	1893–94	2 0 0	451 16 5	480 13 7	541 11 11	542 9 6	575 10 5	486 9 2	539 8 4	402 11 11	451 5 5	303 0 10	415 5 5	392 1 8	5,582 4 7	..	..	..	..	..	..
Free	1893–94	..	101 5 2	119 5 7	99 4 6	110 7 1	92 9 10	147 16 2	112 11 0	164 18 5	82 0 4	112 3 10	132 15 10	70 6 10	..	1,306 0 3	39 4 4	..	..	..	..
			553 1 7	599 19 2	640 16 5	652 16 7	668 0 3	634 5 4	651 19 4	567 10 4	533 5 9	415 4 8	548 1 3	462 8 6	..	..	..	..	6,927 9 2	49·48	1,917 8 5
Water sold ..	1894–95	2 0 0	477 1 8	437 17 4	501 3 4	482 1 3	513 7 11	413 0 5	213 19 2	375 7 6	428 8 9	298 2 5	198 7 1	308 2 11	4,646 19 9	..	..	..	..	..	..
Free	1894–95	..	76 11 8	98 12 8	103 1 3	92 17 11	83 5 0	122 17 6	96 4 2	105 6 8	81 11 8	74 14 2	72 17 6	86 12 6	..	1,054 12 8	40 0 0	..	5,741 12 5	41·01	1,976 17 7
			553 13 4	536 10 0	604 4 7	574 19 2	596 12 11	535 17 11	310 3 4	480 14 2	510 0 5	372 16 7	271 4 7	394 15 5	..	..	..	..	..	..	..
Water sold ..	1895–96	2 0 0	277 5 10	379 15 0	349 12 1	322 15 10	345 1 8	354 1 8	351 16 8	336 5 5	331 0 0	315 15 5	336 3 4	406 18 4	4,106 11 3	..	..	..	..	..	..
Free	1895–96	..	95 3 4	96 1 8	139 19 2	81 16 3	76 19 7	77 10 10	110 9 7	114 12 1	67 3 4	92 8 4	90 18 11	86 16 3	..	1,129 19 4	..	..	..	..	..
Free, No. 4 Channel	1895–96	..	..	..	..	..	5 12 6	39 14 2	62 7 6	56 9 2	65 4 7	32 10 0	36 1 3	34 15 10	..	..	..	332 15 0	5,569 5 7	39·78	1,943 8 7
			372 9 2	475 16 8	489 11 3	404 12 1	427 13 9	471 6 8	524 13 9	507 6 8	463 7 11	440 13 9	463 3 6	528 10 5	..	..	..	..	..	..	..
Water sold ..	1896–97	{2 0 0 / 1 10 0}	286 13 4	307 0 0	166 9 6	387 13 8	318 10 7	310 7 4	356 16 4	322 8 10	144 13 3	319 1 3	284 1 3	299 1 8	3,502 17 0	..	..	..	..	..	..
Free	1896–97	..	100 5 0	99 4 10	22 18 2	31 1 10	12 19 4	22 16 10	13 18 4	12 11 3	12 18 9	51 18 9	58 16 2	39 19 9	..	479 9 0	..	..	..	..	..
Free, No. 4 Channel	1896–97	..	15 0 0	14 16 8	4 0 10	18 0 0	7 0 0	18 0 0	9 0 0	12 0 0	7 0 0	6 0 0	10 0 0	13 0 0	..	..	..	133 17 6	4,116 3 6	40·41	1,786 15 9
			401 18 4	421 1 6	193 8 6	436 15 6	338 9 11	351 4 2	379 14 8	347 0 1	164 12 0	377 0 0	352 17 5	352 1 5	..	..	..	..	..	..	..
Water sold ..	1897–98	..	243 11 2	240 5 1	204 19 1	210 11 1	266 15 6	147 4 8	296 9 10	213 1 9	255 19 11	208 16 2	415 13 9	185 15 3	2,889 3 3	..	..	..	..	..	..
Free	1897–98	..	29 1 3	39 16 3	18 1 10	29 5 0	29 0 0	51 5 0	49 14 4	52 10 0	38 2 6	29 1 3	..	48 15 0	..	414 12 5	..	..	..	..	..
Free, No. 4 Channel	1897–98	..	..	..	..	..	..	..	..	..	2 10 0	14 0 0	17 0 0	..	..	33 10 0	..	..	3,337 5 8	..	1,841 0 0
			272 12 5	280 1 4	223 0 11	239 16 1	295 15 6	198 9 8	346 4 2	265 11 9	296 12 5	251 17 5	432 13 9	234 10 3	..	..	..	..	..	..	..
Water sold ..	1898–99	..	160 6 6	194 11 5	171 13 0	226 15 6	224 0 6	251 9 1	202 2 11	233 18 5	258 15 4	196 19 9	320 17 10	270 4 2	2,711 14 5	..	..	..	..	..	..
Free	1898–99	..	28 15 0	59 1 3	30 7 6	42 3 9	45 13 9	54 7 6	33 15 0	37 10 0	28 8 1	28 2 6	37 10 0	44 1 3	..	469 15 7	..	..	..	..	..
Free, No. 4 Channel	1898–99	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3,181 10 0	..	2,174 3 11
			189 1 6	253 12 8	202 0 6	268 19 3	269 14 3	305 16 7	235 17 11	271 8 5	287 3 5	225 2 3	358 7 10	314 5 5	94,286 10 6	11,909 12 0	2,375 15 9	2,872 13 8	111,444 11 11	38·24	26,867 11 2

The question of reducing the charge made per sluice-head will therefore have soon to be faced, as in many instances, after paying for water, there is not sufficient left to the miner to meet the cost of living.

The following statement shows the revenue derived from sales of water, and also the cost of maintenance, for the year ended 31st March, 1899:—

Month.	Sales of Water.	Cash received for Sales of Water.	Expenditure.	Outstanding Moneys at the End of each Month.	Number of Men employed.	Approximate Quantity of Gold obtained.	Value of Gold obtained.
1898.	£ s. d.	£ s. d.	£ s. d.	£ s. d.		Oz.	£ s. d.
April	160 6 6	175 0 0	130 10 7	297 5 9	64	295	1,150 10 0
May	194 11 5	138 0 0	230 1 9	366 17 2	70	349	1,361 2 0
June	171 13 0	270 12 6	157 5 8	279 2 8	82	312	1,216 16 0
July	226 15 6	249 0 0	162 8 9	260 4 0	73	403	1,571 14 0
August	224 0 6	201 15 0	191 14 4	274 19 3	83	410	1,599 0 0
September	251 9 1	238 12 6	166 8 4	282 16 0	74	446	1,739 8 0
October	202 2 11	237 8 7	173 14 4	245 14 2	70	373	1,454 14 0
November	233 18 5	376 13 9	149 5 8	219 11 3	69	425	1,657 10 0
December	258 15 4	78 0 0	195 1 6	282 12 1	69	461	1,797 18 0
1899.							
January	196 19 9	215 0 0	247 17 7	253 1 0	69	250	975 0 0
February	320 17 10	260 0 0	199 6 3	328 8 8	62	475	1,852 10 0
March	270 4 2	195 0 0	170 9 2	390 3 10	63	472	1,840 16 0
Totals	2,711 14 5	2,635 2 4	2,174 3 11	..	70·66 (average)	4,671	18,216 18 0

It will be seen from the foregoing statement that the value of the sales of water for the past year amounted to £2,711 14s. 5d., as against £2,889 3s. 3d. for the former year, and that the cost of maintenance was £2,174 3s. 11d., as against £1,841 for the previous year. This shows a decrease in the revenue last year of £177 8s. 10d., and an increase in the cost of maintenance of £333 3s. 11d. In addition to the sales of water, the value of free water supplied to the claims which did not prove payable to work during the year amounted to £613 0s. 6d. The average number of men employed in claims worked with water from this supply was 70·66, and the approximate quantity of gold obtained by them was 4,671 oz., representing a value of £18,216 18s. Deducting the value of the sales of water from the approximate value of gold obtained it leaves £15,505 3s. 7d. as the earnings of the miners, which is equal to an average of £218 7s. 9d. a man per annum, or £4 8s. per man per week. The total cost of this work up to the end of March last amounts to £44,543 17s. 6d., and, deducting the cost of maintenance from the value of the sales of water for the year, it leaves a profit on the working of £537 10s. 6d.

[For table showing result of working Kumara Water-race for fifteen years, see page 25.]

Waimea-Kumara Race.

In order to augment the present supply of water a new water-race has been surveyed, and is in course of construction. This race will carry water from the Wainihinihi, a branch of the Teremakau River, across a saddle into the Kawhaka, from the watershed of which the present water-supply is obtained. It is expected that not less than fifteen sluice-heads can be added to the already extensive supply of water for the races, even during the driest weather, and when the creeks in Kawhaka watershed are at their lowest.

The extension of the Kapitea Hill branch of the Kumara Race has been carried on to supply water for working the claims at No. 5 channel. The necessary flush-water race and the 26 in. main are also being proceeded with. On the completion of the works the additional quantity of water required to supply No. 5 channel will probably be made up when the Wainihinihi Race is finished.

The extension of the Waimea Race to supply water to the claims at the middle branch that can be worked by the use of the Waimea main tail-race will prove of great benefit to the district.

The following statement will show the revenue and expenditure on the whole of these works for the year ending the 31st March last:—

Month.	Sales of Water.	Cash received for Sales of Water.	Expenditure.	Outstanding Moneys at the End of each Month.	Number of Men employed.	Approximate Quantity of Gold obtained.	Value of Gold obtained.
1898.	£ s. d.	£ s. d.	£ s. d.	£ s. d.		Oz.	s. d.
April	214 1 1	227 15 6	200 4 9	311 19 5	108	460	1,794 0 0
May	295 14 2	266 15 6	293 0 11	378 16 5	122	625	2,437 10 0
June	251 11 4	327 4 6	241 19 5	291 1 11	132	544	2,121 12 0
July	291 8 0	305 17 9	228 2 11	275 19 5	120	602	2,347 16 0
August	322 10 11	340 1 0	258 3 6	286 18 6	134	700	2,730 0 0
September	348 14 11	293 6 3	253 7 6	297 15 8	132	730	2,847 0 0
October	288 17 1	326 13 7	260 3 6	259 16 0	126	634	2,472 12 0
November	320 16 4	447 18 3	262 18 5	239 15 0	127	684	2,667 12 0
December	309 5 4	135 11 0	307 0 8	296 18 6	118	616	2,402 8 0
1899.							
January	254 1 5	299 1 0	345 6 9	267 7 5	115	418	1,630 4 0
February	366 11 7	286 7 6	286 10 5	342 15 1	106	606	2,363 8 0
March	334 10 10	249 0 9	242 15 10	413 5 3	101	665	2,593 10 0
Totals	3,598 3 0	3,505 12 7	3,179 14 7	..	120·08 (average)	7,284	28,407 12 0

It will be seen from the foregoing statement that the value of the sales of water for the year amounted to £3,598 3s., while the expenditure for maintenance for the same period was £3,179 14s. 7d. For the previous year the value of the sales of water was £3,849 1s. 10d., and the expenditure £2,646 6s. 6d. This shows that there was a decrease in the revenue last year to the extent of £250 18s. 10d., while the cost of maintenance has increased to the extent of £533 8s. 1d.

The total value of free water given to the miners to open up new ground and construct new tail-races, and also for working claims which did not prove payable, amounted for the past year to £448 2s. 5d. The number of men employed in claims worked with water from these supplies was 120·08. Deducting the value of the sales of water from the approximate value of the gold obtained from claims worked with water from these supplies, which amounted to 7,284 oz., representing a value of £28,407 12s., it leaves £24,809 9s. as the average earnings of the miners, which is equal to about £206 14s. 10d. per man per annum.

The total cost of the whole of these works, including the cost of acquiring Wylde's Water-race —£790 9s. 4d.—up to the 31st March last was £189,203 4s. 1d.

The following statement will show the receipts and expenditure for the last fourteen years ending the end of March last of the Waimea and Kumara Water-races.

Year.	Waimea Race.			Kumara Race.		
	Sales of Water.	Expenditure on Maintenance.	Net Profit.	Sales of Water.	Expenditure on Maintenance.	Net Profit.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1886	1,790 16 0	1,131 18 1	+ 658 17 11	9,788 16 8	1,459 19 5	8,328 17 3
1887	1,675 19 4	1,116 10 0	+ 559 9 4	6,470 14 4	1,398 18 10	5,071 15 6
1888	1,612 11 3	1,027 17 11	+ 584 13 4	7,169 10 3	982 12 0	6,186 18 3
1889	1,416 6 8	860 2 5	+ 556 4 3	6,716 6 10	1,024 1 9	5,692 5 1
1890	1,240 9 7	795 7 7	+ 445 2 0	3,550 4 8	1,424 13 3	2,125 11 5
1891	1,388 17 5	933 3 3	+ 455 14 2	6,665 12 8	1,766 4 3	4,899 8 5
1892	1,121 16 2	784 13 10	+ 337 2 4	6,645 11 0	1,584 10 11	5,061 0 1
1893	1,015 12 3	858 0 4	+ 157 11 11	5,789 0 9	1,782 11 0	4,006 9 9
1894	828 15 8	919 9 4	− 90 13 8	5,582 4 7	1,919 8 5	3,662 16 2
1895	988 0 7	1,061 9 4	− 73 8 9	4,646 19 9	1,976 17 7	2,670 2 2
1896	795 13 6	770 3 8	+ 25 9 10	4,106 11 3	1,943 8 7	2,163 2 8
1897	776 19 5	669 6 3	+ 107 13 2	3,502 17 0	1,786 15 9	1,716 1 3
1898	787 18 7	677 1 6	+ 110 17 1	2,889 3 3	1,841 0 0	1,048 3 3
1899	886 8 7	1,005 10 8	− 119 2 1	2,711 14 5	2,174 3 11	537 10 6
Totals ..	16,326 5 0	12,610 14 2	3,715 10 10	76,235 7 5	23,065 5 8	53,170 1 9

This table shows that there has been a net profit derived from the working of the Waimea Race of £3,715 10s. 10d., and £53,170 1s. 9d. from the Kumara Race, for the above period.

Mount Ida Water-race.

This race continues to furnish a supply of water for sluicing and elevating claims in the Naseby district. On account of the altitude, the local sources from which water for mining purposes is derived are not very extensive, nor capable of contributing sufficient water for the field; but with the continuous supply from the Mount Ida race in addition, a considerable population is maintained. A flow of fifteen sluice-heads was continuous during the year. This is to be attributed to the favourable season, the rainfall having been of such an extent and duration that the whole of Central Otago was benefited.

The Mount Ida Race being of great length, careful supervision is necessary, and much clearing and repairing required, as the ditch runs along sidelings, and has been cut through material subject to slips, that have to be removed in order to keep the race open.

The following statement will show the revenue derived from sales of water, the cost of maintenance, and the approximate quantity and value of gold obtained by the miners using water from this race for the year ending 31st March last:—

Date.	Sales of Water.	Cash received.	Maintenance.	Number of Men employed.	Approximate Quantity of Gold obtained.	Value.
1898.	£ s. d.	£ s. d.	£ s. d.		Oz.	£ s. d.
April	58 12 5	58 12 5	85 0 8	55	152	..
May	78 10 7	85 14 6	84 10 8	53	160	..
June	62 17 9	65 8 1	84 10 8	44	135	..
July	92 13 1	92 13 1	83 16 8	38	142	..
August	132 11 8	137 0 0	166 2 8	50	219	..
September	12 6 3	14 2 3	138 11 8	18	10	..
October	188 18 0	198 10 0	94 1 8	55	323	..
November	213 0 7	223 0 7	88 4 8	67	340	..
December	132 11 8	137 0 8	122 15 8	57	445	..
1899.						..
January	158 10 10	158 10 10	98 14 8	55	410	..
February	155 5 3	158 5 3	94 16 8	51	269	..
March	210 10 11	212 10 11	90 7 8	50	290	..
Totals	1,496 9 0	1,541 8 7	1,231 14 0	49·42 (average)	2,895	11,145 5 0

It will be seen from the foregoing statement that the value of the sales of water last year amounted to £1,496 9s., as against £1,395 18s. 11d. for the previous year, which is an increase of £100 10s. 1d., while the expenditure on maintenance was £1,231 14s., as against £1,384 18s. 9d. for the previous year. The gain on the working last year was £264 15s. The approximate quantity of gold obtained from claims worked with water from this supply was 2,895 oz., representing a value of £11,145 5s.; and the number of men employed in these claims averages about 49·42. Deducting the value of the gold obtained from the value of the sales of water, it leaves £9,648 16s. as the earnings of the miners, which is equal to about £192 19s. a man per annum, or about £3 13s. 5d. a man per week.

The Eweburn reservoir, which is in course of construction, will store sufficient water to enable a continuous supply to be obtained by the miners during the dry seasons. This reservoir is intended to hold 500,000,000 gallons of water, but the average quantity it will store during the year must depend on the rain and snowfall within the area of drainage. The construction of this reservoir is being supervised by Mr. R. H. Browne, C.E., engineer, of Naseby, under the direction of Mr. T. Perham, A.M. Inst. C.E., and the following report on the progress of the work up to the 31st March has been furnished by him:—

"I have the honour to report that during the past three months these works have made considerable progress towards completion. The laying and jointing of the outlet pipes and valves, and testing of same, being completed early in January, allowed of the tail-race being closed. This was satisfactorily accomplished, but not without some difficulty, owing to the strong body of underground water to be overcome. The filling about the pipes and closing of the open tail-race brought the earthwork to a more uniform level, enabling more satisfactory progress to be made, and minimised the risk of unequal subsidence. The material to be obtained for the earthwork and rock-facing continues to be all that could be desired, and readily obtainable. The height of the embankment, as completed and stone-faced, at this date is 22 ft., and the permanent by-wash at the 60 ft. level is well advanced. About 70,000 cubic yards of earthwork will be required to complete the embankment. This, with the stone facing, will cost £3,500 to £4,000. We find that about 1s. per cubic yard is the present cost of the work, including getting clay and earth, carting and spreading same, and the rock-pitching on face. This is exclusive of foundation-work, pipes, valves, and by-wash rock-cutting; but, as these latter may be considered as finished, the cost of the work above the 22 ft. level can be computed at the above estimate as from the 31st March. The work, as you are aware, is being carried out, under the management of Mr. A. Butler, on co-operative-contract lines, and in a very satisfactory manner. Given a fairly dry and mild winter, the work by the ensuing spring can be sufficiently advanced to be out of danger from floods, but until the 65 ft. level is reached there is that danger to be considered. This danger can only be met by keeping the accumulating water down to a sufficiently low level to admit of a very heavy flood being held with the aid of the outlet pipe. It is satisfactory to note that since the closing of the tail-race, about the 11th January last, the enclosed water has accumulated to a much greater extent and faster than was anticipated; so much so that to prevent the water overtopping the work it became necessary to open the valves and let it flow into the Government race; and, from records kept up to the 10th March, 291 Government heads ran for eight hours, being equal to 157,000,000 gallons of water, and at this date there is 13 ft. in depth of water at the outlet pipe, which throws the water back, covering about 13 acres, containing 21,000,000 gallons, making a total of 178,000,000 gallons accumulated since about the 20th January to the 20th March. This flow will give 1,068,000,000 gallons for twelve months. The reservoir can be roughly estimated to contain, when full, 500,000,000 gallons; thus, taking 178,000,000 gallons as the average accumulation for the two driest months in the year, there is every reason to expect that, with the snow accumulations melting in the spring added to the above steady supply, the reservoir will more than fill—in fact, quite possibly may fill twice—a year. From an engineering view, it is essential that the completion of the work should be obtained as soon as possible; also, from a commercial view, that as much water should be retained in the reservoir to be sold as is consistent with safety."

Blackstone Hill Race.

A limited number of miners still continue to profitably use water from this race. The nature of the country through which it is carried permits of this race being maintained and kept open without great expense.

The following statement will show revenue derived from sales of water, the cost of maintenance, the number of men employed, and the approximate quantity of gold obtained from those claims which are worked by the aid of this race:—

Month.	Sales of Water.	Cash received.	Maintenance.	Number of Men employed.	Approximate Quantity of Gold obtained.	Value.
1898.	£ s. d.	£ s. d.	£ s. d.		Oz.	£ s. d.
April	10 15 10	10 15 10	0 3 0	9	..	..
May	10 15 10	10 15 10	0 3 0	9	..	..
June	10 15 10	10 15 10	0 3 0	9	..	..
July	10 15 10	10 15 10	0 3 0	9	..	..
August	10 15 10	10 15 10	0 3 0	9	..	..
September	10 15 10	10 15 10	0 3 0	9	..	..
October	10 15 10	10 15 10	1 7 0	9	..	..
November	10 15 10	10 15 10	..	9	..	..
December	10 15 10	10 15 10	..	9	..	..
1899.						
January	10 15 10	10 15 10	0 3 0	9	..	..
February	10 15 10	10 15 10	0 3 0	9	..	..
March	10 15 10	10 15 10	0 3 0	9	..	..
Totals	129 10 0	129 10 0	2 14 0	9 (average)	140	539 0 0

It will be seen from the foregoing statement that the sales of water for the last year amounted to £129 10s., as against £126 16s. 1d. for the previous year, while the cost of maintenance was £2 14s., thus leaving a net profit of £126 16s. on the working of this water-race. The average number of miners employed in claims worked by the aid of this water-race was nine, and the approximate quantity of gold obtained by them was 140 oz., representing a value of £539. Deducting the value of sales of water from the value of the gold obtained, it leaves £489 3s. 11d. as the earnings of the miners, which is equal to about £45 10s. per man per annum. The total cost of this water-race was £1,036 16s.

Argyle Race.

The Argyle Water-race, which supplies water to the Charleston field, is now managed by and under the control of the Buller County Council. Certain repairs and additions to the siphon being required, a subsidy amounting to £150 was given towards this work, which has been satisfactorily completed at a total cost of £350.

Summary of Water-races.

The following statement will show the profits and losses of working the different water-races constructed and maintained by the Government for the last twenty-one years, and also the collateral advantages derived by the utilisation of the water from these races :—

Name of Water-race.	Value of Sales of Water, including Value of Gold obtained in Sludge-channel.	Expenditure.	Profit or Loss on Working.	Average Number employed.	Approximate Quantity of Gold obtained.	Value of Gold obtained.	Duty received on Gold obtained.	Total Profit or Loss, with Value of Gold Duty added.	Total Cost of Construction.
Waimea-Kumara Water-race and Sludge-channel	£ s. d.	£ s. d.	£ s. d.	Men.	Oz.	£ s. d.	£ s.	£ s. d.	£ s. d.
Twenty years ended 31 March, 1898 ..	151,529 4 5	91,422 12 0	60,106 12 5	..	274,204	1,034,749 16 3	20,728 0	80,834 12 5	..
Year ended 31 March, 1899	3,598 3 0	3,179 14 7	418 8 5	120	7,284	28,407 12 0	..	418 8 5	..
Totals ..	155,127 7 5	94,602 6 7	60,525 0 10	120	281,488	1,063,157 8 3	20,728 0	81,253 0 10	*211,168 2 3
Nelson Creek.									
Thirteen years four months ended 31 July, 1892 ..	17,577 0 7	15,415 7 1	2,161 13 6	52	32,943	126,049 17 0	3,269 16	5,431 9 6	90,722 10 8
Argyle.									
Thirteen years ended 31 March, 1895 ..	5,530 16 0	5,455 7 7	75 9 3	17	8,040	30,738 12 0	804 0	879 9 3	15,151 15 3
Mount Ida.									
Twenty years ended 31 March, 1898 ..	26,589 19 11	29,907 5 6	†3,317 5 7	..	53,207½	202,961 7 6	3,176 2	†141 3 7	68,607 8 9
Year ended 31 March, 1899	1,496 9 0	1,231 14 0	264 15 0	49	2,895	11,145 5 0	..	264 15 0	..
Totals ..	28,086 8 11	31,138 19 6	†3,052 10 7	49	56,102½	214,106 12 6	3,176 2	123 11 5	68,607 8 9
Blackstone Hill.									
Five years ended 31 March, 1898 ..	619 5 0	72 5 0	542 0 0	..	1,032	3,998 19 6	..	542 0 0	1,036 16 0
Year ended 31 March, 1899	129 10 0	2 14 0	126 16 0	9	140	539 0 0	..	126 16 0	..
Totals ..	748 15 0	74 19 0	180 16 0	9	1,172	4,537 19 6	..	668 16 0	1,036 16 0
Grand totals ..	207,070 8 9	146,686 19 9	59,890 9 0	49	379,745½	1,438,590 9 9	27,977 18	88,356 7 0	386,686 12 11

* Including £6,027 15s. 6d. cost of constructing extension to Callaghan's. † Loss on working.

GOLD- AND SILVER-MINING.

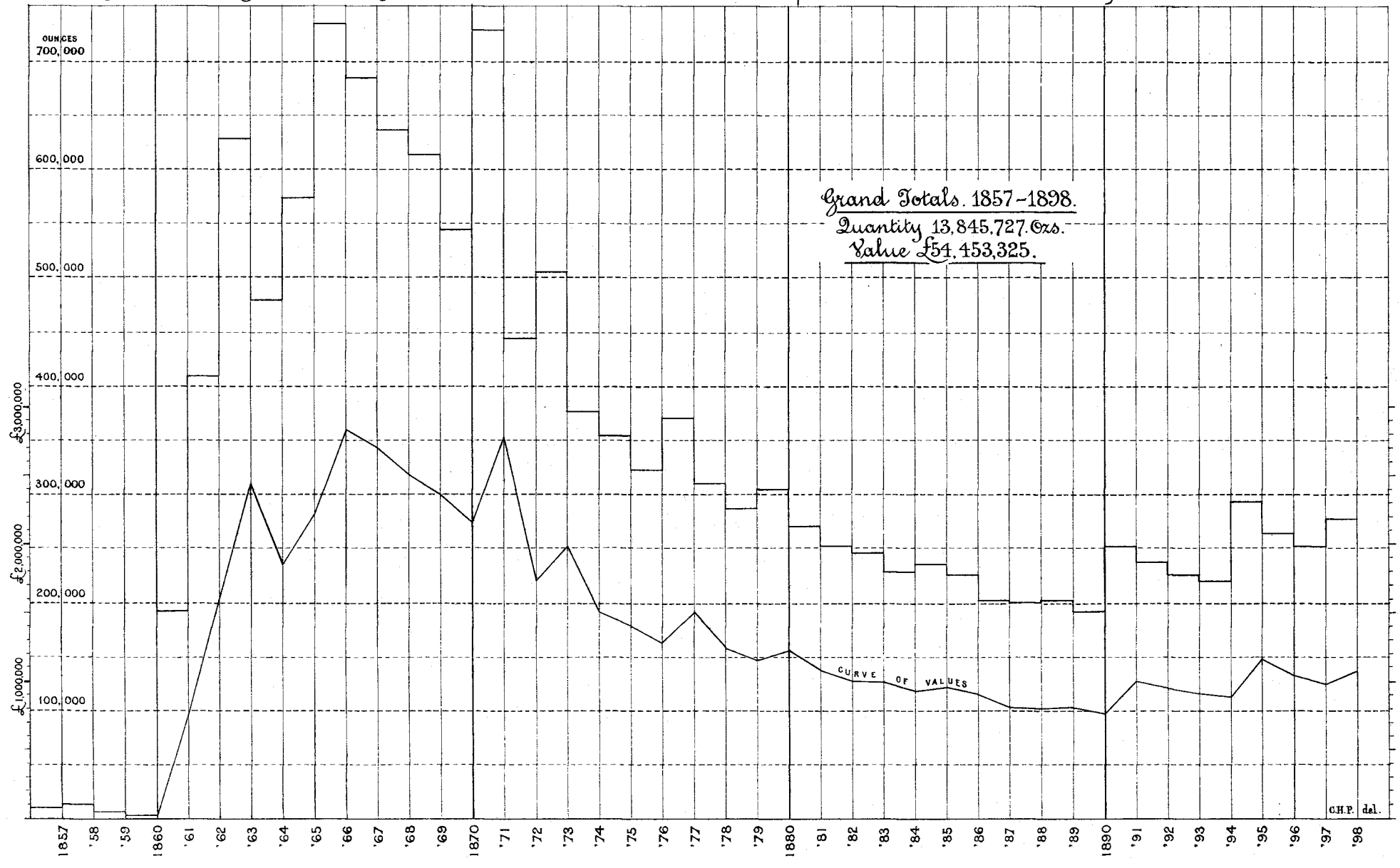
In the conduct of operations prosecuted in search of gold and silver, steady perseverance has characterized the efforts of all the companies and persons who have entered on the industry as a field for legitimate investment.

Prospecting-works that were carried on throughout the goldfields in both Islands, and which did not realise encouraging results, have for the most part been stopped, and only in those mines that are favourably situated, or those from which the returns have been satisfactory, have progressive and development works been vigorously prosecuted.

It is satisfactory to note that in most instances an increase in the yield has resulted from further development of quartz, alluvial, hydraulic sluicing, and dredging claims, on which improvements and additions have been made to the different plants and machinery required in the working of mines, and the recovery of the precious metals.

Dividends to a considerable amount have been paid by quartz, hydraulic mining, and dredging companies, and there are evidences that the number of dividend-paying mines is on the increase.

Diagram showing TOTAL QUANTITY & VALUE of GOLD exported from N.Z. for the years 1857 to 1898.



The following statement of the quantity and value of gold entered for exportation for the year ended 31st March, 1899, shows by the material increase in the quantity exported that this industry continues to be of very great importance :—

Name of District.	Year ended 31st March, 1898.		Year ended 31st March, 1899.		Increase for 1899.
	Oz.	£	Oz.	£	Oz.
Auckland	108,490	401,602	148,183	545,463	39,693
Marlborough	619	2,400	621	2,406	2
Nelson	758	2,853	1,720	6,882	962
West Coast	66,121	264,481	74,700	298,824	8,579
Otago	75,504	304,862	78,289	315,306	2,785
Canterbury	..	..	12	49	12
Totals	251,492	976,198	303,525	1,168,930	52,033

The hopeful anticipations of a substantial increase in value of the yield of gold for this year are in a great measure realised, especially in quartz-mining and dredging.

QUARTZ-MINING.

The developments in quartz-mining have been of a very satisfactory character for the past year, and many of the operations conducted have met with marked success. This industry continues to attract great attention from mining investors, and capital is constantly forthcoming in the development of mines, and in the erection of necessary machinery.

The majority of claims taken up about three years ago have been surrendered, and operations are now chiefly conducted in the older claims, and in the mines that recently have been the best gold-producers. There are, however, a number of places where newer mines are being opened, and on which the necessary machinery is being erected, that give favourable promise of future gold-production. It may be said that the pursuit of this class of mining is now carried on on a more stable footing, and the great increase in the yield of gold from this source gives proof that a legitimate conduct of operations has been productive of such a successful issue.

The following list of companies outside the colony connected with New Zealand mining shows that the interest taken in this industry is still maintained :—

Name.	Locality in which Operations are being carried on.	Nominal Share Capital.	London Office.
		£	
Achilles Gold-mines	Otago	92,000	6, Queen Street Place.
Anglo-Continental Gold Syndicate (Limited) ..	General	100,000	Austinfriars, London.
Anglo-New Zealand Mines Investment	"	100,000	54 and 55, London Wall.
Apakura Syndicate	"	1,800	10, Bloomfield Street.
Aroha Gold-mines	Aroha	100,000	30 and 31, St. Swithin's Lane.
Australasian Gold Trust	Taitapu, Nelson ..	500,000	9, St. Mildred's Court, E.C.
Blagrove's Freehold Gold-mining Company ..	Coromandel ..	62,500	97, Dashwood House, E.C.
Blue Spur and Gabriel's Gully Consolidated Gold-mining Company	Otago	130,000	6, Great St. Helen's, E.C.
Britannia (Hauraki) Gold-mining Company ..	Coromandel ..	100,000	34 and 36, Gresham Street, E.C.
C.N.Z. Syndicate	General	10,000	..
Collingwood Goldfields	Collingwood, Golden Bay	150,000	46, Queen Victoria Street, E.C.
Colville Company	Coromandel ..	7,500	7, Drapers' Gardens, E.C.
Consolidated Goldfields of New Zealand	Reefton	225,000	11 and 12, Cornhill, E.C.
Coromandel Exploration Syndicate	General	2,000	6, Great St. Helen's.
Cromwell Proprietary	"	100,000	54, Old Broad Street, E.C.
Dolcoath Gold-mining Company (Hauraki Peninsula, New Zealand)	Coromandel ..	150,000	142 and 143, Palmerston Buildings, E.C.
Dual Syndicate	General	10,000	3, Clement's Lane, E.C.
East Hauraki Gold-mining	Coromandel ..	100,000	Finsbury House.
Ethel Reef Gold-mining Company	Te Aroha ..	200,000	Dashwood House, E.C.
Fame and Fortune	Thames	50,000	110, Cannon Street.
Finance, Mines, Industries Association	..	5,000	"
Fortuna (Hauraki) Gold-mines	Thames	50,000	3, Laurence Pountney Hill, E.C.
Glenrock Consolidated (Limited)	General	225,003	35, Queen Street, E.C.
Gloucester Gold-mining Company	Thames	120,000	Throgmorton House, E.C.
Golden Blocks	Taitapu, Nelson ..	100,000	11, Old Broad Street, E.C.
Golden Eclipse Mine (Hauraki)	Thames	75,000	..
Golden Lead of Hauraki	Coromandel ..	100,000	Moorgate Court, E.C.
Golden Pah (Hauraki)	" ..	62,500	97, Dashwood House, E.C.
Goldfields of Hauraki Prospecting Syndicate ..	General	3,000	53, New Broad Street, E.C.
Goldfields of New Zealand	"	100,000	13, St. Helen's Place, E.C.
Gold Trust of New Zealand	"	100	4, Great Winchester Street, E.C.
Good Luck Gold-mines of New Zealand	..	75,000	..
Grey Consolidated	Grey	200,000	15 and 16, George Street, S.W.
Hauraki Associated Gold Reefs	Coromandel ..	100,000	Winchester House.
Hauraki (Auckland) Goldfields Syndicate	General	10,000	36, Basinghall Street, E.C.
Hauraki Development Syndicate	Thames	25,000	..
Hauraki East	General	150,000	6 and 7, Grocers' Hall Court, E.C.
Hauraki Golden Age Mines	Thames	..	13 and 14, Abchurch Lane, E.C.
Hauraki Golden Bay Mines	General	150,000	8, Old Jewry, E.C.

Name.	Locality in which Operations are being carried on.	Nominal Share Capita	London Office
		£	
Hauraki Gold-mining Company	Coromandel ..	40,000	97, Dashwood House, E.C.
Hauraki New	" ..	150,000	3, Princes Street.
Hauraki (New Zealand) Associated Gold-mines ..	" ..	100,000	..
Hauraki Peninsula Exploration	Thames	20,000	..
Hauraki South Gold-mining Company	Coromandel ..	90,000	7, Great Winchester Street.
Hikutaia Gold Syndicate	Ohinemuri ..	15,000	Suffolk House, E.C.
Humphrey's Hydraulic Sluicing	Humphrey's Gully	150,000	11, Cornhill, E.C.
Inkerman Combined Gold-mines	General	200,000	15 and 16, George Street, S.W
Irene (Hauraki) Gold-mine	Kuaotunu ..	80,000	Dashwood House.
Island Block Gold-mining Company	Otago	60,000	4, Lombard Court, E.C.
J. R. Exploration Syndicate	..	5,000	..
Kapai-Vermont Gold-mining Company	Kuaotunu ..	150,000	1, St. Helen's Place, E.C.
Kapanga Gold-mining Company	Coromandel ..	250,000	97, Dashwood House.
Karaka (Limited)	Thames	150,000	..
Kathleen Crown	Coromandel ..	75,000	Dashwood House.
Kathleen Gold-mine	" ..	75,000	Dashwood House.
Kauri Freehold Gold Estates	General	250,000	6, Drapers' Gardens.
Kawarau Dredging Company	Kawarau River, Otago	15,000	..
Key of Komata	Ohinemuri ..	100,000	34 and 36, Gresham Street, E.C.
Komata Exploration Company	" ..	..	31, Lombard Street, E.C.
Komata Reefs Gold-mining Company	"	100,000	97, Dashwood House.
Kuranui-Caledonian Gold-mining Company ..	Thames	175,000	20, Great Winchester Street.
London and Auckland Exploration Company ..	..	250,000	..
London and New Zealand Exploration	General	100,000	Broad Street House.
London and New Zealand Finance Corporation ..	"	102,000	139, Cannon Street, E.C.
London and West Australian Exploration	"	270,000	1, Great Winchester Street.
London and West Australian Investment	"	100,000	Broad Street House.
Mahara Royal	..	150,000	54, Old Broad Street.
Mahakirau Syndicate	..	20,000	3, Crown Court.
Maori Dream Gold-mines, Tairua	Tairua	130,000	8, Old Jewry, E.C.
Maori Gold	Tairua	100,000	8, Old Jewry.
Maori Syndicate	General	10,000	Austinfriars Passage, E.C.
Maoriland Gold-mines	"	95,000	Dashwood House.
Mariposa Gold-mines	..	100,000	3, Crown Court.
May Queen (Hauraki)	Thames	200,000	22, Austinfriars.
Melville's New Zealand Corporation	General	100,000	20, Great Winchester Street, E.C.
Mines Corporation of New Zealand	"	251,875	3, Princes Street, E.C.
Moanataiari Gold-mining Company	Thames	200,000	110, Cannon Street.
Monowai Gold-mines	Waiomo	150,000	28, Renfield Street, Glasgow.
Montezuma Gold-mines	Te Aroha ..	30,000	15, Sergeant's Inn.
New Alburnia Gold-mining Company	Ohinemuri ..	180,000	Finsbury House, E.C.
New Alburnia Gold-mining Company	Thames	180,000	Finsbury House, Bloomfield Street, E.C.
New Hauraki Gold Properties	Thames and Coromandel	100,000	Dashwood House.
New Hauraki Properties	Coromandel ..	80,000	Dashwood House.
New Inkerman Mines	Reefton	100,000	..
New Zealand and General Mining Syndicate ..	General	25,000	19A, Coleman Street, E.C.
New Zealand and Globe Exploration	"	10,050	4, Great Winchester Street, E.C.
New Zealand and Western Australia Syndicate ..	"	50,000	Portland House.
New Zealand Broken Hills Gold-mining Company ..	Tairua, Thames ..	300,000	13, St. Helen's Place, E.C.
New Zealand Consolidated	General	50,000	15, George Street, Mansion House, E.C.
New Zealand Corporation	General	100,000	3, Laurence Pountney Hill, E.C.
New Zealand Crown Mines Company	Karangahake ..	200,000	11 and 12, Cornhill, E.C.
New Zealand Exploration Company	General	75,000	30, St. Swithin's Lane.
New Zealand Finance Syndicate	"	10,000	32, Old Jewry, E.C.
New Zealand Gold Development Syndicate ..	..	..	23, College Hill, E.C.
New Zealand Goldfields	General	50,500	23, College Hill, E.C.
New Zealand Gold Investment	"	5,000	11, Abchurch Lane.
New Zealand Gold Share and Finance Company ..	"	..	3, Newman's Court, Cornhill.
New Zealand Gold Share and Finance Company ..	"	..	
New Zealand Joint-stock and General Corporation ..	"	150,000	Finsbury House, E.C.
New Zealand Jubilee Gold-mines	Waitekauri ..	125,000	20, Great Winchester Street, E.C.
New Zealand Minerals Company	General	250,000	3, Laurence Pountney Hill, E.C.
New Zealand Mines Trust	"	200,000	11, Abchurch Lane.
New Zealand Pioneers	"	100,000	46, Queen Victoria Street.
New Zealand Talisman	Karangahake ..	150,000	65, New Broad Street.
New Zealand Venture Syndicate	General	5,000	11, Abchurch Lane.
Norman Proprietary Gold-mines	Waitekauri ..	75,000	Bloomfield House, E.C.
North Island New Zealand Prospecting Syndicate ..	General	50,000	9, St. Mildred's Court, Poultry, E.C.
North Kapanga Gold-mining Company	Coromandel ..	60,000	54, Old Broad Street, E.C.
Ohinemuri Syndicate	Owharoa ..	60,000	11, Abchurch Lane.
Otago Syndicate	General	20,025	30, St. Swithin's Lane.
O.P.Q. Waipori Gold-mines	Otago	150,000	3, Laurence Pountney Hill, E.C.
Peveril Gold-mines	Coromandel ..	80,000	27, Old Jewry.
Phœnix	Macetown, Otago	200,000	3, Queen Street.
Preece's Point Proprietary (Hauraki)	Coromandel ..	100,000	Dashwood House.
Premier New Zealand Gold-mining Company ..	Macetown, Otago	50,000	3–5, Queen Street, Cheapside, E.C.
Progress Mines of New Zealand	Reefton	275,000	11 and 12, Cornhill, E.C.
Puriri Gold Estates	Puriri, Thames ..	175,000	..
Ravenscliff Mining Company	General	60,000	Winchester House.
Royal Oak of Hauraki	Coromandel ..	250,000	63 and 64, New Broad Street.
Scandinavian Gold-mines	Hauraki ..	110,000	3, Newman's Court.

Name.	Locality in which Operations are being carried on.	Nominal Share Capital.	London Office.
		£	
Scottish Coromandel Corporation	Coromandel ..	175,000	..
Scotty's Gold-mines	" ..	100,000	63 and 64, New Broad Street.
Southern Star Gold-mines	" ..	75,000	63 and 64, New Broad Street.
Success Gold-mines	" ..	50,000	Dashwood House.
Taitapu Gold Estates	Nelson	150,000	9, St. Mildred's Court.
Tararu Creek Gold-mining Company	Thames	95,000	Dashwood House.
Thames-Hauraki Goldfields	"	275,000	54, Old Broad Street, E.C.
Tokatea Consols	Coromandel ..	100,000	45 and 46, Broad Street Avenue.
Tokatea of Hauraki	" ..	150,000	63 and 64, New Broad Street.
Triumph-Komata Gold-mine	Ohinemuri ..	175,000	Finsbury House.
Tui Gold-mines	Tui Creek ..	100,000	8, Old Jewry, E.C.
Union-Waihi Gold-mining Company	Waihi	200,000	11, Abchurch Lane.
United New Zealand Exploration	General	250,000	22, Austinfriars.
Victor Waihou Gold-mining Company	Karangahake ..	170,000	63 and 64, New Broad Street.
Waihi Consolidated Gold-mines	Waihi	200,000	39, Lombard Street, E.C.
Waihi-Gladstone	"	100,000	8, Old Jewry.
Waihi Gold-mining Company	"	320,000	11, Abchurch Lane.
Waihi-Grand Junction	"	200,000	18, Finsbury Circus.
Waihi New	Thames	160,000	11, Abchurch Lane.
Waihi Proprietary Company	General	175,000	Bishopsgate Street House, E.C.
Waihi-Silverton Gold-mines	Waihi	100,000	23, College Hill, E.C.
Waiho Hydraulic Sluicing and Water-race Company	Westland ..	..	9, New Broad Street, E.C.
Waitaia Gold-mines	General	100,000	82, Gordon Street, Glasgow.
Waitekauri Central	Waitekauri ..	65,000	63, New Broad Street.
Waitekauri Consolidated Gold-mines	" ..	120,000	Swan Chambers, E.C.
Waitekauri Cross	" ..	100,000	19A, Coleman Street.
Waitekauri Extended	" ..	175,000	63 and 64, New Broad Street.
Waitekauri Gold-mining Company	" ..	230,000	11, Abchurch Lane.
Waitekauri United	" ..	150,000	Finsbury House, E.C.
Waitekauri Union Claims	Hauraki ..	300,000	15 and 16, George Street, E.C.
Wealth of Nations	Reefton	..	77, Bishopsgate Street Within, E.C.
Welcome Gold-mining Company	"	110,000	11, Cornhill, E.C.
Westport Twins Gold-mines	Westport ..	100,000	28, Basinghall Street, E.C.
Westralia and New Zealand Gold-explorers ..	Macetown, Otago	..	3-5, Queen Street, E.C.
West Tokatea Gold-mine	Coromandel ..	50,000	..
Whangamata Gold Corporation	Whangamata ..	200,000	23, College Hill, E.C.
Wheel of Fortune	Stafford, Westland	125,000	..
Winding Creek Gold-mining Company	Otago	30,000	14, Sherborne Lane, E.C.
Woodstock	Karangahake ..	150,000	6, Drapers' Gardens, E.C.
Woodstock Main Reef	Ohinemuri ..	..	3, Princes Street, E.C.

NORTH ISLAND.

Puhipuhi Mining District.

Mining matters in this district are not yet advanced to such an extent that payable reefs have been met with, although latterly a new company has become possessed of some of the older claims, and is carrying on works to test the reefs at deeper levels.

Abstract of Licenses for Special Claims issued from the Warden's Office at Whangarei, in the Puhipuhi Mining District, and registered on or before the 31st March, 1899, in the Books of the Mining Registrar at Whangarei.

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
17/2/98	100	0	0	Puhipuhi ..	III.	Hukerenui ..	Star of England ..	Montezuma Gold-mining Co.
17/2/98	100	0	0	" ..	"	" ..	Star of England Extended	"
21/12/98	100	0	0	" ..	"	" ..	Hampton No. 1 ..	Hampton Plains.
21/12/98	100	0	0	" ..	"	" ..	Hampton No. 2 ..	"
21/12/98	96	0	0	" ..	"	" ..	Hampton No. 3 ..	"

Hampton Plains Mine (Area, 296 acres; owners, the Hampton Plains Company—English).—Prospecting operations have been carried on to a considerable extent. The low level has been extended, and is now in a distance of 800 ft. The greatest depth of backs that this level will command is about 270 ft. Another level has also been driven a distance of 200 ft. The company is forwarding by the "Star of England," 13 tons of quartz, containing sulphides of silver, to Swansea for treatment. An average of eight men were employed for the year. This is the only mine that is being and has been worked for some years past.

At Kauri Mountain some prospecting has been done, but so far the results are not satisfactory.

Ohaeawai.

Works which were carried on near the hot springs at this place are all suspended, and the plant and machinery removed.

Great Barrier Island.

In this district mining and prospecting operations have been confined to three or four claims, but so far machinery for the extraction of gold and silver is not yet erected.

The following list shows the whole of the claims registered, and for which titles were in existence, at the end of the year:—

Abstract of Licenses for Special Claims issued from the Warden's Office at Thames, and situated in the Great Barrier Island, and registered on or before the 31st March, 1899, in the Books of the Mining Registrar, Thames.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
	A. R. P.					
30/11/96	100 0 0	Great Barrier	VI.	Fitzroy ..	Fitzroy ..	Great Barrier Gold-mining Co. (N.L.).
30/11/96	100 0 0	"	VI.	"	Great Barrier Extended	Great Barrier Gold- and Silver-mining Co. (N.L.).
30/11/96	100 0 0	"	VII.	"	Great Barrier Excelsior	William Ernest Cossar.
28/9/98	100 0 0	"	VI.	"	Mount Argentum	Mount Argentum Gold-mining Co. (N.L.).
10/11/98	40 0 0	"	VI.	"	Okupa ..	Barrier Reefs Gold-mining Co. (Ltd.).
10/1/99	99 1 22	"	VII.	"	Original Great Barrier	Original Great Barrier Gold-mining Co. (N.L.).

In the Great Barrier Island a considerable amount of prospecting has been carried on in some of the mines, and the character of the quartz disclosed is generally of a favourable nature.

Barrier Reefs Mine.—This company are systematically prospecting their property, and doing good, permanent work. A low-level cross-cut has been put in from the side of the hill for a distance of 1,050 ft., and has intersected what is termed the large reef; but as a considerable quantity of water was running from the face when the reef was cut, it was deemed advisable to discontinue driving on it for a time until the water had drained off. The tests taken from the reef did not give a high percentage of the precious metal, but little was done to prove its value. Driving has been done on a reef that was intersected at a distance of 700 ft. from the mouth of the tunnel. The drive west on this reef is in 220 ft. from the cross-cut, and the eastern drive is in 243 ft.; about 60 ft. of further driving east on the reef will connect with a shaft that has been sunk from the side of the hill to a depth of 220 ft., and this will provide adequate ventilation. The reef varies from 1 ft. to 6 ft. in width, and there will be about 350 ft. of backs from the low level. Tests have been made from time to time from this reef, and satisfactory results obtained. The company contemplate erecting a 20-stamp mill, to be fitted up with all modern appliances for the treatment of the ore. The situation of the site for the battery and buildings will be about half a mile from the present low level. Fifteen men were employed in the mine.

Great Barrier Gold- and Silver-mining Company's Mine.—This company have given an option over their property to some English investors, who have carried on development and prospecting works. In the upper level a considerable amount of driving has been done on the reef, but the operations now in progress are confined to extending the low-level cross-cut to intersect the large reef, and driving east on Lee's reef. The cross-cut is in 300 ft., the country in the face being of a very hard description. The western drive on Lee's reef is in 170 ft. from the cross-cut, and has been continued to the Barrier Reefs boundary. The reef varies from 1 ft. to 2 ft. in width, the quartz being of a kindly description, and the country generally presenting favourable characteristics. Fourteen men were employed in this mine.

Mr. Albion S. Howe, civil and mining engineer, has furnished the following report on the Great Barrier Island, and the mines and workings:—

"The Great Barrier Island is about sixty miles north-east from Auckland and fourteen miles north from Cape Colville. Its extreme length is about twenty-six and its greatest breadth sixteen miles. The gold- and silver-mines of the Great Barrier are located on the slopes of a hill about two miles from the north shore of Blind Bay. This hill is locally known as the "White Cliffs"; its Maori name is Te Ahumata. The highest point of Te Ahumata is nearly 1,300 ft. above the sea. From that point as a centre, a circle with a radius of 1,000 yards would include all mine-workings in which anything of value has been found. Te Ahumata and the south-east part are nearly separated from the main body of the island by the Kaitoke Swamp to the north and by Whangaparapara Harbour to the westward, there being only a ridge about half a mile wide between Kaitoke Creek and Whangaparapara.

"The surface of the country for some miles around Te Ahumata is thickly covered with volcanic ash and mud, and strewn with rock *débris* from the cliffs above. In the vicinity of Kaitoke Swamp, and from one to four miles away from the cliffs, this tuff is coloured brick-red by iron-oxide. In most places, however, the tuff is an ash-grey to a brown in colour. Owing to this deposit of ash and loose rock, the quartz reefs only outcrop in the neighbourhood of creeks or near the edge of cliffs, and it is usually difficult, and often impossible, to trace the course of a reef on the surface. A number of prospecting cross-cut tunnels were started in this tuff by different companies, but none of them developed anything. Some were driven several hundred feet without getting into solid country. If valuable quartz veins exist in the line of those tunnels, the tunnels may have passed over the top of them.

"Besides being a volcanic centre, Te Ahumata has been a theatre of great hydrothermal action. This is shown by the extensive kaolinization of feldspars, the signs of mud springs, the beds and concretions of iron-pyrites, and the great extent of sinter deposits on the hills. In many places beds of almost pure kaolin can be seen. This is usually white in colour, but some beds are

coloured black by organic matter. In these kaolin beds crystals and bunches of crystals of bright, untarnished iron-pyrites occur. On the new wagon-road to Whangaparapara the cuttings show beds of kaolin, soft and unctuous in one place, with a gradual change, until further on the clay has been metamorphosed to a white flinty porcelanite and chert. The bulk of the rock composing the white cliffs on the north, east, and west sides seems to be of this jasper-porcelanite, the south side being mostly scoriaceous trachyte. The porcelanite sometimes contains small nodules of kaolin and pyrite, and with which sulphide of silver has been seen. Almost any of the rock will give by fire-assay traces of silver and gold. One assay by the writer gave 2·1 oz. silver and 0·06 oz. gold to the ton. The baked clays are stratified in beds, the planes of stratification usually falling away from the hill. They rest unconformably on the eruptive rocks beneath. Through the clay beds dykes of trachyte have made their appearance. The heat from the dykes, and perhaps from laccolites beneath, has baked the clays. At a lower elevation on the hill, excavations have disclosed a dark-grey porphyritic rock which quickly decomposes on exposure to the air. The disintegration of this rock will account for the formation of the clay beds.

"The top of Te Ahumata is about half a mile in diameter, with the south-east portion the lowest. Around the rim rock shows in place. The central portion is little lower than the edges, and is covered with rock *débris* and mud. A number of holes, probably fumaroles, were noticed. Obsidian and pumice are common on the surface. Large quantities of kauri-gum have been dug on top of this hill in years past, and gum-diggers still work there; but there are no large trees within 400 ft. of the top of the hill.

"The only mining being done on the Barrier is on the Great Barrier and on the Barrier Reefs Claims, which are adjoining properties, and working on the same reef. This reef has been named the Lee Reef. The workings on the Lee Reef are about half a mile north-west from the summit of the hill The Lee Reef has a strike nearly magnetic east and west, and a dip to the south of 70 deg. It has been developed in the two properties by drifts along its strike for nearly 1,200 ft., and in that distance no faulting has occurred, and there has been but little change in its general direction. The workings of the Great Barrier Company on this reef consist of two levels, about 90 ft. apart. The end of the upper drift is about 600 ft. from the boundary-line between the Great Barrier and Barrier Reefs. The mouth of the drift or adit is a few feet from the boundary. A cross-cut tunnel, about 200 ft. long, connects the low level with the surface. The low level is being extended eastward, and the face is over 200 ft. from the boundary-line. The ore being taken out is good-looking quartz.

"The workings of the Barrier Reefs consist of an upper level driven on the reef for 150 ft. The mouth of this drift is about 80 ft. from the entrance to the upper drift of the Great Barrier Company, and is on the same level. A creek between the two shows the reef exposed on the surface. Near the creek a shaft was sunk 214 ft., and a cross-cut was made to the reef. The low level is now being extended eastward to join this cross-cut. The low-level workings consist of an adit 1,050 ft. long, and about 500 ft. of drifting on the reef. The reef was cut 700 ft. from the mouth of the adit, but the cross-cut was continued until another reef was cut in the present face of the adit.

"The Lee Reef has varied in width from 8 in. to 6 ft., but is usually between 18 in. and 3 ft. in width. The reef is a fissure vein in a dark basic eruptive rock, probably diorite. The diorite is usually decomposed and bleached on one wall or both, but in places it is aphanatic, with the quartz frozen to both walls. The country to the north and south from this sheet of diorite, as exposed in the cross-cuts, appears to be an andesite. The ore shows a ribbon structure. There is usually a rib of white quartz in the centre of the vein, with a band of richer ore on each side. In the vicinity of a 'horse' the vein is usually brecciated, with the angular fragments of country rock partly or wholly replaced by ore. The surface ores are high-grade in silver in the form of sulphide, mostly stephanite and polybasite, with some pyrargyrite and proustite. On the surface, in places, assays can be taken of samples across the reef giving over 400 oz. in silver to the ton, besides good values in gold. With depth the percentage of silver in the ore has decreased, and that of gold has increased. Some high-grade gold-ore has been taken from the low-level, without enough silver in it to part the assay-button. The gangue is white quartz, with a little calcite and some kaolin. A small percentage of iron-pyrites, with traces of copper-pyrites, and occasionally mispickel, are to be seen in ores from the low levels. No lead, bismuth, or tellurides have been noticed. Gold never shows in the ore, and no prospect can be had in the pan, but the pan-concentrates contain nearly all the gold. The water from the reef contains a small amount of sulphuretted hydrogen, and this, together with the alkaline carbonates, will account for the presence of gold in the reef. Besides the calcite in the reef, there are parallel seams of calcite on each side in hanging- and foot-wall country.

"A number of other reefs show on the surface, some of which have been cut by the underground workings in these properties, but no development-work has been done on them. These reefs have different strikes and dips, some running nearly north and south. The north-and-south reefs are older than the Lee Reef, as shown by the Lee Reef intersecting them. Some of the large reefs contain stibnite. A brown precipitate from the waters from one of them, tested qualitatively, showed iron, antimony, and traces of arsenic.

"On the opposite side of the hill, half a mile south from the Great Barrier-Barrier Reefs workings, is the Barrier Proprietary. Near the surface on this property a body of rich silver-ore was taken out and shipped. The reef has an east-and-west strike, and a dip to the north—the opposite to that of the Lee Reef. In view of the experience on the Lee Reef, it is possible that sinking on the Proprietary Reef might show an increase in gold-values sufficient to warrant development.

"The Iona-Aotea properties have cross-cut tunnels on the north side of the hill, near the contact of the sinter deposit. A little driving has been done from both cross-cuts. The Iona reef seems to be of the same character as the sinter cliffs above, with the difference that in places there appears to be more vitreous quartz showing in the stone. From some of the stone containing this glassy quartz the writer saw very good pan-prospects obtained. There is a chance of getting a rich body of ore on these properties in the vicinity of the contact.

"The Government road from Blind Bay to Whangaparapara is nearly completed, and when that is done the mines will be more accessible. The Barrier Reefs Company contemplate the erection of a stamp-mill on Kaitoke Creek in the near future, and the work of that company and of the Melville Corporation, which holds an option on the Great Barrier Mine, should make this part of the Barrier more lively than it has ever been before."

Coromandel District.

This district comprises the whole of the Coromandel County. Operations have been vigorously carried on in the Coromandel, Tokatea, Opitonui, and Kuaotunu districts, but little or no mining-work has been done in the more northerly and the southerly portions of the field during the year.

The Hauraki, Kapanga, Royal Oak, and Hauraki Associated Mines have been the chief gold-producers, and the extensive developments in the Kauri Freehold Company's mines, and at Kuaotunu, will largely add to next year's gold-production.

The following list shows the licenses for claims now held in the Coromandel and Kuaotunu districts, and it will be seen, on comparison with last year's list, that a very large proportion of the holdings have been surrendered:—

Abstract of Licenses for Special Claims and Licensed Holdings issued from the Warden's Office at Coromandel, in the Hauraki Mining District, and registered on or before the 31st March, 1899, in the Books of the Mining Registrar at Coromandel.

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
10/7/97	100	0	0	Kennedy Bay	II.	Coromandel	Akarana	Golden Butterfly Gold-mining Co. (N.L.).
5/11/96	20	0	0	Coromandel	V.	"	Albion	Hauraki Main Lodes (Ltd.).
20/11/95	78	3	37	"	"	"	Albion Extended ..	"
31/3/98	59	2	0	"	IX.	Harataunga	Avondale Warrior ..	John Bollard.
8/11/97	83	2	0	Kennedy Bay	IV.	"	Bay View	Bay View Gold-mining Co. (N.L.).
23/12/96	63	2	0	Matamata-harakeke	VI.	"	"	"
18/2/96	100	0	0	Coromandel	"	Coromandel	Beatrice	Hauraki Golden Bay Mine (Ltd.).
2/7/95	18	0	30	Tokatea ..	II.	"	Bismarck Extended	J. H. Witheford.
21/8/95	38	1	8	"	"	"	Britannia	Britannia Hauraki Gold-mining Co. (Ltd.).
5/8/97	98	0	0	Kikowhakarere	I.	"	British Kapanga Freehold Proprietary	James Halley.
5/8/97	60	0	0	"	"	"	Ditto Extended ..	"
27/8/95	2	0	12	Coromandel	V.	"	Bunker's Hill ..	Bunker's Hill Gold-mining Co. (Ltd.).
27/8/95	1	0	0	"	"	"	Bunker's Hill Extd.	"
21/2/98	90	0	0	Kennedy Bay	VII.	"	Castle Rock Consolidated No. 1	Kauri Freehold Gold Estates (Ltd.).
21/2/98	90	0	0	"	"	"	Ditto No. 2 ..	"
21/2/98	90	0	0	"	"	"	" No. 3 ..	"
21/2/98	90	0	0	"	XI., VI.	"	" No. 4 ..	"
21/2/98	90	0	0	"	VII., XI.	"	" No. 5 ..	"
21/2/98	90	0	0	"	"	"	" No. 6 ..	"
21/2/98	90	0	0	"	XI.	"	" No. 7 ..	"
21/2/98	90	0	0	"	"	"	" No. 8 ..	"
21/2/98	90	0	0	"	"	"	" No. 9 ..	"
25/7/98	100	0	0	"	X.	"	Charley Beresford ..	John Lynch.
6/6/98	54	0	29	"	II.	"	City of Chester ..	
2/3/98	28	3	3	"	XII.	"	Colorado	William Whitaker.
14/4/96	30	0	0	Tokatea ..	II.	"	Cuirassier	Cuirassier Gold-mining Co. (N.L.).
1/9/96	14	3	21	" ..	"	"	Cuirassier Surplus ..	"
25/6/98	96	1	13	Coromandel	VI.	"	Empress	Empress Gold-mining Co. (N.L.).
21/7/97	50	0	0	"	II.	"	Forest Queen ..	Frederick Charles Ring Horne.
10/3/96	30	0	0	Tokatea ..	"	"	Four-in-Hand ..	Four-in-Hand Gold-mining Co. (N.L.).
1/9/98	28	1	10	Coromandel	"	"	Good Luck ..	H. L. Smith and others.
31/3/98	92	2	22	"	XIV. III.	" Hastings ..	Golden Hill ..	F. G. Clayton.
6/10/96	18	2	0	"	V.	Coromandel	Golden Pah ..	Golden Pah Hauraki (Ltd).
30/11/95	100	0	0	Tokatea ..	II.	"	Golden Shore ..	Hugh Davis.
4/8/98	30	0	0	Coromandel	"	"	Golden Tokatea ..	J. D. Regan.
22/3/97	93	1	28	Port Charles	"	Moehau ..	Grand Moehau Freehold Syndicate No. 1	Fitzgibbon Lough.
5/8/97	63	0	37	Tokatea ..	"	Coromandel	Harbour View ..	Harbour View Gold-mining Co. (N.L.).
21/2/98	54	2	6	..	"	"	Hauraki Gem ..	Matthew Dyer.
6/10/96	29	0	11	Coromandel	V.	"	Hauraki	Hauraki Gold-mining Co. (Ltd.).
28/5/95	6	0	8	"	"	"	Hauraki No. 2 ..	The Hauraki No. 2 Gold-mining Co. (N.L.).
31/3/98	79	0	0	"	XIV. III.	" Hastings ..	Hauraki Queen ..	F. G. Clayton.
13/1/97	80	2	32	Cape Colville	II.	Cape Colville	Hauraki Peninsula ..	W. White and G. Linnet.
9/6/96	14	1	25	Coromandel	V.	Coromandel	Hauraki South ..	Hauraki South Gold-mining Co. (Ltd.).
30/6/97	13	0	0	"	VI.	"	Ida	Joseph Howard Witheford.
25/5/97	53	1	18	Cabbage Bay	"	Harataunga	Jersey	Jersey Gold-mining Co. (N.L.).
28/8/95	92	2	35	Coromandel	V.	Coromandel	Kaka	Hauraki Golden Bay Mines (Ltd.).
4/10/94	99	3	27	"	I., II.	"	Kapanga	Kapanga Gold-mining Co. (Ltd.).
15/12/97	29	1	7	Kapanga ..	VI.	"	Kapanga Township..	Hugh Campbell and J. J. Duross.
24/1/96	15	3	14	Manaia ..	XIV.	"	Native	Ernest C. Daldy.
31/3/98	98	2	33	Coromandel	XIII., XIV.	"	Little Minnie ..	F. G. Clayton.
9/2/99	2	2	0	"	II.	"	Miners	A. B. Kelly and W. Dwyer.
11/2/96	14	2	28	"	VI.	"	New Hauraki ..	New Hauraki Gold Properties (Ltd.).
5/8/97	94	1	24	"	"	"	New Hauraki Gold Properties (Ltd.) No. 1	"

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Coromandel—*continued.*

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
5/8/97	66	0	0	Coromandel	VI.	Coromandel	New Hauraki Gold Properties (Ltd.) No. 2	New Hauraki Gold Properties (Ltd.).
28/5/95	16	1	28	"	II.	"	New Tokatea ..	Tokatea Consols Gold-mining Co. (Ltd.).
27/8/95	14	0	0	Tokatea ..	"	"	New Tokatea Extd.	"
24/7/97	82	0	0	Kennedy Bay	X.	Harataunga	Noko	Arthur Frederick Witty.
30/6/97	25	3	16	Preece's Point	V.	Coromandel	Nora	Henry Thomas Gorrie.
24/7/97	99	2	0	Kennedy Bay	VI.	Harataunga	North Star ..	Flossie Gold-mining Co. (N.Z.).
7/6/97	48	2	10	Tokatea ..	II.	Coromandel	Orina	Hauraki (N.Z.) Associated Gold-mines (Ltd.).
23/11/95	36	0	32	" ..	"	"	Paul's Creek ..	William James Allen.
15/9/97	8	3	0	Coromandel	VI.	"	Peeblean	Matthew Dyer.
23/12/96	32	0	32	Tokatea ..	II.	"	Pigmy	Pigmy Gold-mining Co. (N.L.).
8/7/96	53	1	8	Coromandel	VI.	"	Poneke No. 2 ..	F. Swindley and H. C. Bell.
24/1/96	15	3	5	"	II., VI.	"	Poneke No. 3 ..	Henry C. Bell.
7/6/97	38	0	18	Tokatea ..	II.	"	Pride of Tokatea ..	Hauraki (N.Z.) Associated Gold-mines (Ltd.).
23/7/96	60	0	0	Tiki ..	X.	"	Progress Castle Rock	Progress Castle Rock Gold-mining Co. (N.L.).
7/7/98	29	3	26	Coromandel	VI.	"	Prospere	John FitzGerald.
1/12/96	17	0	10	Tiki ..	X.	"	Pukewhau	Pukewhau Gold-mining Co. (N.L.).
31/3/98	52	2	22	Coromandel	II.	"	Queen of the North ..	Queen of the North Gold-mining Co. (N.L.).
11/2/96	9	2	10	Tiki ..	X.	"	Royal Mint ..	Rickley F. Gerdes.
27/2/96	39	1	9	Tokatea ..	II.	"	Royal Oak of Hauraki	Royal Oak of Hauraki (Ltd.).
21/2/98	68	0	17	..	"	"	Scotty's	Scotty's Gold-mine (Ltd.).
2/7/95	30	0	0	Tokatea ..	"	"	Standard	Edward Claude Randle.
28/8/95	88	0	0	Coromandel	V.	"	Stanley	Hauraki Golden Bay Mine (Ltd.).
15/12/97	100	0	0	"	"	"	Stirling	William Thompson McGregor.
10/3/96	15	2	6	"	II., VI.	"	Success	Success Gold-mines (Ltd.).
5/2/95	5	0	25	"	II.	"	Suez Extended ..	New Golconda Gold-mining Co. (N.L.).
18/5/96	100	0	0	Tokatea ..	"	"	Tainui	S. W. Bedlington.
19/9/96	42	0	38	" ..	"	"	Tainui Extended ..	J. M. Brigham, jun.
24/7/97	71	0	0	Kennedy Bay	X.	Harataunga	Tawera	Arthur Frederick Witty.
1/2/96	75	2	2	Tokatea ..	II.	Coromandel	Tokatea of Hauraki	Tokatea of Hauraki (Ltd.).
23/12/96	91	2	11	" ..	III.	"	Tokatea Hinemoa ..	Tokatea Hinemoa Gold-mining Co. (N.L.).
23/3/97	30	0	0	" ..	II.	"	Tongariro	Charles M. McFarlane.
15/9/97	15	1	20	Coromandel	VI.	"	Trig Hill	T. Morrin, S. T. George, J. Russell, and J. W. Lennox.
14/3/93	20	0	10	Tiki ..	X.	"	Vaughan	Matawai Gold-mining Co. (N.L.).
5/2/95	8	1	8	Coromandel	V.	"	Welcome Find ..	Welcome Find Gold-mining Co. (Ltd.).
2/4/97	24	0	17	"	"	"	Zelanadia	Zealandia Gold-mining Co. (N.L.).
					Kuaotunu District.			
7/4/96	100	0	0	Kuaotunu ..	II.	Otama ..	Aorere	Aorere Gold-mining Co. (N.L.).
12/11/95	30	0	0	" ..	V.	" ..	Balfour	Balfour Gold-mining Co. (N.L.).
2/3/98	28	3	3	" ..	XII.	Coromandel	Colorado	W. Whitaker.
6/6/98	86	0	0	" ..	XV.	" ..	Day Dawn ..	J. H. Taylor.
19/11/89	28	0	12	" ..	V.	Otama ..	Great Mercury ..	Great Mercury Gold-mining Co. (Ltd.).
12/5/96	5	2	1	" ..	II.	" ..	Handsworth ..	Louis Woodcock.
22/9/96	57	2	0	" ..	V.	" ..	Irene	Irene Hauraki.
25/2/98	99	2	0	" ..	IV., V.	" ..	Jupiter No. 1 ..	Sir T. S. Tancred and John Whittaker.
25/2/98	94	0	0	" ..	IV.	" ..	Jupiter No. 2 ..	"
25/2/98	84	3	0	" ..	"	" ..	Jupiter No. 3 ..	"
25/2/98	66	1	0	" ..	"	" ..	Jupiter No. 4 ..	"
1/10/95	4	0	0	" ..	V.	" ..	Kapai-Vermont ..	Kapai-Vermont Gold-mining Co. (Ltd.).
15/5/95	31	3	19	" ..	"	" ..	" ..	"
22/8/98	94	0	0	" ..	V.	" ..	Lucky Maori ..	C. F. Brown.
7/6/97	100	0	0	Matarangi ..	IV.	" ..	Murphy's Hill ..	Kauri Freehold Gold Estates (Ltd).
21/11/98	100	0	0	Kuaotunu ..	II.	" ..	Nordenfeldt ..	F. A. White.
24/10/93	29	1	35	Matarangi ..	I.	" ..	Ocean View Extended	Matarangi Gold-mining Co. (Ltd.).
24/7/97	100	0	0	Mercury Bay	XII.	Coromandel	Owera	Kauri Freehold Gold Estates (Ltd.
1/10/95	6	1	12	Kuaotunu ..	V.	Otama ..	Try Fluke Extended	Mariposa Gold-mining Co. (Ltd.).
18/5/96	100	0	0	" ..	"	" ..	Try Fluke	"
24/4/96	85	2	0	" ..	"	" ..	Waitaia	Waitaia Gold-mines (Ltd.).

Port Charles District.

In this district operations to a very limited extent only have been carried on, the whole of the mines, with the exception of the Eva, having suspended workings. The quantity of gold obtained by the Eva Mine was 85 oz., valued at £229 10s. The gold is chiefly obtained from small leaders. Two men were employed.

Cabbage Bay District.

There are five mines at present working in this district, but not to any great extent, and, in consequence, the yields are small. The production was as follows: The Jersey crushed 2 tons 10 cwt. for 1 oz. 4 dwt., valued at £3 4s. 10d.; the Belgic, 1 ton 10 cwt. for 2 oz., valued at £5 8s.; Beattie and Ford, 1 ton 10 cwt. for 3 oz. 10 dwt., valued at £9 9s.; Queen Victoria of Hauraki, 7 tons for 42 oz. 5 dwt., valued at £29 2s.; City of Gisborne, 1 ton 19 cwt. for 14 oz. 15 dwt., valued at £41 5s. 10d. Twelve men were employed in these mines.

Kennedy Bay District.

Bay View Mine is the largest contributor in this district, but operations on the whole do not seem to be carried on with much vigour. The mines crushed as follows: Flossie tributers, 1 ton 12 cwt., for 11 oz. 7 dwt., valued at £31 15s. 7d.; Morning Star, 2 tons 2 cwt., for 2 oz. 1 dwt.,

valued at £5 14s. 9d.; Bay View, 5 tons 10 cwt., for 22 oz. 15 dwt., valued at £63 14s.; Vanderbilt, 2 tons, for 18 dwt., valued at £2 10s. 7d.; Evening Star, 11 cwt., for 4 dwt., valued at 11s. 2d.; Simonds, 1 ton 5 cwt., for 14 dwt., valued at £1 19s. 2d.; Dyer's Claim, 3 lb., for 11 oz. 7 dwt., valued at £31 15s. 7d.; Rose, 47 lb., for 5 oz., valued at £14. The number of men employed in these mines was nineteen.

Tokatea District.

Queen of the North Mine.—This mine, which is situated to the northward of the Royal Oak and Tokatea Mines, was at one time remarkable for rich yields of gold. The leaders worked on are generally small, and encased in hard andesite rock. The owners crushed 3 cwt. 30 lb., for a return of 23 oz. 18 dwt., valued at £68 2s. 3d.; and the tributers, 3 tons 14 cwt. 92 lb., for 33 oz. 8 dwt., valued at £95 3s. 9d. Six men were employed.

Royal Oak Mine (Area, 143 acres 3 roods 11 perches; owner, the Royal Oak of Hauraki, Limited; mine-manager, Francis Hodge).—This mine is situated on the Tokatea Range, and includes the land formerly held by the Tokatea Company. The adit-level is situated on the eastern side of the range, and below this level a shaft has been sunk to a considerable depth. The present depth of workings below the crown of range is 1,040 ft. over this. There are five levels, at a depth from the crown of the hill of 373 ft., 542 ft., 690 ft., 880 ft., 980 ft. There are four principal reefs, and numerous veins, from which very rich yields of gold have been obtained during the past thirty years, and there are still many blocks of reef to be operated on. A considerable amount of development work has been done in this mine—on the Tokatea Reef, in driving, rising, sinking, and stoping, nearly 10,000 ft.; on No. 1 Tribute leader, about 2,300 ft.; and No. 7 level cross-cut has been developed 250 ft. Two portable engines, 12- and 10-horse power nominal, driven by steam; one multitubular boiler, 30-horse power, driving one air-compressor 15-horse power, to drive air-winch for winding; and pump (Tangye), for draining mine, value £750; one multitubular boiler, 30-horse power, driving single-cylinder engine, 25-horse power, for twenty-five heads of stamps; one stone-breaker; and eight berdans (makers, Bowers, Scott, and Co., London), steam-power, value £3,000. During the year 267 tons of quartz was crushed for a yield of gold valued at £12,942 8s. In the mine and mill seventy-five men were employed. It has been decided to use water-power in future whenever such is available, and Captain Hodge has supplied the following:—

"The water is derived from three streams—viz., Harataunga, Waverley, and Waikoromiko. The length of the water-races is 150 chains, all flumed throughout. A tunnel has been constructed 321 ft. in length, to convey water from the Waikoromiko Stream, through the spur of hill, to power-site. The Pelton wheel is 11 ft. in diameter and 10 in. in face; the number of buckets to same is thirty-two. Direct power is applied to two air-compressors, 14 in. diameter by 24 in. stroke; and coupled to these by belting is one compressor, 12 in. diameter by 18 in. stroke. The air from power-house to battery is conveyed through a 6 in. pipe system. The pipes are of wrought-iron, and in 18 ft. lengths, and extend a distance of 4,700 ft., or 71 ch. 14 ft. From battery to shaft in No. 7 level they measure a further 30½ chains, making the total from power-site to shaft 101 ch. 47 ft. Air-storage—At power-site, two receivers, 25 ft. by 5½ ft.; at battery, in 17 ft. by 5 ft. boiler, one 20 ft. by 5 ft. receiver, and one 19 ft. by 4½ ft. receiver; at shaft-mouth, No. 7 level, one receiver, 10 ft. by 3½ ft. The head of water is 132 ft. The length of steel water-pipes is 210 ft. of 18 in. pipes, and 150 ft. of 15 in. pipes. Pressure—Applied to wheel, 60 lb. per square inch; carried in receivers, 60 lb. per square inch. Estimated power available—In summer, 25-horse power; during winter months, 120-horse power. Estimated flow of water—Summer, 180 cubic feet per minute; winter, varies from 350 to 600 cubic feet. Value, about £400."

Hauraki Associated Mine (Area, 68 acres 2 roods 28 perches; owner, Hauraki Associated Gold-mines, Limited; manager, Henry Franklin Shepherd).—This mine is situated on the top and eastern slope of the main Tokatea Range. The upper portion of this property has an altitude of about 1,200 ft. above sea-level, and from the lowest portion of the claim there is 1,000 ft. of available backs, so that the mine can be worked for years to come by means of adit-levels, of which there are at present three—No. 1, 500 ft. in length, and about 200 ft. below the top of range; No. 2, 700 ft. in length, and 100 ft. below No. 1 level; No. 3, 750 ft. in length, and 100 ft. below No. 2 level. The principal ore-bodies operated upon are the Rainbow End and Foot-wall leads, and a cross-reef. These reefs have all been well opened up from the No. 2 level. Nearly 400 ft. of driving has been done on the Rainbow End lead, also a good deal of stoping. On the Foot-wall leader 300 ft. of driving has been done, and this block stoped out up to the No. 2 level. The quantity of ore won for the year ending 31st March, 1899, was 505 tons, which yielded 1,320 oz. 2 dwt. of gold, valued at £3,752 12s. 4d. During the past five months of the year only a limited amount of ore has been broken out, owing to most of the ground opened up at the No. 2 level being worked out. The No. 3 level, which will give a further height of 100 ft. on this lead, will soon reach the point where the leader should be met with. This level is 750 ft. in length, 300 ft. of which has been driven on the Rainbow End lead, the remaining 450 ft. being cross-cutting.

In connection with the mine there is a modern up-to-date crushing-mill, consisting of ten head of stampers, four berdans, ore-crusher, and automatic ore-feeders, worked by power generated by a Smith-Vaile turbine. There is also a 25-horse-power engine and boiler, used as an auxiliary power when short of water. In connection with this mill there is also a small two-stamp mill for crushing specimen ore, and an assay and gold-melting plant, all gold won from the mine being melted and assayed before leaving the works. An average of 37·3 wages-men were employed by the company in the mine and battery.

Tokatea Consols Mine (Area, 30 acres; owners, the Tokatea Consols Gold-mines, Limited; mine-manager, Thomas Goldsworthy).—This mine, which is situated on the Tokatea Range, is worked from six levels, which have attained the following depths: East side—No. 1 level, 300 ft.; No. 2 level, 100 ft.; No. 3 level, 50 ft. West side—No. 1 level, 360 ft.; No. 2 level, 300 ft.; No. 3

level, 100 ft. There are six reefs opened in this ground—No. 1 reef, on the west side, is 4 ft. wide, and consists of solid white quartz, encased in blue sandstone, with hard walls of country rock; No. 2 reef is 18 in. wide, and consists of brown quartz, encased in brown ironstone, with good walls of country rock and brown sandstone; white quartz is apparent in No. 3 reef, which is 1 ft. wide, and has a similar casing to No. 2 reef; No. 4 reef, on the east side, varies in width from 6 in. to 2 ft., and consists of rubbly quartz, cased with country rock and white sandstone; No. 5 reef, which consists of wide solid quartz, is 1 ft. wide, and has a casing of country rock, and good hard hanging-walls; No. 6 reef is 15 in. wide, and exists in similar surroundings to those of No. 5. The development work done during the year comprises driving, rising, and sinking to make connections. A considerable amount of stoping has also been done. The total quantity of quartz crushed during that period was 92¾ tons, valued at £8 9s. per ton, or £783 14s. 9d. for the whole quantity treated by the amalgamation process. Eight men were employed.

West Tokatea Mine (Area, 29 acres 3 roods 32 perches; owner, the West Tokatea Gold-mine, Limited; mine-manager, C. W. Skrine).—The chief work carried out in this mine during the year has been driving on the reef in No. 1 level 100 ft., and a cross-cut in No. 2 level 110 ft. to intersect the reef. Driving has also been carried out on the reef to distances of 55 ft. northward and 25 ft. southward. A rise was put up to No. 1 level for ventilation purposes, and the reef was stoped out for 12 ft. above the north drive. A cross-cut is being continued to intersect a reef known as the Tribute reef, about 30 ft. east of the West Tokatea reef. The company own the battery known as the Triumph battery, consisting of ten stamps, 850 lb. falling-weight; one Blake crusher, with a capacity to supply twenty stamps; two berdans, the power for which is supplied by a 25 nominal horse-power horizontal expansive engine, with a locomotive-type boiler of 30-horse power. This plant has not been used by the company, its situation not being convenient to the mine. The mine was purchased by the present owners from the East Hauraki Gold-mines (Limited). Sixteen tons of quartz was treated at the Associated Gold-mining battery by the amalgamation process, and yielded bullion to the value of £214 9s. 4d. Four wages-men were employed.

New Hauraki Gold Properties Mine (Area, 224 acres 1 rood 32 perches; owner the New Hauraki Gold Properties, Limited; mine-manager, Francis Hodge).—Operations have been carried on in prospecting the mine, but no quartz was crushed during the year. There are five principal levels—380 ft., 420 ft., 450 ft., 500 ft., and 600 ft. The lower, or No. 6, level has been extended 449 ft. during the year. The mine machinery consists of one hand-boring rock-drill for testing class of country rock; battery, ten heads; four berdans; portable boiler; 20-horse-power horizontal engine, 14 in. cylinder; Pelton wheel for water when available. There were twenty wages-men employed. Captain Hodge reports upon this mine and workings as follows:—

"This company now comprises the property recently known as the Success Gold-mines as well as its own. The principal work is in the large east-and-west reef, varying in width from 6 ft. to 30 ft. We have had assays up to 5 dwt., but not to average that. We are in hopes as we proceed on this reef to discover payable sections. Should we do so it would be a great discovery for the district. In the Success portion of the property work is being carried on in No. 3 level on what is known as the Jubilee No. 2 reef. We have had a few very rich pockets of gold, and while these occur there are great probabilities of discovering something very good."

Harbour View Mine (Area, 65 acres; owners, the Harbour Gold-mining Company; mine-manager, Archibald Kelso).—This mine, which is situated near the Tokatea Saddle, has been worked chiefly by tributers, who have been engaged on the small leaders running through the ground on the foot-wall side of the main Tokatea reef. The quartz crushed on behalf of the company was 4 tons 11 cwt., for a yield of 28 oz. 4 dwt., valued at £81 7s. 4d; and for tributers, 5 tons 10 cwt. 170 lb., for a yield of 102 oz. 19 dwt., valued at £293 8s. 1d. Four wages-men and eight tributers were employed.

Hauraki Gem.—This mine, which comprises an area of 54 acres 2 roods 6 perches, is situated to the northward of the Whakapara Creek. The ground, which is situated to the westward of the main Tokatea reef, includes the claim formerly worked by Power and Bennett. The present owners are working the leader which in the past gave good returns to former owners. Three tons of quartz was crushed for a yield of 30 oz. 9 dwt., valued at £86 15s. 5d.; and two men were employed.

Waikoromiko District.

Four-in-hand Mine (Area, 217 acres and 19 perches; owner, New Four-in-hand Gold-mining Company, Limited; mine-manager, Thomas Radford, jun.).—The workings of this mine are from an adit 210 ft. in length and at a depth of 220 ft. from the surface. There are three levels opened—one 50 ft., the others 150 ft. and 200 ft. Two reefs are opened out, one averaging 20 in. in thickness, and the other about 4 in., both being free-milling, and incased in a firm class of andesite. The mine is fairly well opened up, and a five-stamper battery and two berdans, to be driven by steam, are now in course of erection, the probable cost of which will be £2,500. There were thirteen wages-men and two tributers employed during the year.

Operations in this district have also been carried on in the Tandem and Napier Mines, the former crushing for the year 20 tons, for a yield of 6 oz., valued at £16 16s.; and the latter 2 tons, for 6 oz. 7 dwt., valued at £17 15s. 7d.

Lillis.—The Kauri Freehold Gold Estates have done a good deal of work on the larger reefs in this property during the past twelve months, but operations are at present suspended, and a portion of the ground has been let on tribute to the former owners of the claim—Messrs. Lillis and Ryan—who had worked for a considerable time on small leaders and stringers, with satisfactory results.

Kapanga District.

Kapanga Mine (Area, 99 acres 3 roods 27 perches; owner, English company; mine-manager, Francis Hodge).—Development-work in this mine has not been carried on at the lower levels, the chief operations having been at and above No. 5 level. Several blocks of ground have been worked

on the tribute system, with very good results. The quantity of quartz crushed during the year was 272 tons 12 cwt. 2 qr. 16 lb., for 995 oz. 9 dwt. of gold, valued at £2,951 18s. 4d., for owners, and 1,604 oz. 14 dwt., valued at £4,680 7s. 6d., for tributers; total value, £7,632 5s. 10d. The machinery consists of one Cornish direct-pumping beam engine, 75-horse power, steam; one winding-engine (rotary), 24 nominal horse-power, steam; one 13-horse-power horizontal engine, driving battery, steam; one 12-horse-power portable steam-engine; three rock-drills, driven by compressed air; one 10-horse-power air-compressor, complete; one 10-head battery; two berdans, driven by steam. An average of fifty-five wages-men and twenty-seven tributers were employed. The manager, Captain Hodge, gives the following particulars about the mine:—

"Work has been carried on extensively here. Our measurements for twenty lunar months, ending 17th September last, totalled over 10,000 ft. in shaft-sinking, cross-cuts, driving on reefs, rises, winzes, stoping, clearing levels, &c. The most important development in this mine has been below the 420 ft. on Scotty's Reef, from which has been raised rich gold. It is only last month that we effected a communication to the 500 ft. level, thereby opening up a large section of ground, which, if it yielded as well as the portion already stoped away, assures a good future for the company."

Scotty's Mine (Area, 68 acres and 27 perches; owner, the Scotty's Gold-mine, Limited; mine-manager, Francis Hodge).—The depth of the shaft of this mine is 415 ft., and a locomotive-engine, 36-horse power, is used for winding. No pumping is required, the water in the workings finding its way to the Kapanga. There are five levels—viz., Battery, Golden Point, 72 ft.; Corby, 156 ft.; No. 3, 300 ft.; No. 4, 400 ft. Operations have not been continuously carried on during the year, but latterly thirty-one men were employed. Captain Hodge gives the following particulars with reference to the mine:—

"A very considerable amount of work has been carried out here. The most important feature during the year has been the discovery of Scotty's Reef, in the Golden Point level, close to the new shaft. It has since been cut in the Corby level below, and is being worked as the principal development of the mine. Judging from its indications, and comparing its character to the Kapanga, there is every reason to hope that we shall have good discoveries as we proceed."

Blagrove's Freehold Mine (Area, 128 acres; owner, Blagrove's Freehold Gold-mining Company, Limited; manager, H. Battens).—Mr. H. Battens, mine-manager, gives an account of the workings in this mine as follows:—

"During this period the eastern shaft has been sunk a further depth of 48 ft. When we had gone down 150 ft. the water became more than we could contend with, having only a tank. A Tangye pump was obtained and lowered, but in order to do this it was found necessary to enlarge the shaft. To the depth of 150 ft. it was 6 ft. by 3 ft. within timbers, but below that depth it became necessary to enlarge it to 7 ft. by 4 ft. This was done, the shaft securely timbered, and with centres, guides, and ladderways complete. 50 ft. below the adit-level we cut a chamber 8 ft. by 7 ft. by 7 ft. Here the No. 1 leader (which went down vertically with the shaft, and had a strike from east to west) junctioned with No. 3 reef, this having the same strike, and dipping north at an angle of 45 degrees. We drove east and west on the junction of Nos. 1 and 3 reefs, getting gold in each direction. East we got some very rich specimens. A considerable amount of driving on No. 3 reef at the 200 ft. level has been done, and the reef right through proved itself a fine compact body of quartz, encased in two well-defined walls, and running through a good country rock. It had varied in thickness from 6 in. to 4 ft., and at times produced rich specimens, though not in quantities sufficient to prove payable. We have also driven south on No. 2 or Scotty's Reef for some distance. Just before suspending operations the reef faulted, and in driving to the left to pick it up again we came across a leader composed of quartz, arsenical and iron pyrites, having visible gold in the stone. This may prove to be the No. 2 reef. At the same time we merged into a splendid class of country, consisting of kindly sandstone, nothing approaching it having been met with since we started to drive south from the main cross-cut on this reef. The marked improvement in the country is no doubt accountable for the presence of gold at this point. In driving south on No. 2 or Scotty's Reef in the old workings in the spur we intersected No. 1 reef, from which we got the gold in the eastern shaft. We drove some distance on it, occasionally seeing gold. We have also done a good deal of driving in the spurs, with a view to prospecting the property, but nothing very favourable was met with, though gold was occasionally seen. A large amount of cross-cutting has been done during the year, most of it being necessary to establish the connection with the eastern shaft. We have risen on No. 3 reef, timbered up same, formed mullock-pass and ladder-way, and also on the footwall branch of No. 3. From the 50 ft. level, east of eastern shaft, we sunk a winze on No. 3 reef, and obtained strong colours of gold in the quartz, but an influx of water caused us to abandon work for a time. From the adit-level a winze was sunk to connect with the 50 ft. level below. A considerable amount of stoping has been done on the various reefs and leaders, from which we have obtained a quantity of low-grade ore. The connection of the eastern shaft with the main engine-shaft is a matter of very great importance, all work now proceeding from the latter resulting in a great saving of labour and coal. We erected a portable boiler on the eastern shaft to drive the Tangye pump. The big pumping-engine has also been started, and all necessary alterations completed in the pitwork to allow of a 6 ft. stroke in the shaft. The mine is now equipped with a first-class plant, and all the necessary appliances for the safety of the men employed are of the most complete kind, and no accident of any kind has as yet occurred in the mine. The tutwork measurements are as follows: Drives on reefs and leaders, 521 ft.; stopings, 2,351 ft.; rises, 164 ft.; winzes, 106 ft.; shaft, 48 ft.; cross-cuts, 510 ft."

New Hero Mine (Area, 26 acres and 32 perches).—This mine is situated north-east of Scotty's. The low level was continued with the view of intersecting at this depth Murphy's reef, which was worked on at the surface-levels in the early days, and from which a considerable amount of gold

was obtained. This low level is in a distance of 620 ft., and it is expected that the reef will be cut when about 50 ft. more has been driven. Several promising-looking reefs and leaders have been cut in this level, and driven on some distance, but have not proved payable so far as they have been worked on. Two men were employed.

Kauri Block.

Hauraki Mine (Area, 28 acres 3 roods 1 perch; owner, the Hauraki Gold-mining Company, Limited; mine-manager, Francis Hodge).—This mine still continues to produce a large quantity of valuable quartz. During the year 2,089 tons of quartz and 2,312 lb. picked stone was crushed for results valued at £16,545. The development-works have chiefly been confined to shaft-sinking, winzes, driving, rising, and stoping. The main shaft has a depth of 420 ft. to the bottom of the well-hole and the Iona shaft. The number of levels opened consist of the adit-level, the 100 ft., 160 ft., 220 ft., 300 ft., and 400 ft. levels. There are eleven reefs and leaders which have been opened in the ground, and works have been carried out on some of them at each of the various levels. The machinery used at the mine consists of one 88-horse-power horizontal engine; one 10-horse-power vertical engine, used for pumping at the Hauraki and the Iona shafts respectively; one 22-horse-power horizontal winding-engine, Hauraki shaft; one 30-horse-power winding-engine (horizontal), used at the Union Beach shaft; one 26-horse-power horizontal engine for working stamps, &c.; one 36-horse-power horizontal engine, used for air-compressing; and one 6-horse-power air-winch: all driven by steam with the exception of the latter. There are 102 wages-men employed at the mill and battery. The following account of the mine and workings has been furnished by Captain Hodge, the manager:—

"The developments in this mine during the past year have principally been carried on in the levels from the adit to the 400 ft. The principal gold-producing reefs have been cross reef No. 2, No. 6 reef, and adit-level No. 2 reef. We have sunk shafts 85 ft., driven cross-cuts 515 ft., and extended on lodes 1,524 ft., risen 154 ft., sunk winzes 242 ft., stoped 4,565 ft., and cleared levels, &c., 456 ft., making a grand total of 7,541 ft. The above figures represent work of the year ending the 10th December last. The following also are for that period: Total gold won, 5,790 oz. 11 dwt.; total quartz crushed, 2,179 tons; picked stone, 1 ton 3 qr. 14 lb.; average price of gold per ounce, £2 18s. 11·34d. The average yield of gold per ton of ore was 2 oz. 13 dwt.; total value, £17,066 5s. 10d. Our costs this year have been £16,257, irrespective of London costs. The old Union Beach section has been drained, and fair discoveries of gold made. We have sold from this portion of the mine since it has been drained about one thousand pounds' worth of bullion. The mine has done well considering, and bids fair to pay working-expenses for some time, irrespective of any new discoveries."

Bunker's Hill (Area, 3 acres and 12 perches; owners, Bunker's Hill Gold-mining Company; mine-manager, H. Moorcraft).—This mine adjoins the Hauraki Mine, to the northward. The workings are carried on from a shaft 270 ft. in depth, from which four levels are opened. Several reefs have been cut, but the only one operated on during the year is known as the 4 in. leader. The depths of the levels below the surface are as follows: No. 1, 140 ft.; No. 2, 205 ft.; No. 3, 270 ft.; and No. 4, 335 ft. The machinery consists of one 35-horse-power Tangye winding-engine, with a 20-horse-power tubular boiler, used for winding purposes, valued at £1,200. 165 lb. of specimen stone was crushed, for a yield of 260 oz. 17 dwt. of gold, valued at £783. Nine wages-men were employed.

Welcome Find Mine (Area, 8 acres 1 rood 8 perches; owner, Welcome Find Gold-mining Company, Limited; manager, John G. Vivian).—This mine has been continuously worked during the year, but the returns have not yielded sufficient to pay expenses. Mr. John G. Vivian gives the following account of the mine and work done during the year:—

"The shaft is 236 ft. in depth, and there are three levels opened from it. No. 1 level is 110 ft. below the surface; No. 2, 170 ft.; and No. 3, 230 ft. The development-works at No. 3 level have been driving on quartz and 337 ft. of cross-cutting, also stoping out about 30 fathoms of reef. There are four lodes exposed at this level, varying from 5 in. to 8 ft. in width, all of which are encased in firm andesitic rock, the most of the quartz being highly oxidized. The company have, in addition, done a good deal of development-work during the year in the form of driving, rising, sinking, and stoping at the Nos. 1 and 2 levels, as well as at the surface-level. The mine machinery consists of one 40-horse-power steam-engine, for winding and pumping. There is no crushing-mill connected with the mine, but 26 tons of ore and a parcel of picked stone were crushed at the Thames, yielding 59 oz. 15 dwt. melted gold, valued at £179 5s. The average number of men employed during the year was thirteen."

The directors intend to apply for six months' protection, in order to afford time for raising further working capital.

New Golconda Mine (Area, 5 acres; owner, New Golconda Gold-mining Company; mine-manager, R. H. Harrison).—This mine is worked from a shaft 135 ft. deep, which is also the greatest depth below the surface. There are two levels opened, one at a depth of 80 ft. and the other at 135 ft. A limited extent of driving and stoping has been carried on during the year. The mine is under protection at present. The company's available capital having been expended, it was deemed advisable to suspend operations.

Kathleen Mine (Area, 36 acres 2 roods; owner, Kathleen Gold-mine, Limited; mine-manager, Francis Hodge).—Work at this mine was discontinued during a portion of the year, but operations have recently been recommenced. The machinery consists of one 70-horse-power Tangye horizontal engine (compound) for pumping, and one 30-horse-power Tangye horizontal engine (compound) for winding. Wages-men to the number of twenty were employed. The following information has been supplied by the manager, Captain Hodge:—

"This company has been resuscitated during the year. The principal development here is sinking the shaft, which is now nearly down to the 300 ft. level. We may possibly sink another

50 ft. before opening out. We continue to cross-cut easterly at the 200 ft. level. Beyond this there is no other work being carried on in the mine. As we are in virgin ground, both in sinking the shaft and cross-cutting, there are great probabilities of success. Being contiguous to the famous Hauraki, there is every reason to suppose it will be a successful mine."

Hauraki No. 2 Mine (Area, 6½ acres; owners, Hauraki No. 2 Gold-mining Company; mine-manager, William Anderson).—Operations have not been conducted in a very vigorous manner at this mine during the past year. There is a shaft 210 ft. deep, from which a cross-cut has been driven 350 ft. to the westward and 150 ft. eastward. There are six reefs and leaders of hard white quartz encased in blue sandstone country. Since September last the company has been driving prospecting levels from the surface. No quartz has been crushed. Two men were employed for the last six months.

Kathleen Crown Mine (Area, 95 acres; owner, Kathleen Crown, Limited; manager, H. Battens).—Mr. H. Battens, the manager, furnishes the following particulars of work done in this mine:—

"During this period considerable developments have been carried out on Argall's reef, at the 200 ft. level, and for the whole time the reef has varied considerably, sometimes becoming a compact and uniform body of stone, and then separating into two distinct branches. It has also been subject to sudden disturbances, but on the whole has passed through very fair country. At times it has looked very promising, and has yielded some nice pieces of stone, but I regret that no payable ore has been obtained. Early in Januury last year the indications were exceptionally good about 50 ft. from the bottom cross-cut, and I expected to meet with success, especially as we were getting under the spot where gold was found near the surface; but unfortunately our hopes were not realised. All operations on this reef were suspended on the resumption of sinking the shaft. I may add that the risings and stopings on this reef yielded fair crushing dirt, but not sufficient to make it worth while carting to a distance to be crushed. After carefully studying the geological formation of the country, I am of opinion that it would be desirable to continue the drive south at the 200 ft. level, as it would bring us out of the dyke, and into the more congenial and auriferous belt of country. Driving on No. 1 reef north and south has been carried a considerable distance. Since this work was suspended surface prospecting has been carried on to the north of the forebreast, and a cross-reef has been discovered, which is gold-bearing, encased in very congenial sandstone, and running almost at right angles to No. 1 reef. The operations in Thompson's section have been prosecuted during the whole of the year, and the reefs and leaders prospected and developed by means of drives, rises, winzes, and stopings, which, however, have not been carried on without some difficulties and drawbacks, such as slides and superabundance of water. The Nos. 2 and 3 reefs are both gold-bearing, the former being coarse and the latter fine gold, heavily charged with minerals. This section of the property is a complete network of small reefs, leaders, and veins, all more or less gold-bearing, and are undoubtedly identical with those in the eastern section of Blagrove's. We have had during the year two small lots of 5 tons each crushed from this section of the mine, yielding 11 oz. 8 dwt. of gold; and I am satisfied that in the vicinity there is a substantial gold-bearing reef from which these smaller ones are branches or stringers.

"During the month of June we resumed sinking operations, by contract, in two sections. The first 50 ft. cost £262 10s., and the second 50 ft. £260. The total depth of the shaft is 305 ft. At the 250 ft. we cut a chamber, and timbered the same, also at the 300 ft., and the shaft is securely timbered throughout, with cage-roads and ladderways complete. At the 250 ft. we put in a tank, with the necessary bearers to carry our 14 in. plunger column, and below this point we have fixed a 12 in. bucket-lift. The plunger, which is on the ground, will heave from the 250 ft. to the adit level, which is 60 ft. below the collar of the shaft. The tutwork measurements for the year are as follows: Drives on reefs and leaders, 840 ft.; stopings, 1,001 ft.; rises, 202 ft.; cross-cuts, 175 ft.; winzes, 77 ft.; sinking shaft, 105 ft.; surface prospecting, 70 ft."

Golden Pah (Area, 18 acres 3 roods; owner, Golden Pah (Hauraki), Limited; mine-manager, Francis Hodge).—This mine is adjacent to the Union Beach, and is worked from a shaft 240 ft. in depth, 50 ft. of which was sunk during the year. There are four levels—viz., the adit, 80 ft., 130 ft., and 193 ft. or present low level. The machinery consists of one 22 in. horizontal condensing pumping-engine, 43-horse power; one pair 10 in. horizontal winding-engine, 18-horse power: valued at £2,769. There are four reefs in the ground, also numerous quartz-veins. The quantity of quartz treated was 31 tons, which was crushed at the Hauraki Company's battery, for 104 oz. 4 dwt., valued at £312 12s. There were thirty-one men employed, all on wages. Captain Hodge, the manager, gives the following account of this mine and workings:—

"This company's measurements for the year ending 17th September last were as follows: Main shaft sunk 50 ft., and the development on various veins and leaders in the 193 ft., 130 ft., 80 ft., 60 ft., Pacific, and road-levels nearly 3,500 ft. Up to very recently this company has been engaged in the erection of extensive machinery, sinking its main shaft, doing a lot of cross-cutting, all of which may be considered dead-work. We are just now having bi-monthly crushings, to the value of £150. The average price of gold in the mine is over £3, and the future offers good chances of success."

Operations were suspended by the company in the Hauraki South Mine, which was afterwards let on tribute.

Zealandia Mine.—Very little development-work has been done on this ground.

Hauraki South Mine.—Operations were carried on in prospecting from the shaft, but the quartz found was unimportant, and the work has lately been confined to prospecting by tributers at the surface levels. 29 tons was crushed, for 70 oz. 7 dwt.; value, £218 1s. 8d. Twenty-two men were employed.

Hauraki Main Lodes.—This property consists of a foreshore claim, in which a shaft has been sunk to a depth of 180 ft. on the beach below high-water mark, and between the Union Beach and

Golden Pah shafts. A chamber was opened out at this depth, and about 1,800 ft. of driving and cross-cutting was done, and several bars of very hard country were passed through. Five different faces were driven from this level, two being on the line of reefs, which have not so far proved payable. The reef runs north-west and south-east, and dips north-east at an angle of 45°. Its width averages 3 ft., and the reef appears to be improving in quality, and is more defined where a rise was put up. Eleven men were employed—six underground and five on the surface, including three engine-drivers.

Hauraki North Mine.—There has been very little work done in developing this property during the year.

Trig Hill Mine.—This mine has been worked by a small party of tributers, who crushed a parcel of 4 tons of ore, for a yield of 8 oz. 14 dwt. of gold. Two men were employed.

Wynyardton.—This mine has been worked by tributers, who have operated on the surface and shallow levels, and have succeeded in obtaining 31 tons of quartz, which gave a return of 52 oz. 11 dwt. of gold; value, £153 5s. 4d.

Preece's Point District.

Preece's Point Mine.—Operations in this mine were of a limited character in the early part of the year, and the mine was shut down. It is understood that efforts are being made to resuscitate working of the mine by raising fresh capital.

Golden Shore.—A considerable amount of work was done in sinking the shaft to a depth of 137 ft. A small crushing, taken from the reef, did not, however, prove payable, and work has been suspended for a time.

Karaka Block District.

The discovery of gold that was made last year in one of the claims taken up on this ground, and from which good returns of gold were anticipated, has proved disappointing. 32 tons of quartz crushed during the year yielded 11 oz. 15 dwt. of gold, of the value of £33 18s. 9d.

Pukemaukuku Block.

Aitken's Freehold.—Prospecting has been regularly carried on on this land, but no returns of gold have been reported.

Empress Mine.—Some work has also been done on this mine, and a little prospecting on other portions of the block.

Tiki District.

Coromandel Freehold.—A considerable amount of prospecting- and development-work has been carried on in various sections of this company's property, and several reefs have been opened up and driven on in the different levels. The Blackmore, Home Rule, Union, and Little Nell reefs have all proved gold-bearing, and vary from 1 ft. to 3 ft. in width. A small parcel of quartz, about 5 tons, was crushed for a yield of 1 oz. 15 dwt., valued at £5 5s. An average number of eight men were employed.

The following mines also crushed as follows: Matawai Claim—3 tons quartz for 2 oz. 18 dwt., valued at £8 14s.; two men employed. Pohutu—50 tons 13 cwt. quartz, for 30 oz. 19 dwt., valued at £92 17s.; six men employed. The Golden Butterfly—15 cwt. quartz, for 5 oz. 12 dwt., valued at £16 16s.; two men employed.

A considerable amount of prospecting has been done throughout the district, but no find of any importance has been noted.

Matawai, or Castle Rock, District.

Progress Castle Rock Mine (Area, 60 acres; owners, Progress Castle Company; mine-manager, W. G. Martin).—This mine is situated on the spur along which the road runs, leading from the Matawai to Castle Rock. The nature of the development works carried on during the year was driving a cross-cut to intersect the No. 1 reef, and driving 112 ft. on the reef. Stoping is being carried on from a rise above No. 3 level. The reef at this point is about 8 in. in width, in which colours of gold are occasionally seen. It was near this place some picked stone was obtained about eighteen months ago. In the No. 4, which is about 70 ft. below the No. 3 level, the main lode has been intersected, and has been driven on 120 ft. in a south-westerly direction. The reef in the face is about 3 ft. in width, and is a well-defined body of highly mineralised quartz. Several other reefs of a promising character have been discovered on the property, but no work of any importance has, so far, been done on them. Five men are employed.

Manaia District.

Although some work has been carried on here in various claims, no crushings have been reported.

Whangapoua District (Opitonui).

Kauri Freehold Gold Estates Company.—This company has carried on vigorous operations both in mine-development and in the erection of the battery and construction of tramways, &c. The mines are now well opened, and large quantities of quartz available for working out, a considerable quantity being already stacked at the surface. The battery, which will be one of the most complete of its kind, will shortly be ready; an unavoidable delay in its completion was due to the non-arrival of various portions of the plant from England. There is every indication that this company's mill, when at work, will largely contribute to next year's gold return. A large staff of men have found employment on the works connected with these mines, the average number being about a hundred and eighty, who are engaged in all kinds of work. The company's superintendent, Mr. Alexander Montgomery, has furnished me with the following particulars of the work carried out by the company during the year:—

"The work for the year ending the 31st March has been practically confined to the three principal mines at Opitonui—viz., the Maiden, Carvill, and Lanigan's and Hilda—with the intention of developing these to such an extent as would provide constant work for the 40-stamp mill before undertaking further extensive prospecting operations on the less developed reefs. In order to concentrate on these mines, and on the erection of the mill, all outside work was discontinued soon after the report sent to you last year was written,. operations being suspended at the Owera, Murphy's Hill, and Lillis Mines, and also on the Australasia and other less developed reefs at Opitonui.

"*Maiden Mine.*—The Maiden main shaft has been sunk to a total depth of 153 ft., and levels opened out at 64 ft. and 144 ft. At No. 1 level the lode was cut by a cross-cut to the north at 137 ft. 6 in. from the chamber, and at No. 2 level at 120 ft. At No. 1 level the reef had been driven along to the westward 78 ft., and at No. 2 level 7 ft., up to the end of March, and these levels have since been rapidly extended. The roof is poor where first cut, but improves as followed to the westward towards the ore-chute worked in the No. 2 adit. The No. 2 adit-level has been extended to a total distance of 850 ft., when driving was suspended, the reef having become valueless. Stoping was commenced in this adit in January, and a leading stope had been taken out for 107 ft. in length up to the end of March, the reef being of good payable quality. In the No. 1 adit a rise has been made to surface, 113 ft. A great deal of surface work has also been done about this shaft, the heaviest item being the making of an incline tram from the end of the railway to the shaft. This incline is worked by means of a small steam-winch.

"*Carvill Mine.*—The main shaft has been sunk to 71 ft., and a chamber has been cut and level driven at 65 ft. The level has been extended 438 ft. 6 in. along the course of the lode in a south-westerly direction, and cross-cuts amounting to 32 ft. of driving have been put in. The reef is a body of clean stone averaging 3 ft. in width, and of payable quality. The winze from the adit has been connected with this level, total depth being 78 ft. The mine having shown itself to be valuable, it was decided to equip it with a permanent winding and pumping outfit, instead of the prospecting plant with which the above work was done. A fine double-cylinder, double-drum, helical-geared hoisting-engine has been obtained from the Union Ironworks of San Francisco, and is now being erected. The cylinders are 10 in. by 12 in., and drums 4 ft. in diameter, and the machine is capable of a working load of 10,000 lb. The poppet-heads are 60 ft. in height. The steam is obtained from two Tangye's Colonial type multitubular boilers of 14- and 20-horse power (nominal) respectively. The pump is a Blake-Knowles steam sinking-pump of capacity 7,200 gallons per hour from a depth of 350 ft. The machinery will be at work in June, when sinking of the shaft will be resumed.

"*Lanigan's and Hilda Mine.*—The main shaft has been sunk to 216 ft. in depth, and there are now three levels open from it. The Lanigan's low-level adit connects with the shaft at 44 ft. down, and is now called No. 1 level, while Nos. 2 and 3 levels are at depths of 124 ft. and 204 ft. respectively. The No. 1 level had been extended to 1,584 ft. from the mouth of the adit on the 31st March, and has proved the chutes of ore worked in the higher levels in the Hilda section of the mine to be living downwards very satisfactorily, the ore being of more even quality than at the higher levels, and of rather better average value. The No. 2 level has not been extended eastward since last report, but a leading stope has been opened for 58 ft. in length, and a winze to No. 3 level has been started. At No. 3 level a chamber has been cut, and a cross-cut 60 ft. in length driven south to intersect the lode, which here proved to be a large 'formation' of broken country-rock. Levels had been driven 118 ft. east and 113 ft. west on the walls of this formation at the 31st March without as yet reaching the valuable portion of the lode. The No. 2, or Hilda low-level adit has been extended to a total distance of 943 ft. from the cross-cut to the westward and 92 ft. to the eastward, the latter drive coming out to surface, and giving a more convenient entrance than the old cross-cut. The reef in this level is rather patchy, but is a strong large lode containing valuable chutes of ore. Stoping has been commenced on the Hilda No. 2 chute, the leading stope being beaten out for 54 ft. in length. A branch drive 126 ft. in length has been made along the north wall at a point where the reef made a very sudden bend, in order to straighten the level. On surface a large ore-hopper has been built, and the main shaft has been connected with the railway-line by a branch. In order to get a good tip for mullock also, a drive has been made through the steep spur north of the shaft, a total distance of 112 ft. The shaft has been equipped with baling-tanks and safety-cages.

"*Sawmill.*—The sawmill now contains one breaking-down frame, one large circular-saw with automatic travelling bench, one smaller circular-saw with breast bench, one cross-cut swing-saw or goose bench, and a planing-machine. It is capable of an output of 60,000 superficial feet of sawn timber per day. Up to the 31st March the amount of sawn timber produced by the mill has been 1,351,575 superficial feet, most of which has been used in the Central 40-stamp mill and the mines and accessory buildings. A bush tramway about half a mile in length is now being constructed to get out the timber lying near the head of Quartz Creek more expeditiously and cheaply.

"*Railway.*—The railway from Whangapoua to the mines and battery has been completed, a large number of sidings and conveniences of one sort and another having been put down during the year. The total length of track laid is 8 miles 33 chains, and of formation 9 miles 23½ chains. The cost of the line is, in round figures, £11,400 for the line, and branches, and sidings; £1,500 for locomotive and rolling-stock; and £700 for wharf, coal-bin, goods and engine sheds, and other buildings. The coal-bin holds over 100 tons of coal. Another locomotive has been ordered, from the H. K. Porter Company, of Pittsburgh, Pennsylvania, U.S.A., and will shortly be in use.

"*Water-race.*—The water-race supplying water to the Central Mill is brought in from the Waingaro Creek, and is a mile and a half in length. This is for battery-supply purposes only, not for power.

"*Central Mill.*—The quartz-mill and cyanide-works of the company are now nearly completed, and will be working regularly in June. The amalgamation portion of the plant was finished in March, but through great delay in getting out the material for the cyanide-vats from Europe a start was not able to be made with the putting together of these until the 21st March.

"The ore brought from the mines by the railway is tipped from the trucks into a large ore-bin of nearly square section, capable of holding 710 tons. From this it passes down over four grizzlies to the rock-breaker floor, where it is shovelled into two Blake rock-breakers, 15 in. by 9 in. Beneath these is another ore-bin of triangular section, capable of holding 250 tons, from which eight shoots deliver the stone to as many suspended automatic feeders, which again pass it into the mortar-boxes. There are eight batteries of five stamps each, the stamps weighing 1,150 lb. each. The mortar-blocks are 13 ft. in length, made of single pieces of kauri, 5 ft. by 2 ft. 6 in., and each pair of blocks rest upon a block of concrete 2 ft. 6 in. thick. The crushed ore passes over amalgamated copper-plates, 12 ft. long, into four sets of spitzlutten and settling-boxes. There are two spitzlutten, which separate out the coarsest sands escaping from the stamps, placed tandem, in each set. The settling-boxes are 15 ft. square, with nine pyramidal-pointed boxes let into the bottom of each. The function of these is to settle the slimes and fine sands as much as possible, and to get rid of the excess of water coming from the stamps before the stuff is elevated to the cyaniding tanks. The coarsest sand from the spitzlutten runs into a 5 ft. Huntingdon mill, where it is further ground. The crushed material is next raised by a bucket elevator 45 ft., to a set of launders, which carry it to eight collecting-vats set in two rows. Into these it is passed through eight of Butters and Mein's patent distributors. The collecting-vats are of mild steel, $\frac{3}{8}$ in. thick, and are 22 ft. 6 in. in diameter and 6 ft. deep. They have four bottom-discharge doors, through which the stuff, after settling, can be shovelled down into the percolating-vats. The collecting-vats are placed vertically over the percolating-vats, and are supported by a very heavy wooden framework. The percolating-tanks are the same size as the collecting-tanks, but have only one discharge-door each, which is placed at the side to admit of the leached material being sluiced out into the main tail-race. There are three solution-tanks, 20 ft. diameter and 10 ft. deep, placed at a level slightly above the tops of the collecting-vats. The solutions from the leaching-vats pass through 3 in. mains to three vacuum-drums and three collecting- or settling-tanks, and thence to the zinc boxes, of which three sets are provided. The vacuum-drums are made from the shell and flue of an old Cornish boiler, 22 ft. 3 in. by 5 ft., and the collecting-vats are 8 ft. diameter by 6 ft. high. From the extractors the solutions pass to three sumps, of steel, 30 ft. diameter and 6 ft. deep. Two centrifugal pumps raise the solutions from these to the solution-tanks, and the pipes are arranged so that solution can be pumped directly on to any of the collecting- or percolating-tanks without passing through the solution-tanks. For the treatment of the slimes from the zinc boxes an acid-treatment plant has been provided, consisting of acid-tub, tubular heater, and Johnson filter-press; but there is also an oxidizing furnace for the dry treatment more usual in this colony. There are two melting-furnaces and two assay-furnaces, also an American retort furnace. The whole forms a very complete mill."

Matarangi District.

Prospecting has been carried on to a limited extent in this district. The Matarangi Mine was let on tribute to Noble and party, but their operations proving unprofitable, the battery in connection with this mine was sold and removed to Maratoto.

Kuaotunu District.

Mariposa Mine (Area, 101 acres; owners, Mariposa Gold-mining Company; mine-manager, John Goldsworthy).—Operations in this mine during the year past have been steadily carried on. The work of most importance has been the erection of machinery for pumping, sinking, and winding. The shaft has now attained a depth of 59 ft. The machinery consists of one 30-horse-power steam-engine; one 50-horse-power steam-boiler, with heater, feed-pump (Knowles's), and connections; one sinking-pump (Knowles's patent), 5 in. delivery, 6 in. suction, $2\frac{1}{2}$ in. steam and exhaust, 12 in. cylinder, 16 in. stroke. The plant for sinking purposes is erected at No. 4 level, in a chamber the dimensions of which are 55 ft. by 20 ft., of a height of 13 ft. The poppet-heads are 40 ft. high from the floor of the chamber, the distance being 50 ft. from the engine to the pulleys. The smoke-passage from the boiler to the surface is 400 ft. in height, and is fitted with an iron funnel for a distance of 340 ft. The chamber is securely timbered with heavy timber; and a water-tank constructed for feeding the boiler is 14 ft. by 6 ft. by 7 ft. The pump and all the machinery are found to work in a very satisfactory manner. In addition to the pump there is an iron tank available for baling purposes. It is expected that the reef will be cut when the shaft attains a depth of 150 ft. from No. 4 level. The number and depth of levels opened are four—No. 1, 110 ft.; No. 2, 190 ft.; No. 3, 330 ft.; No. 4, 460 ft. The reefs worked are five—namely, Fluke lode, East lode, No. 2 lode; Red Mercury, east branch; Red Mercury, west branch. The lodes are generally hard solid quartz cased in blue or brown sandstone country. The development work done during the year consisted of—driving, 1,127 ft. 6 in.; rising, 279 ft.; sinking main shaft, 59 ft.; stoping, 2,944 ft.; sinking winzes, 129 ft.; excavation and surface work, 177 ft. The quantity of quartz crushed for the year was 2,812 tons, producing by amalgamation 770 oz., valued at £1,754 5s. 10d., and 858 oz. 18 dwt. by cyanide, valued at £1,986 7s. 4d. A quantity of old copper plates melted down produced bullion to the value of £16 11s. The average number of men employed was thirty-three, including both mine- and battery-hands.

Kapai-Vermont Mine (Area, 35 acres 3 roods 19 perches; owner, Kapai-Vermont Gold-mining Company, Limited; mine-manager, James R. S. Wilson).—This company is in liquidation, and since the 31st March, 1898, no work, mining or development, has been prosecuted. Three men are engaged making necessary renewals and repairs. This mine adjoins the Mariposa. The same line of reef has been worked to a considerable extent from the No. 4 level upwards, and several runs

of payable ore were worked on. During the past year operations were limited, the mine being under partial protection; but it is anticipated that mining will soon be energetically carried on with a large number of men, as some difficulty which had existed between the shareholders is likely to be settled, and a plan of future development decided upon for working at deeper levels.

Great Mercury Mine (Area, 34 acres; owners, Great Mercury Gold-mining Company; mine-manager, John Williams).—A considerable amount of work has been carried on in this mine during the year. 1,202 tons of quartz was crushed, for a yield of 1,131 oz., valued at £2,527 6s. 4d. This company had eighteen men employed, thirteen being underground, who were principally engaged in driving and stoping on the Christmas reef, which averages about 18 in. in width, and most of the ore sent to the battery was obtained from this lode. Driving was also carried on at the intermediate level, for the purpose of intersecting the Murphy leader, which has been worked on in No. 2 level, and averaged about 6 in. in width. The company have a ten-head battery, which was usually kept running ten hours per day.

Irene Mine (Area, 57 acres; owners, Irene (Hauraki) Gold-mine, Limited).—This mine is situated to the northward of the Great Mercury. During the month of April, 1898, 163 tons of quartz was crushed and treated at the Great Mercury battery, yielding bullion to the value of £283, after which operations were suspended and total protection obtained.

Handsworth Mine.—This mine, which is adjacent to the Irene, is worked by the owner, Mr. Louis Woodcock, who has driven a main cross-cut 340 ft. in an easterly direction. Several reefs and leaders, varying from 1 in. to 4 ft., have been intersected, but the larger lodes have not so far yielded payable quartz. Work has been confined to driving on the No. 2 leader, which runs north and south, and varies from 1 in. to 6 in. in width. During the year the owner had a parcel of 170 lb. of picked ore treated at the May Queen Extended battery, Thames, for a return of 107 oz. 10 dwt. of retorted gold.

Juno Mine.—This mine is worked by a small party of tributers, who crushed 3½ tons of quartz and 2 lb. of picked stone for 10 oz. 5 dwt. gold.

Aorere Mine.—This mine has been worked on tribute during the year, and operations were confined to driving and stoping on the Aorere reef. A parcel of 89½ tons of quartz was crushed, for bullion obtained by amalgamation to the value of £246 16s. 7d., and by the cyanide process to the value of £253 13s. 11d.; total value, £500 10s. 6d.

Prospecting has also been carried on in the Lucky Hit, Royal Rose, Moonlight, Phoenix, Ajax, Mint, Golden Anchor, and Prospect Mines.

Waitaia Mine (Area, 85½ acres; owner, Waitaia Gold-mine, Limited; mine-manager, C. H. Bennett).—This mine is worked from an adit-level. The greatest depth of workings below the surface is 400 ft. There are ten levels, varying in depth from 40 ft. to 400 ft., the No. 5 level being a cross-cut 530 ft. There are six reefs, composed of hard flinty quartz encased in sandstone rock. The development work for the year has been—driving on reefs, 1,251 ft.; cross-cutting, 202 ft.; rising, 201 ft.; and sinking, 146 ft. Quartz to the amount of 110 tons was crushed and treated by the cyanide process at Great Mercury battery for a yield of 170 oz.; value, £427. 1 ton of ore was treated at the Thames School of Mines, half of which, by the cyanide, yielded bullion worth 8s. 6d.; the other half, being treated by pan-amalgamation, produced bullion worth £1 15s. 9d.: total value for ton, £2 4s. 3d. There were sixteen wages-men employed during the year.

Moewai District.

Some prospecting-work has been carried on by White Brothers in their claim of 30 acres. Two leaders were cut, a crushing from which yielded 6 oz. 14 dwt. from 2½ tons of stone. At a lower level a reef 7 ft. in width was cut, the quartz giving fair prospects. The owners are endeavouring to obtain assistance from a syndicate towards the erection of a small battery.

Colorado Claim.—This claim adjoins White Brothers. A drive was put in and a 2 ft. reef cut, from which a parcel of quartz, about 50 tons, has been taken out and stacked at the surface. The party have purchased a small battery, which is not yet erected.

Mahakirau District.

Some prospectors are at work in this district, and some on the kauri-timber lands above Gumtown. Occasional prospecting is carried on in the Haehei and Boat Harbour districts.

Remarks on Coromandel District.

The returns show a decrease compared with those of the previous year, but there are strong indications of a considerable increase in the future. The Hauraki Mine still continues to furnish profitable yields of gold. The Kapanga Mine returns are also becoming more substantial. The Royal Oak Mine has also yielded rich and profitable returns, with every prospect of their continuance. The Hauraki Associated Mine has given fair yields; and, as the Kauri Freehold Gold Estates Company's crushing-mill is nearly ready, the returns from this property will also add to next year's yield, as extensive blocks are opened ready for stoping, and a large stack of quartz is also in readiness to be treated. The Kuaotunu district may be expected to furnish continued payable returns. The nature of the deposits throughout Coromandel district is such that hopes may be entertained that fresh finds will follow systematic prospecting operations in many of the mines.

Thames District.

This district comprises that portion of the Thames County lying between the River and Firth of Thames to the westward and the Pacific Ocean on the eastern side. Progressive operations have been conducted in a vigorous manner in some of the mines, but in general continuous work has not been carried on in the newer mines. The drainage and prospecting of the deep levels is looked upon as being of most importance to that portion of the goldfields included in and adjacent to the Borough of Thames, while the newer developments at Tapu, Waiomo, Tararu, Tairua, and Whangamata districts give promise of extensive additions to future gold-production. The following list of claims will show the number of areas occupied for mining purposes:—

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Thames, in the Hauraki Mining District, and registered on or before the 31st March, 1899, in the Books of the Mining Registrar at Thames.

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
21/11/95	21	3	32	Thames ..	IV., V.	Thames ..	Adelaide	Adelaide Gold-mining Co. (N.L.).
1/3/96	58	2	10	Tairua ..	IX.	Tairua ..	Ajax	Finlay McLiver.
14/12/96	100	0	0	Whangamata	VIII., XII.	" ..	Alameda	Henry James Ross.
3/2/97	100	0	0	Gumtown ..	IV.	Whitianga	Albion	Walter Calloway.
27/2/96	68	1	0	Thames ..	"	Thames ..	Alburnia East ..	Seven Reefs Gold-mining Co.
27/7/98	68	1	0	" ..	"	" ..	Alburnia Extended ..	A. M. McMahon.
6/7/97	27	0	0	Tararu ..	I.	" ..	Alexander	Alexander McLeod Cowie.
25/6/96	98	2	7	Puriri ..	XIII.	" ..	Amazon	Golden Centre Gold-mining Co.
13/11/95	96	2	0	Thames ..	V.	" ..	Anchor	Adolph Kohn.
26/2/96	77	2	0	" ..	I.	" ..	Argosy Extended ..	Argosy Gold-mining Co. (N.L.).
18/2/98	31	2	32	Tairua ..	V.	Tairua ..	Argentine	Charles McLean.
5/5/97	90	3	25	Puriri ..	XIII.	Thames ..	Auckland Brokers ..	Henry Culpan.
11/9/97	99	2	22	" ..	"	" ..	Aurarius	Robert Worth.
24/4/96	98	3	2	Waiomo ..	XV.	Hastings ..	Big Reef	Arthur Wright.
8/4/97	10	1	0	" ..	XIV.	" ..	Black Douglas ..	Andrew Dewar Douglas.
11/3/96	100	0	0	Tairua ..	VI.	Tairua ..	Broken Hills ..	Broken Hills Gold-mining Co. (Ltd.).
29/5/96	100	0	0	" ..	"	" ..	Broken Hills No. 2 ..	Broken Hills No. 2 Gold-mining Co.
29/5/96	69	3	24	" ..	"	" ..	Broken Hills No. 3 ..	Broken Hills Gold-mining Co. (Ltd.).
29/5/96	70	3	26	" ..	"	" ..	Broken Hills No. 4 ..	"
23/3/97	100	0	0	Tapu ..	XIV.	Hastings ..	Broken Hill ..	Broken Hill Gold-mining Co. (Ltd.).
9/8/88	15	2	17	Thames ..	IV.	Thames ..	Cambria	Anglo-Continental Gold Syndicate (Ltd.).
3/5/95	64	2	0	" ..	"	" ..	Cardigan	Cardigan Gold-mining Co. (Ltd.).
6/2/96	8	1	0	Ohui ..	"	Tairua ..	Carnation	Henry Becker.
19/12/95	20	1	16	Thames ..	"	Thames ..	Caspian	Caspian Gold-mining Co. (N.L.).
3/3/96	69	0	0	Kirikiri ..	IX.	Tairua ..	Chester	Malcolm Fleming.
16/3/98	100	0	0	Tararu ..	II.	Thames ..	Chicago	William Nicol Macbeth.
14/9/95	99	2	23	" ..	I.	" ..	City of Auckland ..	City of Auckland Gold-mining Co. (Ltd.).
28/7/98	84	0	12	Tapu ..	XI.	Hastings ..	City of Santa Rosa ..	Frank Hennah.
15/12/97	43	1	39	Punga Flat ..	IV.	Thames ..	Clarence Berry ..	Charles Short.
4/3/96	98	2	14	Tairua ..	IX., X.	Tairua ..	Colossus	George S. Budge.
13/11/95	96	3	9	Waiomo ..	XV.	Hastings ..	Comstock ..	Comstock Gold-mining Co. (Ltd.).
12/3/96	86	3	12	Tairua ..	IX.	Tairua ..	Consolation ..	John Morrow.
6/4/96	69	1	7	Thames ..	IV.	Thames ..	Creek	Tararu Creek Gold-mining Co.
4/10/95	64	2	10	" ..	IV., V.	" ..	Cumberland ..	John Bowler.
1/2/96	28	0	0	" ..	"	" ..	Cumberland Ext. ..	Karaka Queen Gold-mining Co.
21/1/97	7	3	15	" ..	"	" ..	Darwin	Darwin Gold-mining Co. (N.L).
14/9/95	90	0	0	" ..	IV.	" ..	Deep Levels Consolidated	Thames Hauraki Goldfields (Ltd.).
14/8/95	67	1	0	" ..	XXVII.	" ..	Deep Sinker ..	"
3/12/98	100	0	0	Tararu ..	II.	" ..	Eclipse	C. A. Harris.
14/12/97	16	0	0	" ..	"	" ..	Eclipse Extended ..	Harry Sidney Smith.
20/3/96	27	1	3	Thames ..	IV.	" ..	Ellerslie	John Churton.
11/9/97	59	2	0	Puriri ..	XIII.	Tairua ..	Empress	London and New Zealand Exploration Co. (Ltd.).
20/7/98	62	2	26	Thames ..	IV.	Thames ..	Favorite	Charles McLean.
3/3/96	45	0	0	Kirikiri ..	IX.	Tairua ..	Filly	Malcolm Fleming.
11/9/97	68	1	0	Hape Creek	IV., V.	Thames ..	Fortuna	Fortuna (Hauraki) Gold-mines (Ltd.).
28/2/95	6	1	10	Thames ..	IV.	" ..	Freedom	Freedom Gold-mining Co. (N.L.).
22/11/97	29	3	12	Tairua ..	V., VI.	Tairua ..	Gem	William Gorrie.
6/2/96	30	0	0	Tapu ..	XI.	Hastings ..	Gem and Crown ..	Monowai Gold-mines (Ltd.).
6/7/97	15	3	23	Te Mata ..	VII.	" ..	Gentle Lizzie ..	Elizabeth Brain.
18/2/98	93	2	25	Tairua ..	VI.	Tairua ..	Glencoe	Herbert Gordon and Albert Bruce.
2/9/97	7	1	22	" ..	"	" ..	Glentanner ..	Montague H. Wynyard.
23/3/97	97	0	0	Karaka ..	V.	Thames ..	Gloucester ..	Gloucester Gold-mining Co.
16/3/98	88	2	6	" ..	"	" ..	Gloucester Extended	Gloucester Gold-mining Co. (Ltd.).
20/3/96	2	2	20	Tairua ..	IX.	Tairua ..	Golden Arrow ..	Lachlan McLiver.
21/1/97	30	0	0	" ..	"	" ..	Golden Belt ..	Finlay McLiver.
16/8/98	8	0	0	Thames ..	IV.	Thames ..	Golden Drop ..	George Fisher.
18/2/98	34	2	6	Tairua ..	VI.	Tairua ..	Golden Hill ..	Robt. Worth, W. D. Tilsey, and Thos. Davy.
21/12/95	100	0	0	Ohui ..	IV.	" ..	" ..	J. C. P. Seaver.
13/7/98	62	3	1	Tairua ..	VI.	" ..	Gordon Point S.C. ..	Herbert Gordon.
24/7/97	71	3	29	Waiotahi ..	IV.	Thames ..	Hauraki Golden Age	Hauraki Golden Age Mines (Ltd.).
22/11/97	25	2	24	Tairua ..	VI.	Tairua ..	Hidden Treasure ..	William Armstrong.
3/3/96	82	0	0	Kirikiri ..	IX.	" ..	Horseshoe ..	Malcolm Fleming.
11/3/96	87	3	35	Whangamata	XV.	" ..	Inca No. 1 ..	Inca Gold-mining Co. (N.L.).
15/2/97	100	0	0	Puriri ..	XIII.	Thames ..	Inverness ..	E. Thomas Dufaur and James Russell.
24/7/97	52	0	0	Tapu ..	XI.	Hastings ..	Jessie	Robert Patterson.
5/8/97	79	2	1	Kauaeranga	I.	Tairua ..	Joselyn Davis ..	Balfour, Nixon, and others.
6/6/98	85	3	20	Thames ..	IV.	Thames ..	Jubilee	T. C. Bayldon.
11/7/95	49	3	25	Tararu ..	I., IV.	" ..	Kaiser	Kaiser Gold-mining Co. (N.L.).
13/11/95	84	3	20	Thames ..	IV.	" ..	Karaka Mines ..	C. A. Harris.
25/6/96	100	0	0	" ..	V.	" ..	Kedge	Adolph Kohn.
10/5/97	100	0	0	Tararu ..	II.	Tararu ..	Kensington ..	Ernest Clifton Beale.
23/3/97	64	0	0	Thames ..	V.	Waiomo ..	Kent	William Shaw.
15/2/97	100	0	0	Whangamata	III., VII.	Tairua ..	King of Tairua ..	Edward J. Smith.
6/7/97	29	3	32	Thames ..	..	Thames ..	Kuranui Caledonian	Kuranui Caledonian Gold-mining Co. (Ltd.).
16/5/89	14	3	10	" ..	IV.	" ..	Kuranui No. 3 ..	Kuranui Gold-mining Co. (Ltd.).
21/12/95	30	0	0	Ohui ..	"	Tairua ..	Last Chance ..	J. C. B. P. Seaver.
4/3/96	94	0	23	Tairua ..	IX.	" ..	Light of Asia ..	George S. Budge.
31/8/98	50	0	0	Thames ..	V.	Thames ..	Limerick	A. M. McMahon.
21/9/97	4	2	13	Shellback Creek	IV.	" ..	Little Mabel ..	Charles Longhurst.
26/2/96	100	0	0	Whangamata	XV.	Tairua ..	Luck at Last ..	Whangamata Proprietary (Ltd.).
26/2/96	100	0	0	"	"	" ..	Luck at Last Ext. ..	"
23/1/99	91	1	0	Puriri ..	XIII.	Thames and Tairua	Lucky Chance ..	R. Worth.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Thames—*continued*.

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
3/3/96	26	2	22	Tairua ..	XX.	Tairua ..	Main Lead Extended	Frederick John Tiffin.
21/12/95	100	0	0	Thames ..	V.	Thames ..	Manchester ..	William McCullough.
2/8/94	15	0	0	Ohui ..	IV.	Tairua ..	Maori Land ..	T. P. P. Seaver.
6/2/96	5	0	36	"	"	" ..	Marigold	Arthur O. Field.
20/7/98	57	3	22	Thames ..	V.	Thames ..	Mascotte	Francis Geraty.
5/5/97	49	1	30	Karaka ..	IV.	" ..	May Queen ..	May Queen Extended Gold-mining Co.
27/8/94	73	1	18	Thames ..	"	" ..	" ..	May Queen Hauraki (Ltd.).
21/6/98	92	1	0	" ..	"	" ..	" ..	"
6/4/96	100	0	0	Gumtown ..	XIV.	Whitianga	Merry England ..	George McNeil.
5/10/98	59	0	0	Whangamata	III.	Ohinemuri	Minnesota.. ..	Oliver George Browne.
2/11/97	4	0	0	Tairua ..	II.	Tairua ..	Missing Link ..	Albert Gold-mining Co.
16/8/98	13	2	1	Tararu ..	"	Thames ..	Mistletoe	John Wigmore.
10/11/96	94	3	26	Thames ..	IV.	" ..	Moanataiari ..	Moanataiari Gold-mining Co. (Ltd.).
24/10/95	12	0	39	" ..	IX.	" ..	Moanataiari North ..	Moanataiari North Gold-mining Co.
9/3/95	57	3	39	Waiomo ..	XV.	Hastings ..	Monowai	Monowai Gold-mines (Ltd.).
19/8/96	74	0	31	" ..	III.	Thames ..	Morion	Morion Puru Gold-mining Co.
22/6/96	80	0	0	Tararu ..	I., II.	" ..	Mount Taylor ..	Thomas Millet and Ernest C. Beale.
2/9/97	21	2	10	Tairua ..	I., VI.	Tairua ..	Myosotis	Benjamin M. Myers.
29/10/96	16	3	25	Whangamata	XV.	" ..	Nellie	Nellie Gold-mining Co. (N.L.).
4/10/95	54	2	0	Thames ..	IV.	Thames ..	New Alburnia ..	New Alburnia Gold-mining Co. (Ltd.).
5/8/97	73	0	8	Tairua ..	XIII.	Tairua ..	New Chicago ..	Charles Foster Wigley.
16/11/97	9	1	20	Punga Flat..	IV.	Thames ..	New Eileen ..	New Alburnia Gold-mining Co. (Ltd.).
18/5/97	22	0	0	Karaka ..	"	" ..	New Hauraki No. 1..	James McNeil Agnew.
24/7/97	73	0	0	Whangamata	XV.	Tairua ..	New Leap Year ..	William Prebble.
20/12/98	16	2	0	Tairua ..	IV.	" ..	New Manaia ..	T. F. Farley.
26/4/97	100	0	0	Puru ..	I.	Thames ..	New Olive.. ..	Rowland Campion Long.
27/7/98	70	1	20	Tararu ..	IV.	" ..	New Tararu ..	John M. Hume.
5/10/98	100	0	0	Whangamata	III.	Ohinemuri	New Wentworth ..	Oliver George Browne.
6/6/98	67	0	0	Thames ..	IV.	Thames ..	New Whau ..	New Whau Gold-mining Co. (Ltd.).
1/10/96	21	0	0	" ..	"	" ..	Nonpariel	Nonpariel Gold-mining Co. (N.L.).
28/9/98	86	0	0	Waiomo ..	XIV.	Hastings ..	Oamaru	M. Bowron.
2/11/96	59	0	0	Thames ..	IV., V.	Thames ..	Occidental ..	Occidental Gold-mining Co. (N.L.).
10/1/99	100	0	0	Tararu ..	I.	" ..	Old Argosy ..	S. C. Macky.
11/3/96	36	3	28	Thames ..	V.	" ..	Only Chance ..	Thomas Boyle.
21/3/89	15	0	0	" ..	IV.	" ..	Orlando	Orlando Gold-mining Co. Ltd.).
17/8/95	100	0	0	Tairua ..	IX.	Tairua ..	Pakirarahi ..	James McKay, jun.
11/3/96	62	3	37	" ..	"	" ..	Perseverance ..	John Moore.
6/2/96	25	0	20	" ..	"	" ..	Perseverance Ext. ..	John Morrow.
24/7/97	50	3	0	Whangamata	XV.	" ..	Princess of Wales ..	Patrick E. Ryan.
6/6/98	50	0	0	Puru ..	"	Hastings ..	Puru Creek ..	Big Reef Gold-mining Co. (N.L.).
22/3/88	47	0	0	Thames ..	IV.	Thames ..	Queen of Beauty Ext.	Thames Hauraki Goldfields (Ltd.).
14/12/96	100	0	0	Whangamata	XI.	Tairua ..	Queen Eva ..	E. C. Martin.
23/7/96	90	0	0	"	III.	Ohinemuri	Rapid	Henry William Moore.
10/1/99	31	3	11	Waiomo ..	XV.	Hastings ..	Rimu	R. Brodie.
4/6/97	84	3	5	Tairua ..	IX., XIII.	Tairua ..	Rise and Shine ..	Patrick Claffy.
23/12/96	74	0	4	Tapu ..	XV.	Hastings ..	Royal	Christopher Atwell Harris.
13/11/95	93	2	0	Waiomo ..	II.	Thames ..	Russell	Puru Consolidated Gold-mining Co.
6/12/95	100	0	0	" ..	"	" ..	Russell Extended ..	"
19/9/96	54	0	6	Tararu ..	"	" ..	Scandinavian ..	Scandinavian Gold-mining Co.
2/11/96	99	0	0	Tapu ..	XI.	Hastings ..	Sheridan	Sheridan Gold-mining Co.
13/8/96	0	1	10	Thames ..	IV.	Thames ..	Southern Reefs ..	William Burton.
21/11/95	12	2	34	Waiomo ..	XI.	Hastings ..	Square and Compass	The Crown Royal Gold-mining Co.
25/6/96	100	0	0	Whangamata	XIV., XV.	Tairua ..	St. Albans Extended	J. C. McKinney.
23/7/96	100	0	0	" ..	XV.	" ..	Standard	Arthur W. Smith.
13/1/97	40	2	0	Tairua ..	VI.	" ..	Star of Tairua ..	Benjamin Anderson.
23/12/96	58	3	0	Tararu ..	I.	Tararu ..	Star of Tararu ..	Frederick Bennett, sen.
21/6/98	74	1	0	Thames ..	IV.	Thames ..	St. Hippo	May Queen Hauraki (Ltd.).
19/6/95	90	0	12	" ..	"	" ..	Tararu	Tararu Creek Gold-mining Co. (Ltd.).
4/5/98	43	0	0	" ..	"	" ..	Tararu Freeholds ..	William Fraser.
2/11/97	2	2	18	Tararu ..	I.	" ..	Temple	Temple Bar Gold-mining Co.
27/2/96	65	0	5 6/10	Waiomo ..	"	" ..	Temple Bar ..	"
6/4/96	51	0	0	Thames ..	IV.	" ..	Thames	Samuel E. Mackay.
18/2/98	21	3	20	Tairua ..	VI.	Tairua ..	Treasury	Charles McLean.
19/8/96	100	0	0	Whangamata	XV. / III.	" / Ohinemuri	Three Star ..	Three Star Gold-mining Co. (N.L.).
2/11/96	84	0	0	Waiomo ..	XIV.	Hastings ..	Toulouse Extended..	Thomas Francis Cahill.
24/4/96	12	0	30	Whangamata	XV.	Tairua ..	Triangle	Frederick W. Abbott.
4/3/96	68	2	27	Tairua ..	IX., X.	" ..	True Ring	George Symons Budge.
5/2/95	7	0	0	" ..	IX.	" ..	Venus	James Mackay, jun.
19/9/95	41	3	10	Thames ..	IV.	Thames ..	Victoria	Victoria Gold-mining Co.
29/1/98	33	3	1	Tairua ..	VI.	Tairua ..	"	Herbert Gordon.
16/8/98	96	3	0	The Wires ..	"	Ohinemuri	Volunteer	C. S. Farmer.
27/2/96	100	0	0	Tararu ..	II.	Thames ..	Vulcan Extended ..	Henry Lomas Smith.
2/11/96	100	0	0	Waiomo ..	XIV.	Hastings ..	Waingohia ..	John Murphy and J. B. Fairs.
5/9/95	22	3	30	Thames ..	IV.	Thames ..	Waiotahi	Waiotahi Gold-mining Co. (Ltd.).
21/11/95	30	0	0	" ..	"	" ..	Waitangi	Arthur Pittar.
6/6/98	33	1	0	" ..	"	" ..	Waitangi Extended	R. Wilson.
15/2/97	96	0	0	Puriri ..	XIII.	" ..	Wandoline ..	Edmond T. Dufaur and James Russell.
15/9/98	100	0	0	Thames ..	IV.	" ..	Waratah	James Govan.
6/12/88	6	1	0	" ..	"	" ..	West Coast ..	John Northey.
19/9/96	92	2	28	Whangamata	XII.	Tairua ..	Whangamata Peninsula	Claude Lorraine Kerry.
6/4/96	94	0	17	" ..	XV.	" ..	Wharekawa ..	Frederick W. Abbott.
29/5/96	100	0	0	Tairua ..	II.	" ..	Winder	Andrew M. McMahon.
23/12/96	50	1	28	" ..	"	" ..	Winder Extended ..	Albert Gold-mining Co. (N.L.).
19/8/96	60	3	1	The Wires ..	III.	Ohinemuri	Wires	M. J. Gannon and J. Barber.

Mata District.

The land taken up in this district for mining purposes has been surrendered or abandoned, but in the early part of the year a little prospecting was done on the Mata and Lister's claims.

Tapu District.

Sheridan Mine.—Operations in this mine were of a limited nature. The company's financial arrangements did not admit of their carrying on development work in the mine. 285 tons 18 cwt. 224 lb. of quartz was crushed for a yield of 195 oz. 17 dwt. of gold, of the value of £312 5s. 2d.

Several other claims were worked in the district—viz., the City of Santa Rosa, Comet, Shannon, Golden Point, Little Jessie—the returns from them being as follows: City of Santa Rosa—13 tons 2 cwt. crushed, for a yield of 8 oz. 14 dwt. of gold, valued at £25 13s. 4d.; Comet—5 tons crushed, for a yield of 1 oz. 15 dwt. of gold, valued at £5 3s. 3d.; Shannon—2 lb. crushed, for a yield of 10 dwt. of gold, valued at £1 9s. 6d.; Golden Point—10 tons crushed, for a yield of 8 dwt. of gold, valued at £1 3s. 7d.; Little Jessie—22 tons crushed, for a yield of 4 oz. 11 dwt. of gold, valued at £13 8s. 5d.

Mahara Royal (Area, 173 acres 3 roods 36 perches; owner, Mahara Royal, Limited; mine-manager, George S. Clarke).—This mine is opened up by adits, of which there are four—viz., the Royal No. 1, 560 ft.; Royal No. 2, 400 ft.; Fluke, 260 ft.; and the Shannon, 225 ft., in length. The greatest depth of workings is 280 ft. below the surface. Two reefs have been cut, the Royal at two different levels having a width of 5 ft., and showing gold through the stone. The Shannon was cut after having driven the 225 ft., and has also a width of 5 ft., but no gold has as yet been seen. The development work for the year chiefly consisted of driving and extending the cross-cuts referred to; also driving and stoping on the Royal reef. The milling machinery, which is driven by two Pelton wheels, consists of a 20-stamp battery of a weight of 850 lb. a head, and eighteen berdans. There was 2,488 tons of quartz crushed, which yielded 1,556 oz. 9 dwt. of gold, extracted by amalgamation, valued at £4,236 15s. 9d. Thirty-three wages-men were employed.

Waiomo District.

Monowai Mine (Area, 89 acres; owners, Monowai Gold-mines, Limited; mine-manager, George H. White).—This mine has been continuously worked during the year, and a considerable amount of work has been done in the construction of ground-tramways and water-races, and in the additions and alterations to battery and cyanide plant. Experiments with the ore have been made by the amalgamation, concentration, and cyanide processes, and it has been decided to adopt the latter method as the most efficient means of treatment. In the Monowai section the reef at No. 3B level is a very large body of quartz, and has been driven on the foot-wall side of the reef for a distance of 680 ft. Cross-cuts have been put through the reef in several places in this drive, and it was found to be from 25 ft. to 30 ft. in thickness. In the Gem section the Crown and Gem reefs have been opened up to a considerable extent, but the quartz crushed from here was of a low grade, and not payable. This section has been connected with the battery by a horse and incline tramway three-quarters of a mile in length. 963 tons of ore has been treated, for 126 oz. 4 dwt. of gold, valued at £347 1s. Forty men have been employed.

Broken Hill Mine.—A considerable amount of work has been done to open up the reef, which is of fair size. The ore gives fair prospects.

Prospecting has also been carried on in the Comstock, Paroquet, and other claims, but there is no record of any returns or quartz treated.

Puru District.

Puru Consolidated Mine (Area, 392 acres; owner, Puru Consolidated Mining Company). Extensive operations were carried on in opening the mine at No. 1 and 2 levels on the main reef and also on the Rimu reef. In addition to a large amount of driving, stoping was also carried on, the reefs varying from 1 ft. to 2 ft. in width. There was a parcel of 944 tons of quartz and 20 lb. of picked stone crushed, for a yield of 163 oz. 1 dwt., valued at £489 3s. Seven men were employed. The results from the crushing not proving satisfactory, work in the mine has for some time past been suspended.

Other prospecting works throughout the Puru district were carried on by small parties, but no discoveries are reported.

Tararu District.

Tararu Creek Mine (Area, 160 acres; owner, Tararu Creek Gold-mining Company, Limited; mine-manager, D. E. Thornton).—This mine is worked from an adit-level, the length of which is 3,000 ft., the greatest depth of workings below the surface being 612 ft. There are four levels opened—viz., No. 1, 325 ft.; No. 2, 460 ft.; No. 3, 510 ft.; and No. 4, 612 ft. During the past twelve months only one reef has been worked—viz., the Dunedin reef. The character of quartz is free-milling, the country usually being blue sandstone. The development work for the year consisted of driving and rising. One air-compressor, 16-horse power, is used for driving two rock-drills; value of plant, £750. The milling machinery consists of thirty stamps, each 1,000 lb. weight; two Blake-Marsden stone-breakers; six berdans; six cyanide-vats, 60 tons capacity. The motive-power is water and steam combined. Value of plant, £7,500. The total quantity of quartz crushed was 8,479 tons, for a yield of 3,637 oz. 14 dwt. of gold, of the value of £8,985 15s. 10d. The average number of men employed during the year was seventy. On the 25th March last year the old mill was burned down, and a new plant has since been erected on the same site, lighted by electricity, and all the latest appliances for the successful treatment of ore.

City of Auckland Mine.—There has been little work done on this property during the year, but the Tararu Creek Company now hold an option over the mine.

Iron-cap Mine (Area, 64 acres; mine-manager, William Martin).—This property, formerly known as the Kaiser Mine, is situated in the Ohaia Creek, Tararu district. Prospecting has been carried on by four men, who have driven 300 ft. The reef averages 2½ ft. in width, and consists of light mineralised quartz. Thirteen tons of quartz has been crushed, for a yield of gold valued at £21 0s. 3d.

Scandinavian.—In the early part of the year a party of tributers crushed 82 tons of quartz, for a return of 17 oz. 17 dwt. of gold, valued at £44 14s. 6d. The mine has been since abandoned.

Argosy Mine.—There has been very little work done on this property during the year.

Chicago Mine.—A considerable amount of work was done on the reefs of this property in the early part of the year. A ten-stamp battery was erected, and is being driven by water-power. 156 tons of quartz was crushed, for a return of 26 oz. 13 dwt. of gold. This return, however, not proving payable, work in the mine has been suspended.

Eclipse Mine (Area, 200 acres; owners, Thames Exploration Syndicate; mine-manager, James Thomas).—At present this mine is worked from an adit, but for future workings a shaft is being sunk and is down a depth of about 74 ft. There is a drive of 200 ft. on line of reef, and one level opened 200 ft. from the surface. Two reefs have been met, one called the main and the other the cross lode, composed of hard quartz, containing iron-pyrites and silica, adhering to firm andesite walls. The principal work carried on during the year has been driving, stoping, and sinking. A portable double-cylinder steam-engine is to be used for winding purposes at the shaft. The mill machinery in course of erection consists of a ten-head stamper battery (weight of stamp, 850 lb.) and six berdans, which will be driven by water. A parcel of quartz amounting to 106 tons was crushed at the Chicago battery for a yield of 136 oz. 16 dwt. of gold, valued at £396 14s. 4d. Forty wages-men were employed. A contract was let some time ago for felling and clearing bush along line intended for water-race, somewhat over a mile in length. This has now been completed. A water-race has just been completed by contract. The water is obtained from Tararu Creek, and from the dam to the battery has a fall of 260 ft. A contract has just been completed for the erection of poppet-heads, winding-engine, and building. A ten-head battery and six berdans are at present in course of erection by A. and G. Price, also battery building. This will be completed very shortly. A contract has just been let for the supply and erection of an aërial tramway from the mine to the battery, a distance requiring 14,800 ft. of wire rope, 2½ in. in circumference, and which must be of improved patent plough steel. There is not a sufficient fall to work by gravitation, and the small power required will be applied to the lower terminal. Both the upper and lower terminal will be provided with a 10 ft. diameter sheave.

Kuranui District.

Kuranui Mine (Area, 15 acres; owner, Kuranui Gold-mining Company; mine-manager, P. C. Hansen).—Operations in this mine have chiefly consisted in sinking a shaft and driving cross-cuts near the line of reef to the westward of the older workings. A party of tributers crushed 125 loads, for a yield of 89 oz. 5 dwt. of gold, valued at £194 11s. 5d. The owners crushed seven loads, for a yield of 1 oz. 2 dwt., valued at £3 0s. 6d. Five wages-men and five tributers were employed.

Moanataiari District.

Moanataiari Mine (Area, 94 acres 3 roods 26 perches; owners, Moanataiari Gold-mining Company, Limited).—During the past twelve months this company has carried on continuous prospecting operations in its mine. After the lodes were opened out at the lower levels in the Moanataiari Mine proper the ore was found to be of too low grade to pay for working. The developments were pushed ahead into the Cambria section of the property. A cross-cut from the shaft at a depth of 270 ft. below sea-level was constructed for a distance of 1,000 ft., when it intersected the Cambria lode in the Moanataiari Special Claim, but beyond getting some veins and stringers of auriferous quartz on the hanging-wall side of the lode, from which some specimen stone was obtained, the general body of the ore did not contain sufficient value to leave a margin of profit to work. The lode was driven on at this level for a distance of about 320 ft. without meeting with encouraging results. An uprise was constructed from the termination of the cross-cut from the shaft at 270 ft. below sea-level, and carried up on the hanging-wall side of the lode for a length of 160 ft., following its inclination, when it entered the old workings in the Cambria Mine, or, at least, into a drive which had been constructed by the Cambria Company from the bottom of a winze, which was sunk by that company to a vertical depth of 50 ft. below the No. 3 level in its mine. On breaking into the old workings a level was constructed in an easterly direction on the Cambria lode, so as to get under the place where a rich bonanza of ore was worked several years ago. No ore of any special value was met with until a distance of 220 ft. was driven from top of the uprise, when ore of a value of £6 per ton was struck in a rib on the hanging-wall side of the lode. The level was extended about 50 ft. through good ore, when the lode was cut off by a break or dislocation. Stoping was commenced on the good chute of ore above the level, but, strange to say, the height of the level took all the good ore, the ore in the leading stope being barely payable for working. A winze was sunk on the rich chute of ore, which went down below the level for 32 ft., and the company is now engaged in stoping out this block. No rich ore was expected on the west side of the break met with. It was between this break and the main Moanataiari slide. It was in this portion of the ground where the Cambria Company got the rich bonanza of ore at the higher levels. The level is now being extended on the east side of the break, where there is an immense body of quartz. This break or dislocation has heaved the lode northwards for a distance of about 40 ft., and, although the lode has been picked up, its hanging-wall side, where the rich chutes of ore are generally found, has not yet been reached. There is still a distance of about 200 ft. to drive before the lode will be cut off by the Moanataiari slide. Those who are acquainted with this section of the property hold the opinion that a good chute of ore will be met with between the point where the level is now con-

structed and the Moanataiari slide. The total quartz crushed by the company for the year ending the 31st March last amounted to 3,102 tons, which yielded 1,367 oz. of gold, having a value of £3,844 7s. 9d. There was also 1,049 tons crushed by tributers, which yielded 1,811 oz. 11½ dwt. gold, representing a value of £4,588 0s. 10d., making a total of 4,151 tons of quartz crushed, yielding 3,178 oz. 11½ dwt. gold, having a value of £8,432 8s. 7d. Thirty-four wages-men and seventy-two tributers were employed.

Kuranui Caledonian Mine (Area, 29 acres 3 roods 32 perches; owners, Kuranui Gold-mining Company, Limited).—Operations were carried on at the Nos. 1, 2, 3, and 4 levels, but through not meeting with success operations were suspended. The mine is now worked on tribute, and sixty men are engaged. The company crushed 180 tons 10 cwt. 144 lb. of picked stone, for a yield of 204 oz. 16 dwt. of gold, valued at £550 4s. 10d.; and the tributers, 412 tons of quartz and 795 lb. of picked stone, for a yield of 1,044 oz. 18 dwt. of gold, valued at £2,792 4s. 2d.

New Alburnia Mine (Area, 63 acres 3 roods 20 perches; owners, New Alburnia Gold-mining Company, Limited; mine-manager, Robert James).—This mine is principally worked from a shaft, the depth of which is 603 ft., that also being the greatest depth of workings below the surface. The mine is at a depth opened up by an adit-level, the length of which is 2,433 ft., and levels, seven in number, have been driven from the shaft, the average depth between each being about 80 ft. Three reefs have been opened and worked in the mine—viz., Dixon's, Sons of Freedom, and Branch or New reef. The quartz is generally hard and heavily mineralised. The walls are moderately hard and well defined, and the country rock is composed of andesite. A good portion of the work done during the year was really preparatory in order to commence the work of exploration on virgin ground below the No. 5 level. A tubular boiler, &c.—pressure, 90 lb. per square inch—is used for winding; value, £1,700. There is a twenty-stamp battery, each stamp weighing 550 lb., seven berdans, two pans, and two buddles, all driven by a Pelton water-wheel. The quantity of quartz crushed for the year was 1,385 tons, yielding 253 oz. of gold, for a value of £660. The average number of men employed for the year was forty. There is still a vast extent of untried ground below the Sons of Freedom or adit level and the Moanataiari Tunnel. If a prospecting drive was made from the present end of Moanataiari Tunnel in the direction of this mine, levels at a greater depth from the surface than any ground hitherto worked in the Thames district could be readily prospected, and the testing of deep levels be carried out without the aid of pumping machinery.

Operations have also been carried on in the Tudor, Darwin, Freedom, and Golden Drop Mines, but the returns have been inconsiderable.

Grahamstown District.

Victoria Mine (Area, 41 acres 3 roods 10 perches; owner, Victoria Gold-mining Company; mine-manager, Thomas Moyle).—Very little work has been done during the year on this property, which comprises the ground formerly known as the Tuki Mine and the New Prince Imperial Mine. The ground is well opened up, the lowest level in the mine being 562 ft. below the surface; the other levels are respectively 88 ft., 143 ft., 243 ft., 352 ft., 420 ft., and 492 ft. below the level of the brace. The total quantity of quartz crushed during the year was 131 tons, which returned a yield of gold valued at £158 17s. A party of eight tributers also crushed 145½ tons for a yield of 78 oz., valued at £211.

Drainage.

The deep levels at the Thames continue to be drained by the machinery and pump in the Big Pump shaft, the whole being under the control of the Thames Drainage Board, the members of which are elected by the contributing companies and the Thames Borough and County Councils. The business is conducted in Auckland, at which place the meetings of the Board are held. The following balance-sheet, produced at the annual meeting in January last, shows the financial position of the Board, and also the contributions from the different companies assessed; while the annual report of the manager of the works (Mr. Joseph Brokenshire) gives full details of the past year's operations.

Receipts.

	Arrears.	Assessment.	Rebate.	Cash received.	£ s. d.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
To Balance					346 10 11
May Queen Gold-mining Company	...	1,000 0 0	166 13 4	833 6 8	
Waiotahi	...	645 0 0	107 9 8	537 10 4	
Victoria	...	600 0 0	100 0 0	500 0 0	
Kuranui Caledonian	...	427 0 0	71 3 8	355 16 4	
Moanataiari	...	354 0 0	59 0 0	295 0 0	
Cardigan	...	300 0 0	50 0 0	250 0 0	
Cambria	...	250 0 0	41 13 4	208 6 8	
Thames Hauraki	...	240 0 0	40 0 0	200 0 0	
Kuranui	...	90 0 0	15 0 0	75 0 0	
Thames Borough Council	30 0 0	...	...	...	
Thames County Council	12 10 0	150 0 0	...	150 0 0	
	42 10 0	4,056 0 0	651 0 0	3,405 0 0	3,405 0 0
Scrap-iron sold					20 5 0
Coal sold					3 1 4
Interest on Savings-Bank deposit for year					2 11 0
Deposits with tenders—					
J. J. Craig					50 0 0
P. Maxwell					10 0 0
					£3,837 8 3

Expenditure.	£	s.	d.
By Coal	1,444	11	10
Wages	1,034	16	0
Foundry-work, ironmongery, and requisites	237	12	8
Timber	13	18	2
Cartage	246	1	9
Gas- and water-supply	134	2	6
Board fees and travelling-expenses	166	19	0
Salaries, insurance, advertising, &c.	140	17	1
Rent, legal and miscellaneous expenses	104	14	9
Addition to deposit in Post-Office Savings-Bank—Interest for 1898	2	11	0
Deposit with tender refunded (P. Maxwell)	60	0	0
Balance at Bank of New Zealand	251	3	6
	£3,837	8	3

Liabilities.	£	s.	d.
Contractors' deposits—			
J. J. Craig	50	0	0
P. Maxwell	10	0	0
Sundry creditors	181	6	2
Balance	271	14	8
	£513	0	10

Assets.	£	s.	d.
Thames Borough Council, arrears	30	0	0
Thames County Council, arrears	12	10	0
Sundry debtors for coal, scrap-iron, &c.	36	1	11
Coal on hand, 167½ tons at 11s. 5d. per ton	95	12	3
Cash—			
Deposit in Post-Office Savings-Bank	87	13	2
At Bank of New Zealand	251	3	6
	£513	0	10

The manager's report is as follows: "I have the honour to inform you that pumping operations have been carried on continuously during the past year, the usual stoppages excepted. After the annual clean-out of the water-race pumping was resumed on the 3rd January. As soon as possible after starting I had the repairs to ladderway and the reflooring of the winding-engine room (mentioned in my last annual report) effected. I also obtained from Messrs. A. and G. Price new seating and valves for the plunger at the 400 ft. level. In accordance with instructions received from the Inspector of Mines, two watchmen had to be put on to look out for the gas rising, as the Kuranui Caledonian Company were working at the 400 ft. level. These watchmen were kept on until the company ceased working at that level on the 6th August, at a cost to the Board of £94. To supplement my arrangements for ventilating purposes, I applied in January last for an inch-pipe connection with the county water-mains. This I am still using, as the supply from the Moanataiari fluming is very scanty. In May last I had to obtain another set of seating and valves for the plunger at the 200 ft. level. Owing to a breakage in the water-race, pumping had to be discontinued from the 24th June to the 4th July. Pumping was again stopped on the 21st July, to make ready for the annual boiler inspection, which took place on the 26th July. Mr. Jobson passed the boilers as in fair condition, and allowed the same pressure as before, but ordered new gusset-stays for the four main boilers, which have been placed in position. Early in November the stocking of the plunger at the 400 ft. level showed signs of giving way, and I had to obtain two steel plates, glands, &c., to strengthen and secure it. In this month one of the blow-off pipes in connection with the pumping-boilers commenced leaking, and on examination it was found that two of them were badly corroded. New ones have been supplied and fixed in position by Messrs. A. and G. Price. On Christmas Day pumping was again stopped on account of the annual clean-out of the water-race. Pumping was again resumed on Monday morning last. I took advantage of the stoppings to have the pumps and machinery thoroughly overhauled, and the necessary repairs effected, so that everything is now in fair working-order. The smokestack in connection with the pumping boilers is getting in a dangerous condition, as the top is beginning to break away. I would recommend the heavy cornice at the top being removed and the chimney further secured with wire-rope stays. I estimate these repairs would cost about £35. The roof of the boiler-house is getting out of repair, and will require an outlay in the near future of about £25 to put it in fair condition. The substantial repairs effected in 1897 have had the effect of materially reducing the working-expenses, which amount to £2,771 for 1898, as against £3,061 for 1897, a saving of £290, to which may be added the watchmen's wages of £94, making a total saving of £384 for the last year. The consumption of coal during the past year has been 2,376 tons. The working-expenses for last month have been £184; the extra expenses for repairs £42. Monthly coal statement: 1898—1st December—Stock in hand, 54 tons 15 cwt.; 2nd December, received ex "Huon Belle," 72 tons, Hikurangi Coal Company; 3rd December, received ex "Norval," 79 tons 5 cwt., Hikurangi Coal Company; 15th December, received ex "Huon Belle," 71 tons 17 cwt., Hikurangi Coal Company; 17th December, received ex "Saucy Kate," 66 tons 14 cwt., Hikurangi Coal Company: total, 344 tons 11 cwt. Coal sold, 20 tons 1 cwt; consumption, 157 tons: total, 177 tons 1 cwt. 1st January, 1899—Stock in hand, 167 tons 10 cwt."

The drainage of the deep levels, which up to the middle of January last was effected by the Big Pump, is now shared by the pumping plant at the Queen of Beauty shaft, which has been in operation, with the exception of ten days, since the time mentioned. The effect that the lowering of the water-level in the latter shaft has had in lessening the flow in the direction of the Big Pump is already noticeable, especially in the May Queen and Cardigan workings, the old water-levels in those mines having been lowered considerably by drainage towards the Queen of Beauty end. What the ultimate effect of pumping at this shaft may be on the drainage of the adjacent country, or how far the lowering of the water-level may extend in the direction of the Big Pump, future continued operations alone will demonstrate. It is my opinion that until the Queen of

Beauty shaft has been sunk to a considerable depth below the 500 ft. level in the Big Pump shaft it cannot be ascertained whether the drainage of the field can be effected without a drainage-channel being constructed. The pump at the Queen of Beauty shaft is now taking portion of the water from the Saxon and Cardigan lodes, in the Saxon section of the May Queen (Hauraki) property. At the same time there is a considerable quantity of water flowing along the drainage-levels out of the Saxon and May Queen sections to the Big Pump. Indeed, the fall of the present levels in all the mines being towards the Big Pump, unless the water drains through the rock from the Big Pump shaft the drainage of the field cannot be completely effected by the new pumping machinery. It is not for me to say whether this water-way would prove of the greatest benefit if driven at the level of the 640 ft. Big Pump or at a greater depth, but the earliest drainage of the present deep-working mines would result from proceeding with this work as soon as the Queen of Beauty shaft and pumps have been completed to a suitable depth. The work being now performed by both plants, arrangements between the parties interested must sooner or later be made for equitable participation in the sums raised by assessment for drainage purposes, and the future incidence of assessment must of necessity be readjusted to meet the altered conditions now existing.

Waiotahi District.

Waiotahi Mine (Area, 22 acres; owner, Waiotahi Gold-mining Company; mine-manager, J. E. Smith).—This mine is worked from a shaft the depth of which is 340 ft., the depth of workings below the surface also being 340 ft. There are four levels opened from this shaft—viz., 1, 2, 3, and 4. The reefs, which are in a sandstone country, vary in width from ¼ in. to 5 ft. The development work during the year consisted of driving, stoping, and sinking winzes. The machinery consists of one 16-horse-power steam-engine for winding, also one 16-horse-power steam-engine for driving the mill, which consists of twenty-one heads of stamps and five berdans; value, £4,000. The quantity of quartz crushed was 1,090 tons, for a yield of 1,653 oz. 16 dwt. of gold; value, £4,571 5s. The number of wages-men employed for the year was sixteen.

Nonpareil Mine (Area, 21 acres; owner, Nonpareil Gold-mining Company; mine-manager, John Rickard).—There are two levels from which the mine is worked, the adit being 520 ft. in length, and the other 250 ft. There are several reefs in the ground; the one on which most of the work has been done is 18 in. in width. The mine is now chiefly worked by tributers, ten of whom are engaged, the company only having four men on wages. The quantity of quartz crushed for the company was 34 tons, which yielded 208 oz. 11 dwt., of the value of £723 2s.; and for tributers 154 tons, for a yield of 234 oz. 15 dwt., valued at £642 6s. 3d: total tons crushed, 188; yield, 443 oz. 6 dwt.; value, £1,213 9s. 6d.

Fame and Fortune Mine, Thames (Area, 71 acres 3 roods 21 perches; owners, E. Kersey Cooper and others; manager, Henry Willetts).—This mine was taken over by the Hauraki Golden Age Gold-mining Company, who erected a 40-stamp mill for the treatment of the ore, but operations were discontinued on the property, and no quartz was treated. The property has latterly been worked by Mr. E. Kersey Cooper, who has renovated the old crushing-mill, and intends to recommence crushing at an early date. The mine is well opened up, six different levels being in working use, and it is intended to extend one of the levels of the Moanataiari Mine, in order to prospect the Golden Age reef at a greater depth.

Waiokaraka District.

May Queen Hauraki (Area, 73 acres 1 rood 18 perches; owners, May Queen Hauraki, Limited).—The operations in this company's mine during the past year have been confined to working the No. 2 Cardigan lode, which traverses the Saxon section of this company's property. The whole of the lodes that were previously known to exist in both the Saxon and May Queen sections of the mine that were considered payable for working were stoped out down to the drainage-level by the previous holders of the property. At the time the mine became the property of the present company no great amount of ore of a payable character was known to exist in the mine above the drainage-level, and the quantity of water to contend with below that level was such that it could not be lifted unless the company erected large pumping machinery of its own to drain the claim. As the greater portion of the ground held by the company is within the drainage area which is under the control of the Drainage Board, which has the power to levy rates for drainage purposes, to pay over to any one who drains that area, the present company did not deem it expedient to erect a large pumping plant, seeing the Thames-Hauraki Company were erecting a powerful pumping plant under a specific agreement with the Government to drain the deep levels on the Thames Goldfield to a depth of at least 1,000 ft. A cross-cut from the lowest, or drainage, level was constructed to prospect the portion of the May Queen Special Claim between the workings of the Saxon section and the boundary with the Thames-Hauraki Mine. This cross-cut intersected two lodes known as No. 1 and No. 2 Cardigan lodes. The No. 1 lode was first cut, but the ore was of too low grade to pay for working. The lode was driven on for a distance of about 300 ft. without obtaining any beneficial result. The cross-cut was extended for an additional 140 ft., when it intersected the No. 2 lode. The first parcel of ore from this yielded at the rate of 1½ oz. gold to the ton. A level was constructed westward from the intersection of the cross-cut with the No. 2 lode to the boundary of the Cardigan Claim, and also in the opposite direction, until the lode went into a hard bar of andesite, which was known to exist between the Saxon section and the Thames-Hauraki pump-shaft. This lode was stoped out up to a height of about 70 ft. above the level by the company with wages-men, and in December last it was let to a party of tributers, who are still working it. From the 1st April to December the company crushed 2,139 tons of ore, which yielded 1,866 oz. 10 dwt. of gold, representing a value of £5,167 13s. 10d.; and up to the 31st March last the tributers have crushed 199 tons, which yielded 351 oz. gold, having a value of £963 15s. 6d., making the total number of tons crushed for the year 2,338, yielding 2,217 oz. 10 dwt. gold, having a value

of £6,131 9s. 4d. The No. 2 Cardigan lode shows that it is much richer at the level than in the stopes, and also contains a greater width of ore. From what is now known respecting this lode there is every prospect of getting rich ore when the next level is opened up. Recently a winze has been sunk on the Saxon lode. The water having been drained by the pumping operations of the Thames-Hauraki, this winze is down to a depth of 23 ft., but none of the ore has yet been broken out. This winze is being sunk for the purpose of ascertaining the value of the ore prior to commencing operations to open up the mine at a greater depth.

May Queen Section: New poppet-heads have been erected at the May Queen shaft; also a large Lancashire steam-boiler for supplying steam for an air-compressor and steam-pump, with all necessary buildings for carrying on mining operations from this shaft. The shaft itself has been enlarged to 12 ft. by 4 ft. 9 in. in the clear from the surface down to a depth of 520 ft., which is at the lowest drainage-level, and below this the pumping compartment is enlarged to 6 ft. by 6 ft. in the clear, with two winding compartments of 4 ft. 9 in. by 3 ft. 10 in. each in the clear. Hanging beams are placed in the ladder-shaft above the chamber opening into the drainage-level, from which the pumps can be lowered as the sinking proceeds. Two of Cameron's sinking-pumps, having double-action rams of 9 in. in diameter, are on the ground ready to lower into their place when required. Up to the present the shaft is being sunk in a tough impervious rock, and very little water has been met with. The shaft is now sunk to a depth of 40 ft. below the drainage-level, and will have to be sunk an additional 80 ft. before a commencement is made to open out a lower chamber. From what is known of the Saxon, Cardigan, and May Queen lodes at the lowest level worked, the May Queen Hauraki Company is likely to have mines which will become large gold-producers, but it will yet take about eight months before they are sufficiently opened up to get on a large staff of workmen.

Cardigan Mine (Area, 64 acres 2 roods; owner, Anglo-Continental Gold Syndicate, Limited).—This property was purchased by the Anglo-Continental Gold Syndicate (Limited) from the Cardigan Gold-mining Company at the end of July, 1897, and an arrangement was made between the present holders and the May Queen Hauraki Company so that prospecting operations could be carried on from the lowest or drainage level in the Saxon section of the May Queen Hauraki Company's property into the Cardigan Special Claim. A main level has been constructed from the boundary of the latter company's property for a distance of 335 ft. on the course of the Cardigan No. 2 lode, which is variable in width from a few inches to 3 ft. Since August last 112 tons of quartz has been crushed on behalf of the new proprietors, which yielded 245 oz. 1 dwt. gold, representing a value of £648 0s. 9d.; and 97 tons has been crushed by tributers, which yielded 121 oz. 11 dwt., having a value of £331 12s. 4d.: making a total of 209 tons of quartz crushed, yielding 366 oz. 12 dwt., of a value of £979 13s. 1d., during the past year. The gold in the lode seems to gradually get less as the stopes go upwards, and some ore which was taken from below the floor of the level shows that the lode is considerably richer in going down, so that there is every probability of a good block of ore being opened up when a deeper level is constructed.

Queen of Beauty Mine (Area, 47 acres; owners, Thames-Hauraki Goldfields, Limited; mine-manager, T. A. Dunlop).—This mine is to be worked from a shaft the depth of which at present is about 530 ft. The work during the year consisted in the completion of erecting the machinery, and in the enlargement of the shaft. The machinery now in use consists of—One pumping-engine, 1,000-horse power; one winding-engine, 130-horse power; one capstan engine, 95-horse power: all driven by steam, and valued at £40,000. The electric-light plant is driven by a Pelton water-wheel. A crushing of 7½ tons of quartz when sinking yielded 5 oz. 11 dwt. of gold, amalgamation on plates and grinding in pans. An average number of fifty men were employed. This company's pumping machinery was completed in the end of December, and was first used in sinking the shaft below water-level about the middle of January. The contractors for the machinery had to run it for a period of one month before it was finally taken over. A certificate had to be given by the Government Inspector that the whole of it was completed in a satisfactory manner. This certificate was given on the 14th March. On the company receiving this certificate it suspended operations for a period of about ten days, and again commenced pumping and sinking operations. The pumping-shaft is now enlarged to what is known as the 8th level in the old Queen of Beauty workings. The company intend to open out from this level to intersect the Vanguard lode, which is said to contain a large body of ore payable for working, and at the same time to continue enlarging the shaft to its original depth—namely, 740 ft., where rich ore is said to exist at what is known as the 11th level from the shaft. At present the water is not very heavy in the Queen of Beauty shaft. A steam Cameron double-plunger pump of 12 in. in diameter is able to cope with the water below the 330 ft. level, where the 25 in. plungers are fixed. When the company first commenced pumping they had to work the Cameron steam-pump by compressed air, but the steam-engine which was procured from the Union Ironworks, San Francisco, was not sufficiently powerful to work the air-compresser at a speed requisite to supply air for the pump; consequently steam had to be supplied from the boilers direct to the steam-cylinder attached to the pump. All the machinery is of the best manufacture, and is capable of contending with the whole of the water in the field when a drainage-channel is constructed.

Block XXVII. District.

Deep Sinker Mine (Area, 93 acres; owner, Thames-Hauraki Goldfields, Limited; mine-manager, John Somervill).—This mine is worked from a shaft 450 ft. in depth, and at this level two cross-cuts are driven, one to the north 720 ft. and one to the south 230 ft. No reefs, so far, have been met with. The mine machinery consists of one horizontal engine, 16 in. diameter, 30 in. stroke, and a 10 in. plunger and draw-lift pump, with two sets of gear; valued at £1,700. The average number of men employed during the year was seventeen.

Karaka District.

Karaka Mine (Area, 85 acres; owner, Karaka, Limited; mine-manager, William H. Potts).—This mine is opened up from an adit-level the length of which is 750 ft. and the greatest depth of workings below the surface 200 ft. There are two levels opened—No. 1, 700 ft., and No. 2, 300 ft. Two reefs have been met with, both of a kindly quartz, with sandstone casing. The principal work carried on during the year has been the extending of the main cross-cut eastward to intersect the Hague Smith and other known reefs. Prospects have much improved during the past two months, gold having been freely seen in the quartz from the No. 2 reef. A crushing of 100 tons was treated at the May Queen Extended battery, for a yield of 27 oz. 11 dwt. of gold, valued at £80 18s. 6d. Several test lots have also been crushed to test the value of ore at different points. Thirteen men were employed.

May Queen Extended (Area, 49 acres 1 rood 30 perches; owners, May Queen Extended Gold-mining Company).—The principal work in this mine was confined to driving on the Hague Smith reef, but nothing of importance was discovered. Only a small quantity of quartz was crushed—33 tons—which yielded 9 oz. 8 dwt. of gold, valued at £28 4s. Two men were employed.

Claremont Mine.—Mr. George Bryant, the owner of this ground, continues to devote his attention to working out the quartz veins near the junction of the flinties. He treated 345 lb. of stone, for 255 oz. 9 dwt. of gold, valued at £689 14s. 3d.

A considerable amount of prospecting has also been carried on in other claims in the Karaka district.

Gloucester Mine.—Work in this mine has been confined to prospecting surface-levels. The shaft which was sunk last year has for a time been abandoned.

Manchester Mine.—This mine has been worked by tributers, who crushed 59 tons of quartz for 43 oz. 18 dwt. of gold. Four men were employed.

Adelaide Mine.—Operations in the shaft and lower levels have been suspended on the company's account, and the mine is now let on tribute. The tributers crushed 18 tons 10 cwt. of quartz, for 12 oz. of gold, valued at £36.

Una Hill and Te Papa District.

Occidental Mine (Area, 59 acres; owners, Occidental Gold-mining Company).—The work in this mine consisted of extending the drive 157 ft. at the North Star low-level cross-cut, with a view of intersecting the Loyalty and Hague Smith reefs. The latter was cut and driven on for a distance of 90 ft., showing favourable prospects. Stoping was also carried on on the North Star leader. The quantity of quartz crushed for the year was 89 tons 10 cwt., which yielded 84 oz. 4 dwt. of gold, valued at £227 6s. 10d. Seven men were employed.

Fortuna Mine (Area, 68 acres; owner, Fortuna Hauraki Gold-mines, Limited; mine-manager, Henry Rabe).—This mine is worked both from shaft and adit-levels; the depth of the shaft is 300 ft., and the length of the main adit 909 ft. The workings are being carried on at a depth of 200 ft. below the surface. There are two levels opened up—No. 3, at a depth of 200 ft., and No. 2, 125 ft., from the brace. About six large reefs exist, varying in width from 6 ft. to 20 ft.; also numerous leaders, from 2 in. to 2 ft. wide. The quartz is generally very hard and heavily mineralised. The walls of the reefs in the shaft being very firm, and a good class of sandstone, are easily kept up. At No. 2 level in the shaft antimony in considerable quantities is met with in the quartz. The development work carried on during the year was as follows: In No. 1 level, Gibraltar section, the winze was sunk a further 54 ft., making a total depth of 90 ft. It was sunk in the hanging-wall portion of Gibraltar reef, and is about 10 ft. long by 5 ft. wide in solid quartz, and no sign of the foot-wall when discontinued through having too much water. No. 4 (main) cross-cut was extended 157 ft., making a total length of 909 ft. Driving on Jupiter reef was pushed vigorously ahead. The drive hillward was extended 62 ft., making a total of 101 ft.; and the drive seaward was extended 60 ft., making a total of 104 ft. The reef in cross-cut is about 20 ft. wide, but only about 5 ft. of the hanging-wall has been taken in the drive. The Rover tunnel was cleaned out and repaired a distance of 400 ft. At this point a drive was cleaned out 16 ft. seaward, and extended to a length of 32 ft. In this drive an old winze which was sunk on the Rover reef in former days and filled up has been cleaned out and retimbered, and at a depth of 60 ft. the solid bottom was reached, and sinking is being proceeded with. The reef in the bottom is from 18 in. to 3 ft. in thickness. In shaft at No. 2 level the main cross-cut was cleaned out 55 ft., when No. 1 reef was reached, and driving commenced on it. A total distance of 151 ft. was driven on the reef, only a portion of which was taken down, the remainder being left standing through want of storage-room on the surface. A cross-cut from main cross-cut was cleaned out 632 ft., and intersected No. 1 and No. 2 Rover reefs. Driving on both these reefs is being vigorously pushed ahead. No. 1 reef has been driven on for 57 ft., and No. 2 reef 39 ft. In the shaft, No. 3 level, the main cross-cut was extended 126 ft., making a total of 591 ft. At this point a reef was cut from which issued such a large quantity of water that the pump was unable to cope with it, and driving was discontinued until bigger machinery be put down. The drive hillward on No. 2 reef was driven to a total distance of 206 ft. Only a portion of this reef was taken down, the remainder being left standing through want of storage-room. A 5-stamp battery, as an experimental plant, has been erected, also a hopper with a capacity of 100 tons, together with tramways from mine to hopper and from hopper to battery. The mine machinery consists of one 9 by 5 by 12 vertical special Tangye pump driven by steam; a Tangye boiler, 14-horse power, Colonial, No. 40492; and one Clarke-Chapman winch for winding; two cylinders, 6 in. by 10 in., working one safety-cage. The quantity of quartz crushed was 110·95 tons, for a yield of 1 oz. 19 dwt., valued at £5 0s. 1d. (recovered from plates). The tailings are stacked for future treatment, as wet crushing alone has been found unsuitable, and only an infinitesimal portion of the gold contents have been extracted. An average number of twenty-four men were employed.

Hape District.

Anchor Mine (Area, 196½ acres; owner, Ethel Reef Gold-mining Company, Limited; mine-manager, George Gill).—This mine is worked from an adit-level the length of which is 400 ft., and the greatest depth of workings below the surface is 150 ft. There are five levels opened. Driving and rising operations have been carried on on the Jupiter, Stevenson, Souvenir, and Nellie reefs. The Jupiter is a large body of quartz, averaging about 20 ft. in width, the other reefs ranging from 18 in. to 6 ft. The prospecting battery has been kept constantly at work treating parcels of quartz broken indiscriminately from the reefs as they were developed, so as to ascertain the average value. During the month of July 66 tons of quartz broken down in this way was treated under the ordinary process for a return of gold valued at £98, while the tailings give an assay-value of from 9s. to 17s. per ton. Plans have now been prepared for the erection of the 20-head battery which has been stored on the ground for some time past. The new mill will be fitted up with the most suitable gold-saving appliances for the treatment of the class of ore found in the mine. The battery, which is driven by steam, consists of four heads of stamps, 850 lb. each, and three berdans. This battery is merely used for testing purposes at present. The total quantity of quartz crushed for the year was 655 tons 86 lb., for a yield of 176 oz. 10 dwt., valued at £467 14s. 9d. Two wages-men were employed.

Some prospecting has also been carried on in other portions of the Hape district, and at Otunui.

Kirikiri District.

Fleming's Mine.—A considerable amount of work has been done in this mine during the year. A 4-stamp battery was also erected, which crushed 77 tons of quartz and 15 lb. of picked stone, giving a yield of 108 oz. 7 dwt. of gold, valued at £292 19s. 9d. Eight men were employed. Mr. Fleming has since given an option over the property.

Puriri District.

Empress of India Mine (Area, 85 acres).—A fair amount of work was done here in the early part of the year, but the option-holders afterwards abandoned the property. Fifty tons of ore was crushed, for a yield of 34 oz. of gold, valued at £91 16s.

Puriri Gold Estates.—Very little work has been done here during the year.

Tairua District.

Neavesville.—Very little work has been done in this locality lately, but a party of tributers are now engaged in repairing McLiver's battery, preparatory to commencing operations shortly.

Broken Hills Mine.—Prospecting operations have been carried on during the year, but there is no record of any return of gold.

Albert Mine.—A limited amount of work was done here in the early part of the year.

Mining matters may be said to be at a standstill in the Puriri, Neavesville, and Tairua districts, and very little energy has been displayed during the past term.

Whangamata District.

Wentworth Mine.—The company working this mine have done a considerable amount of prospecting for the year, and are endeavouring to effect amalgamation with adjoining claims. Preparations have also been made for the erection of a crushing plant. Twenty men were employed.

A considerable amount of prospecting has been done in the Whangamata district, but no discoveries of any note have been recorded.

Wharekawa District.

Whangamata Gold Co-operation, Limited (Area, 306 acres 1 rood 7 perches; owner, the Whangamata Gold Co-operation, Limited; mine-manager, Hugh McLiver).—This company is now the owner of the mine formerly known as the Whangamata Gold Proprietary Mine. The property consists of four special claims—viz., the Wharekawa (94 acres and 17 perches), Luck at Last (100 acres), Luck at Last Extended (100 acres), and Triangle (12 acres and 30 perches); total area, 306 acres 1 rood 7 perches. The mine being situated at an altitude of from 500 ft. to 800 ft., has necessitated driving an adit-level 1,400 ft. in length. Two other levels have also been driven on the reef, No. 2 being 200 ft. above the adit and No. 1 77 ft. above No. 2. The height from No. 1 level to the surface varies. The width of the main reef is from 3 ft. to 17 ft., and it consists of whitish quartzose matter generally of a banded structure, and containing finely divided gold and bluish veins of sulphides of silver. The country-rock and walls are of decomposed andesite of a favourable kind. The chief development works during the year have been driving on the reef at the three different levels, aggregating 2,000 ft., and the completion of the adit-level. Winzes have also been sunk on the reef between the levels, and a considerable quantity of quartz is now available for being stoped out. A reduction-works, consisting of two rock-breakers, one revolving ore-drier, two No. 5 Krupp mills, twelve cyanide-vats (20 ft. diameter), six berdans, and the usual accessories, is in course of erection on the property, and is expected to be completed within two months. A water-race 10,000 ft. in length is also nearing completion. The motive-power for the machinery is provided by a 6 ft. diameter Pelton wheel, and a 3 ft. Pelton operates a dynamo for electric lighting. The vertical fall between the terminus of the flume and the Pelton wheels measures 153 ft. Tunnels along the line of water-race aggregate 10,000 ft., and the flume is carried over several gullies by substantial trestlework. The average number of wages-men and contractors for mill, water-race, &c., employed during the year was 125.

Remarks on Thames District.

The yield of gold for the year shows a considerable increase compared with the return for 1898. The Waiotahi Mine is maintaining payable yields, and the new blocks of ground opened at the lately drained levels in the Cardigan and May Queen Mines show indications of highly profitable yields in the near future.

Prospecting in the out-districts is being continued, and the new battery at Whangamata, when completed, will be employed on payable quartz. The Mahara Royal and other mines in Tapu district in which the reefs are being worked will again give fair returns, and the mines in the Tararu district also largely augment the Thames return. The outlook for next year is of a hopeful character throughout the district.

Ohinemuri District.

This district comprises that portion of Ohinemuri County lying between the Thames River to the westward and the Pacific Ocean to the eastward. The Waihi, Crown, Waitekauri, and other large gold-producing mines are situated in this district.

Although there has been a falling-off in the prosecution of work in some of those more recently opened, active operations continue to be carried on for the development of the older mines, and fresh explorations point out the great value of their resources.

A material addition to the yield of gold has been made from the mines throughout the district.

The following list of claims will show the number of areas occupied for mining purposes:—

Abstract of Licenses for Special Claims and Licensed Holdings issued from the Warden's Office at Ohinemuri, in the Hauraki Mining District, and registered on or before the 31st March, 1899, in the Books of the Mining Registrar at Ohinemuri.

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
22/4/88	10	0	25	Karangahake	I.	Aroha ..	Abbey	New Zealand Crown Mines.
5/4/98	97	2	24	Waitekauri ..	X.	Ohinemuri	Alpha	Alpha Gold-mining Co. (N.L.).
15/3/99	26	1	32	Komata ..	"	"	Alpha Extended ..	John Phillip Lawson and Henry Brett, of Auckland.
30/3/99	26	0	8	Waitekauri ..	"	"	Alpha Surplus ..	Alpha Gold-mining Co. (N.L.).
31/12/95	50	0	0	Waihi ..	XVI.	"	Amaranth ..	Union Waihi Gold-mining Co. (Ltd.).
27/2/96	100	0	0	Waitekauri ..	X.	"	Anglian	Waitekauri Union Claims (Ltd.).
23/3/96	100	0	0	" ..	"	"	Australia ..	"
30/11/96	100	0	0	Waihi ..	IV.	Aroha ..	Bright Star ..	Don of Waihi Gold-mining Co. (N.L.).
19/6/95	100	0	0	" ..	XVI.	Ohinemuri	Brilliant ..	Waihi Consolidated Gold-mines (Ltd.).
27/2/96	100	0	0	" ..	XV., XVI.	"	Britannia ..	Waihi Gold-mining Co. (Ltd.).
17/10/95	80	2	5	Waitekauri ..	X.	"	Burbank ..	Waitekauri Consolidated Gold-mines (Ltd.).
5/5/96	6	3	20	" ..	X., XI.	"	California ..	Waitekauri Union Claims (Ltd.).
31/1/99	50	0	0	Waihi ..	XI., XV.	"	Caloric	Waihi Gold-mining Co. (Ltd.).
14/7/98	6	0	0	Hikutaia ..	II.	"	Cameron ..	Alfred Joshua Thorp, of Paeroa.
8/10/95	29	3	0	Waitekauri ..	X.	"	Central	Waitekauri Union Claims (Ltd.).
14/6/97	89	3	0	" ..	"	"	"	Waitekauri Union Claims.
8/10/95	25	0	16	" ..	"	"	Central Extended	Waitekauri Union Claims (Ltd.).
8/8/96	60	0	0	Waihi ..	XV.	"	Christmas Box ..	Waihi South Gold-mining Co. (Ltd.).
10/1/99	64	0	4	Waitekauri ..	XIV.	"	Colewinser ..	Alexander Spiers Thorburn, of Waitekauri.
16/3/96	100	0	0	" ..	X.	"	Crœsus	Waitekauri Gold-mining Co.
8/5/96	100	0	0	" ..	"	"	Crosscut ..	"
5/5/97	50	0	0	" ..	"	"	Crosscut Extended	"
28/9/98	30	0	0	Karangahake	I.	Aroha ..	Crown Extended ..	Patrick McKeever, of Karangahake.
16/6/96	30	0	0	"	"	" ..	Crown Imperial ..	Crown Imperial Gold-mining Co.
2/6/93	98	0	31	"	I., II.	" ..	Crown Mines ..	New Zealand Crown Mines Co. (Ltd.).
24/8/98	24	0	20	Waihi ..	XIV.	Ohinemuri	Cuba	Ohinemuri Syndicate (Ltd.).
30/5/96	100	0	0	" ..	XV.	"	Dauntless ..	Edward Mann Corbett.
25/3/96	100	0	0	Owharoa ..	XIV.	"	Dawn of Hope ..	Edward Bain.
13/9/95	87	0	11	Karangahake	I., II.	Aroha ..	Earl of Glasgow ..	New Zealand Crown Mines (Ltd.).
25/4/96	94	1	12	Owharoa ..	XIV.	Ohinemuri	Elliot	Ohinemuri Syndicate.
19/11/95	30	0	0	Waitekauri ..	X.	"	E.M.C. ..	Waitekauri Union Claims (Ltd.).
18/2/96	30	0	0	" ..	"	"	E.M.C. Extended ..	"
24/3/96	38	0	9	Karangahake	II.	Aroha ..	Excelsior ..	Excelsior Gold-mining Co. (N.L.).
15/2/99	29	3	4	Maratoto ..	VI.	Ohinemuri	Fashoda	John Edward Banks, of Thames.
19/6/95	100	0	0	Waihi ..	XVI.	"	Favona ..	Waihi Consolidated Gold-mining Co. (Ltd.).
28/8/95	100	0	0	Owharoa ..	II.	Aroha ..	Fern Spur ..	Waihi Gold-mining Co. (Ltd.).
5/5/97	100	0	0	Whangamata	VIII.	Ohinemuri	Fiery Cross ..	Fiery Cross Gold-mining Co. (N.L.).
23/7/96	100	0	0	Maratoto ..	..	..	Florence ..	Hikutaia Gold Syndicate (Ltd.).
16/3/96	100	0	0	Waitekauri ..	X., XI.	Ohinemuri	Golden Cross ..	Waitekauri Gold-mining Co. (Ltd.).
19/2/97	40	2	20	Waihi ..	XV.	"	Golden Lure ..	Norman F. J. Hazard.
27/2/96	96	0	0	" ..	XV., XVI.	"	Golden Run ..	Waihi Gold-mining Co. (Ltd.).
30/11/96	89	3	7	Waitekauri ..	X.	"	Grace Darling ..	Grace Darling Gold-mining Co.
10/1/99	100	0	0	" ..	"	"	Grafton No. 1 ..	William Beamish A. Morrison, of Auckland.
23/11/98	30	0	0	" ..	"	"	Grafton No. 2 ..	Ditto.
23/3/96	90	0	0	Waihi ..	XVI.	"	Grand Junction ..	Waihi Grand Junction Gold-mining Co. (Ltd.).
22/7/95	98	2	30	" ..	XV.	"	Haines Morrin ..	Waihi Consols Gold-mining Co.
27/10/96	23	0	32	Waitekauri ..	XIV.	"	Heroic	Lionel McLellan.
5/10/98	48	3	25	" ..	X.	"	Huanui	John McLennan, of Waitekauri.
27/2/96	62	0	15	Karangahake	II.	Te Aroha ..	Imperial ..	Imperial Gold-mining Co. (N.L.).
8/8/96	100	0	0	Maratoto ..	VI.	Ohinemuri	Irving	Irving Gold-mining Co. (N.L.).

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Ohinemuri—*continued*.

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
25/4/96	72	0	12	Karangahake	XIV. I., II.	Ohinemuri Aroha	Ivanhoe.. ..	Ivanhoe Gold-mining Co. (N.L.).
10/11/87	103	0	15	Waitekauri ..	XIV.	Ohinemuri	Jubilee	New Zealand Jubilee Gold-mining Co. (Ltd.).
18/2/96	5	1	32	" ..	"	"	Keep-it-Dark ..	Ditto.
11/7/98	100	0	0	Waihi ..	XV.	"	Key West ..	Charles John Francis Ratjen, of Auckland.
14/9/95	100	0	0	Komata ..	X.	"	Komata Consolidated	Komata Reefs Gold-mining Co.
23/4/97	47	3	10	" ..	V., IX.	"	Komata Eldorado	Peter MacFarlane.
15/3/99	29	1	0	" ..	X.	"	Komata Extended	Komata Reefs Gold-mining Co. (Ltd.).
17/8/95	79	1	24	" ..	"	"	Komata Reefs ..	"
23/2/98	100	0	0	" ..	"	"	Komata Reefs Ext.	James Bowen Pain.
23/7/96	86	2	13	Maratoto ..	VI.	"	Liverpool ..	Hikutaia Gold Syndicate.
7/4/96	64	2	0	Waitekauri ..	XIV.	"	Londonderry ..	Waitekauri No. 2 Gold-mining Co. (N.L.).
6/8/95	30	0	0	Maratoto ..	VI., X.	"	Lydia	Hikutaia Gold Syndicate (Ltd.).
23/3/96	100	0	0	Komata ..	X.	"	Marburg ..	Waitekauri Union Claims (Ltd.).
15/5/96	82	1	20	Maratoto ..	V.	"	Maratoto United	Hikutaia Gold Syndicate (Ltd.).
27/2/96	100	0	0	Waihi ..	XV., XVI.	"	Martha	Waihi Gold-mining Co. (Ltd.).
18/2/96	29	3	4	Maratoto ..	VI.	"	Melbourne Cup ..	James Nicholls.
17/9/95	12	0	22	Waitekauri ..	X.	"	Missing Link ..	Waitekauri Extended Gold-mining Co. (Ltd.).
15/3/99	23	2	28	" ..	"	"	National ..	John Phillip Lawson, of Auckland.
23/3/96	95	2	32	" ..	"	"	Nebraska ..	Waitekauri Union Claims (Ltd.).
8/8/96	66	3	9	Waihi ..	XV.	"	New Year ..	Waihi South Gold-mining Co. (N.L.).
14/9/96	82	1	0	Waitekauri ..	XIV.	"	New-Zealander ..	New Zealand Gold-mining Co. (N.L.).
9/9/97	100	0	0	Waihi ..	I., II.	Waihi North	Ocean Beach ..	Waihi Beach Gold-mining Co. (N.L.).
9/9/97	99	0	0	" ..	"	"	Ocean Beach Ext.	"
27/2/96	34	3	0	" ..	XV., XVI.	Ohinemuri	Ophir	Waihi Gold-mining Co. (N.L.).
24/8/95	90	0	0	Owharoa ..	II.	Aroha ..	Owharoa ..	Ohinemuri Syndicate (Ltd.).
5/8/98	60	2	20	" ..	"	" ..	Owharoa United ..	Edward Bain, of Owharoa.
13/11/95	100	0	0	Maratoto ..	X.	Ohinemuri	Pakirarahi ..	Hikutaia Gold Syndicate (Ltd.).
23/12/96	100	0	0	" ..	"	"	" ..	Edwin G. Banks.
21/1/96	16	1	0	" ..	"	"	Pakirarahi Ext. ..	Hikutaia Gold Syndicate (Ltd.).
2/9/96	100	0	0	Karangahake	II.	Aroha ..	Pandora Extended	Pandora Gold-mining Co. (N.L.).
6/8/95	30	0	0	Maratoto ..	VI.	Ohinemuri	Pay Rock ..	Hikutaia Gold Syndicate (Ltd.).
10/6/97	2	3	0	Waitekauri ..	X.	"	Pilot Extended ..	Waitekauri Union Claims.
31/12/95	100	0	0	" ..	"	"	Pilot	Waitekauri Union Claims (Ltd.).
5/9/93	15	0	0	" ..	"	"	Portsea	Grace Darling Gold-mining Co.
19/5/98	99	2	0	Owharoa ..	XIV.	"	Remuera ..	Ohinemuri Syndicate (Ltd.).
23/12/96	58	1	21	Waitekauri ..	XIV.	"	Rising Sun ..	Rising Sun Gold-mining Co. (N.L.).
31/12/95	100	0	0	Waihi ..	XVI.	"	Rosemont ..	Union Waihi Gold-mining Co. (Ltd.).
7/4/96	100	0	0	Wharekirau-punga	VII.	"	Royal Standard ..	John Guest Ralph.
25/6/96	82	2	38	Waihi ..	XVI.	"	Silverton ..	Waihi-Silverton Extended Gold-mining Co. (Ltd.).
23/12/96	91	1	7	" ..	"	"	Silverton No. 2 ..	Ditto.
8/5/96	99	2	6	Waitekauri ..	X.	"	Socket	Waitekauri Gold-mining Co. (Ltd.).
3/9/96	60	0	0	Karangahake	I.	Aroha ..	Talisman ..	New Zealand Talisman Gold-mining Co. (Ltd.).
29/6/96	79	2	15	"	"	" ..	Talisman Extended	London and New Zealand Exploration Co.
14/11/95	97	3	36	Komata ..	X.	Ohinemuri	Te Ao Marama ..	Waitekauri Gold-mining Co. (Ltd.).
19/5/98	96	1	8	Owharoa ..	XIV.	"	Thorpe	"
28/7/98	7	3	36	Waihi Beach	III.	Waihi North	Treasure Island ..	Waihi Beach United Gold-mining Co. (N.L.).
27/9/95	27	1	24	Owharoa ..	XIV.	"	Tunnel	Ohinemuri Syndicate (Ltd.).
14/2/98	100	0	0	Maratoto ..	X.	"	"	Waitekauri Gold-mining Co. (Ltd.).
21/5/95	14	1	36	Waitekauri ..	VI.	"	Two-and-Two-makes-Four	Waitekauri Central Gold-mining Co. (Ltd.).
31/12/95	100	0	0	Waihi ..	XVI.	Aroha ..	Union	Union Waihi Gold-mining Co. (Ltd.).
10/1/99	99	1	10	Karangahake	I.	" ..	Victor Waihou ..	Thomas Frederick Farley, of Paeroa.
5/4/98	52	3	30	Waihi Beach	III.	Waihi North	Waihi Fluke ..	Waihi Beach United Gold-mining Co. (N.L.).
24/9/98	100	0	0	Waihi ..	XV.	Ohinemuri	Waihi Welcome ..	Herbert S. Fenwick, of Auckland.
29/6/98	13	2	36	" ..	"	"	Waihi Dredging No. 1	Waihi Dredging Co. (N.L.).
29/6/98	13	1	7	" ..	"	"	Waihi Dredging No. 2	"
5/10/98	90	0	0	" ..	XVI.	"	Waihi West ..	Waihi Grand Junction Gold Co. (Ltd.).
14/8/95	100	0	0	" ..	"	"	Waihi Extended ..	Waihi Extended Gold-mining Co. (Ltd.).
1/3/97	66	2	8	" ..	"	"	Waihi Gladstone..	Waihi Gladstone Gold-mining Co. (Ltd.).
1/2/96	100	0	0	" ..	VII.	"	Waihi Monument Extended	Waihi Monument Gold-mining Co. (N.L.).
13/11/95	98	1	0	" ..	XV., XVI.	"	Waihi North ..	Waihi Consols Gold-mining Co.
23/3/96	90	0	0	" ..	XV.	"	Waihi West ..	Waihi Grand Junction Gold-mining Co. (Ltd.).
9/9/97	97	1	16	" ..	I., II.	Waihi North	Waihi Beach ..	Waihi Beach Gold-mining Co. (N.L.).
26/8/97	6	2	30	" ..	III.	"	Waihi Beach No. 1	Frederick Moore.
26/8/97	16	2	30	" ..	"	"	Waihi Beach No. 2	E. B. Grey.
29/11/97	87	3	3	" ..	"	"	Waihi Beach No. 3	John Hanna Grey.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Ohinemuri—*continued.*

Date of License.	Area.			Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
	A.	R.	P.					
29/11/97	100	0	0	Waihi ..	IV.	Waihi North	Waihi Beach No. 4	Charles E. McCormick.
29/11/97	77	1	8	" ..	III.	"	Waihi Beach No. 5	David Sheehan Grey.
29/11/97	96	2	0	" ..	"	"	Waihi Beach No. 6	Arthur Frank Moginie.
29/11/97	82	0	24	" ..	"	"	Waihi Beach No. 8	Ernest B. Dufaur.
29/11/97	92	0	25	" ..	"	"	Waihi Beach No. 9	Sydney Codicutt.
26/8/97	6	2	28	" ..	"	"	Waihi Beach No. 11	John Scarlet.
3/2/98	95	0	0	" ..	"	"	Waihi Beach No. 12	John Rowley Miller Stewart.
7/8/97	56	0	0	" ..	"	"	Waihi Foreshore ..	George Carrick and James W. Shaw.
20/9/88	9	2	23	Waitekauri ..	XIV.	Ohinemuri	Waitekauri ..	Waitekauri Gold-mining Co. (Ltd.).
17/8/95	100	0	0	" ..	VI., VII., X., XI.	"	Waitekauri Cross	Waitekauri Cross Gold-mining Co. (Ltd.).
23/3/96	95	2	19	" ..	VI.	"	Waitekauri Ext. ..	Waitekauri Extended Gold-mining Co. (Ltd.).
18/2/96	30	0	0	" ..	XIV.	"	"	Waitekauri South Gold-mining Co. (N.L.).
19/6/95	100	0	0	" ..	X., XIV.	"	Waitekauri Jubilee Extended	New Zealand Jubilee Gold-mines (Ltd.).
17/2/96	40	0	0	" ..	XIV.	"	Waitekauri King..	Waitekauri King Gold-mining Co. (N.L.).
26/11/98	38	1	18	" ..	"	"	"	Ditto.
5/4/98	97	0	38	" ..	"	"	Waitekauri South	Waitekauri South Gold-mining Co. (N.L.).
19/6/95	100	0	0	Waihi ..	XVI.	"	Waka	Grand Junction Gold-mining Co. (Ltd.).
19/9/96	80	2	2	Maratoto ..	VI.	"	Walker's Maratoto	Maratoto Gold-mining Co.
13/11/95	63	2	35	Karangahake	I.	Aroha ..	Waverley ..	Waverley Gold-mining Co. (N.L.).
11/12/94	15	0	0	Waitekauri ..	X.	Ohinemuri	We Three ..	Alpha Gold-mining Co. (N.L.).
18/1/94	72	1	18	Karangahake	I.	Aroha ..	Woodstock United	Woodstock Gold-mining Co. (Ltd.).
17/4/94	14	3	12	Waitekauri ..	XIV.	Ohinemuri	Young New Zealand	New Zealand Gold-mining Co (N.L.).

Maratoto District.

Hikutaia Gold Syndicate's Mine.—The Hikutaia Gold Syndicate's property is situated on the Arizona and Paiakarahi Creeks, and between the Komata and Maratoto Streams. It comprises six claims, and has a total area of 360 acres 2 roods 20 perches. Mr. C. Gemmings has been in charge over two years, and now has the mine well opened up, as will be seen from the subjoined list of drivages. So far it has been possible to open up the mine with adit-levels, but for deeper levels it is questionable if adits would be profitable, owing to the great length of drivage required before cutting the reef. The cross-cut in to No. 7 level is 575 ft. in length, and is driven through exceedingly hard andesite rock. The drivages in the various levels are as follows: At No. 1, 80 ft., with a 50 ft. cross-cut; No. 2, 147 ft., with a 100 ft. cross-cut; No. 3, 356 ft., with 82 ft. cross-cut; No. 4, 1,200 ft.; No. 5, 117 ft.; No. 6, 398 ft.; No. 7, 1,600 ft. (this is the lowest level at present opened in the mine). The greatest depth below the surface is 425 ft. The total drivage for the past year has been 800 ft. There are three reefs on the property—the Maratoto, Liverpool, and Pay Rock—all of which are gold-bearing. The Maratoto reef, upon which the principal work has been done, averages 10 ft. in width right through the whole of the workings. The casing of the reef is decomposed andesite, while the country-rock is hard blue andesite. The quartz is very white in colour, and is much disintegrated, while portions of the reef appear to be waterworn, and carry large quantities of manganese-dioxide. The quartz throughout the whole of the reef is very friable and easily worked, and can be readily reduced to the size necessary for treatment. A small experimental plant is in course of erection, and will soon be completed. It will have a capacity of 10 tons per day, and the treatment at the outset will be the cyanide process. The object of erecting this plant is to ascertain on a practical working scale the best and cheapest method of treating the large quantity of ore opened up in the mine, and should the results prove satisfactory it is intended that the erection of a plant having a very large capacity will shortly after be undertaken. The cost of the experimental plant will not exceed £2,000.

Maratoto Gold-mining Company (Limited).—This mine, comprising an area of 83 acres, is situated about nine miles from Hikutaia. Attention was first drawn to the Maratoto district about thirteen years ago, when a discovery of rich ore was made by the late Mr. Richard McBruin, and eventually the property was purchased by an Australian syndicate, who formed it into a company. Development works on a large scale were carried out, and a pan plant, comprising two pans and a settler, erected for the treatment of the ore. During a period of eighteen months about twelve thousand pounds' worth of bullion was extracted by the pan-amalgamation process, and it is considered that not more than 50 per cent. of the bullion value of the ore was redeemed. As the company had neither stone-breaker nor stampers, all the ore dealt with was passed through a screen, and the fine stuff sent to the mill, while the coarse particles were allowed to remain on the different tip-heads, stopes, &c. Here there are now fully 2,000 tons of ore available, and the average assay-value is £2 5s. per ton. The Australian company, having made no provisions for lower developments, exhausted the blocks of rich ore above the existing levels, and ceased mining operations. The property was then sold to Mr. W. Nicholl, who took about eighteen hundred pounds' worth of bullion from the old workings by the pan process in a very short time. In the early stage of the late mining boom the mine passed into the hands of Messrs.

Walker, McLean, and Kneebone, who gave options upon it to the representatives of two English syndicates, who surrendered their options owing to some disagreement about terms. The mine was then purchased by a syndicate of Auckland men, who formed the company now carrying on the operations here described. There are two distinct gold- and silver-bearing lodes running through the full length of the mine, and it is within the bounds of possibility that explorations will reveal other ore-bodies. The two lodes mentioned are known as the Maratoto and Pay Rock respectively. They are running parallel to each other, and are located about 500 ft. apart—the Maratoto dipping to the westward and the Pay Rock to the eastward. They vary from 8 ft. to 20 ft. in thickness, and it is reasonable to assume that deep mining will result in a convergence of the two lodes, forming a strong body of ore. Although the richest ore was got in the early days from the Maratoto lode, the present owners decided to test the Pay Rock lode in the first instance. Originally this lode was opened up by Mr. William Goldsworthy and party, who proved it to be a payable ore-body for a length of about 250 ft. by driving along its course, on the south side of McBruin's Creek, and on the hanging-wall portion of the lode. When the English syndicates took over the property they drove a distance of 300 ft. north of McBruin's Creek, and on the foot-wall portion of the lode, which carried gold, but not in payable quantities. As soon as the present company started operations two of the directors—Messrs. Adams and McCombie—examined the property, and concluded that the payable ore-body worked upon on the south side of the creek was still intact on the north side of the same point, as no trace of it could be found in the option-holders' workings. Driving northwards was then started from the face of the level last mentioned, and, after diverging to the right a distance of 7 ft., the hanging-wall portion of the lode was met with. Here some ore rich in the precious metals was disclosed. On the extreme hanging-wall of the lode there is a belt of ore which assayed up to £113 per ton. Since then the hanging-wall portion of the lode has been driven upon, south of the first point of contact, and the average assay result for a width of 2 ft. throughout was very satisfactory. With a view to still further proving the extent and value of this rich ore-shoot both overhead and underfoot, rising and sinking were started upon it. The rise is now up to a height of 35 ft. on the hanging-wall of the lode, which is being broken out to a width of fully 5 ft., and the average assay-value of the ore is £6 per ton. In the winze a depth of 20 ft. has been attained, and here the gold-bearing portion of the lode averages 4 ft. in width, and the assay-value is £11 per ton, with every indication of a continuance of the rich ore-deposit. About 800 ft. north of McBruin's Creek the Pay Rock lode outcrops in the Maratoto Gully, and in between these two points the range rises to a height of fully 250 ft. Some time since a low level was started on the lode from the last-mentioned gully, and already it has been driven southwards for a distance of 400 ft. In the present face the lode measures 6 ft. in thickness, and carries gold and silver, but not in payable quantities. This level will afford 120 ft. of backs beneath the option-holders' level—known as No. 1 level—at McBruin's Creek, and a distance of 200 ft. remains to be accomplished before it reaches under the shoot of ore that is now being sunk upon in the winze already referred to. At the No. 1 level the shoot of rich ore is now fairly proved to be 600 ft. in length, and there is every prospect of its continuance downwards. The No. 2 level is to be the main adit for connecting the whole of the mine-workings with the mill, which will be located about 100 ft. lower down, and 7 chains distant therefrom. The excavations for the battery-site are now approaching completion, and a contract has been let for the construction of the water-race, which is about 12 chains in length, and will afford 170 ft. of fall. The water-supply will be equal to running the full force of the battery for about seven months of the year, and auxiliary steam-power will be used for the remaining five months. The battery will comprise one No. 2 Gates crusher and fifteen head of 700 lb. stampers, with a complete cyanide-plant attachment, and the work of erection is being carried out under the supervision of Mr. H. H. Adams. The system of ore-treatment to be adopted will be wet crushing, amalgamation on plates, and cyanide for the tailings. The whole of the machinery and plant is now at the Junction, within 60 chains of the battery-site, awaiting completion of the road-connection up McBruin's Creek, and this, it is expected, will be ready for traffic about the end of May. The mill, it is hoped, will be ready for ore-treatment sometime in the month of August next.

Komata District.

Komata Reefs Mine (Area, 79 acres; owners, Komata Reefs Gold-mining Company, Limited; mine-manager, Charles H. Lawn).—This mine is worked from adit-levels, the lengths and depths of which are as follows: No. 1 level cross-cut, 40 ft. long and 60 ft. below surface; No. 2 level cross-cut, 125 ft. long and 140 ft. below surface; No. 3 level cross-cut, 850 ft. long and 240 ft. below surface. No. 4 level cross-cut is now being driven with air-drills, and when completed will be 2,900 ft. long, and will cut the reef at a depth of 540 ft. below the surface. The distance so far driven is 900 ft. The reefs operated on are Wilson's lode (formerly called Argall's lode) and Hartridge leader. Wilson's lode runs north and south through the property, and has an average width of 3 ft. to 4 ft. The ore-bodies occur as irregular chutes and patches, the ore being loose friable quartz carrying free gold and sulphide of silver. Hartridge leader strikes off from the east wall of Wilson's lode, and runs north-east and then north almost parallel with Wilson's lode. It is composed of similar quartz to Wilson's lode, is about 8 in. wide, and produces high-grade ore. The development work during the year has been driving No. 4 level cross-cut and driving on the reefs being operated on in levels Nos. 1, 2, and 3. The mine machinery consists of one air-compressor, 12 in. cylinder and 16 in. stroke, which supplies air at 60 lb. pressure per square inch to work two Little Giant drills. The motive-power to drive the compressor is one Pelton wheel, 3 ft. in diameter, working under a head of 285 ft., with about half a Government head of water. In dry weather this power is supplemented with a 10-horse-power nominal Tangye's vertical boiler. The mill machinery consists of a twenty-head battery driven by water-power, with a small semi-portable engine as auxiliary in dry weather. There are two rock-breakers, one of the Blake-Marsden type, with 12 in. jaws, and one Gate's Crusher No. 2, style D.

There are twenty stamps of 700 lb. each, erected on the square-frame plan, and driven with horizontal belts, a mortar-box to each five heads, and a Challenge feeder to each box; and one berdan for grinding blanketings, &c. Concentrators: Blanket-strakes. There are fourteen steel cyanide-vats, 22 ft. in diameter, with 4 ft. sides; and two zinc-boxes with twelve compartments in each. The average quantity of quartz crushed daily is 17½ tons, with ten stamps running ninety-six blows per minute, with a drop of 6 in. to 7 in., each stamp having a capacity of 1¾ tons per day. The number of days worked during the year was 289, and the quantity of quartz crushed was 5,580 tons. The gold produced was 3,242·3 oz., and the silver 8,347 oz., of a total value of £14,644 5s. 11d. The value recovered per ton was £2 12s. 6d. The silver recovered by cyanide was 5,782·5 oz., valued at £643 6s. 10d.; and the gold, 336·2 oz., valued at £1,422 2s.—a total value of £2,065 8s. 10d. The silver recovered by amalgamation was 2,564·5 oz., valued at £285 10s.; and the gold, 2,906·1 oz., valued at £12,293 8s. 3d.—a total value of £12,578 17s. 1d. The cost of mining per ton was £1 1s. 7d.; the carriage of quartz amounted to 1s. 5½d. per ton; and the milling cost 8s. 4d. per ton. There was an average of eighty-five men employed during the year. The milling treatment is wet crushing and amalgamation, the tailings from the copper plates being treated by the cyanide process.

Waitekauri District.

Young New Zealand Mine (Area, 14 acres 1 rood 12 perches; owners, Young New Zealand Gold-mining Company, No Liability; mine-manager, J. M. Haslett).—This is one of the oldest mines in the Waitekauri district, and has changed owners on several occasions during the past twenty years. The present owners are engaged in extending the low-level cross-cut to test the reefs at a greater depth. Mr. J. M. Haslett, the present manager of the mine, has supplied the following information:—

"The main reef has, in the past, been opened and worked for a distance of over 300 ft., and has been stoped out to the surface some 80 ft. above. A monkey shaft or winze has also been put down 43 ft., proving the reef to that depth, when sinking had to be stopped on account of the presence of water. During the past year most of the time has been devoted to driving a low-level adit to cut this reef 130 ft. below the upper level. The adit is now in a distance of 565 ft., and is to be extended about another 150 ft. before it is expected to cut the reef. During last May and June a parcel of 20 tons of quartz was taken from the upper workings, and treated by G. Fraser and Sons, of Auckland, for an assay-value of about £4 per ton; and again in August another 16 ft. was sunk in the floor of the upper level, and another parcel of 9 tons was taken from that locality. 1 ton of this was sent to the Thames School of Mines, and it gave an assay-value of £5 2s. 7d. per ton. The other 8 tons was treated by Messrs. Fraser and Sons, and gave an assay-value of £4 16s. 4d. All these results were satisfactory, although the expenses of carting and treating exceeded the returns; but when the reef is cut the directors intend to erect a small battery on the property, and thus reduce the expenses to a minimum. At present the driving is in very hard ground, and progress is slow, but the prospects are very encouraging. A fine body of stone has been met with, the reef running about 2 ft. thick, and the ore is not very difficult of treatment."

Waitekauri Company's Mines.—Vigorous operations were carried on by this company in the different properties owned by them. Developments at the low levels at the Golden Cross section are of a very favourable character, and the quartz coming to hand has improved in value. In the other mines at Komata and Waitekauri some valuable quartz has come to hand. The crushing-mill of forty stamps, which was adapted for dry crushing, is being altered to a wet-crushing mill. Experiments were made with ten stamps by using cyanide solution in the boxes. This method has proved so satisfactory that the remaining thirty stamps will shortly also be used in wet crushing. The general manager, Mr. G. Davey, has given the following account of the operations carried on in the mine during the year:—

"The name of the mine is the Waitekauri Gold-mining Company (Limited), and it is owned by the company of the same name. It is situated in the Hauraki district, Waitekauri, Province of Auckland. The mine-managers are as follows: Golden Cross section, W. H. Burch; Komata section, B. J. Maclean; Old Waitekauri Mine, William Christie. The mine comprises the following claims, viz.: Golden Cross section—Golden Cross Special Claim, 100 acres; Crœsus Special Claim, 100 acres; Tunnel Special Claim, 100 acres; Socket Special Claim, 99 acres 2 roods 6 perches; Tunnel Extended Special Claim, 99 acres 3 roods; Junction Special Claim, 54 acres 2 roods 37 perches: total, 554 acres and 3 perches. Komata section—Te Ao-Marama Special Claim, 79 acres 3 roods 36 perches; Crosscut Special Claim, 100 acres; Crosscut Extended Special Claim, 50 acres: total, 247 acres 3 roods 36 perches. Old Waitekauri Mine, 9 acres 2 roods 23 perches. Grand total, 811 acres 2 roods 22 perches.

"Golden Cross section: There are two shafts in this section of the mine: No. 1 shaft is 410 ft. below surface, and No. 2 is 204 ft. below surface. The greatest depth of workings below the sill of No. 1 shaft is 400 ft., and below the sill of No. 2 shaft 180 ft. There are six levels—(1.) Corbett's level, a drive in the side of the hill 22 ft. below the level of the sill of No. 1 shaft: this is not connected or worked from the shaft. (2.) No. 1 level north and south of No. 1 shaft. (3.) No. 2 level north and south of No. 1 shaft. (4.) No. 3 level north of No. 1 shaft. These three latter levels are connected with No. 1 shaft by cross-cuts. (5.) No. 1 level north and south of No. 2 shaft. (6.) No. 2 level north and south of No. 2 shaft. These two levels are connected with No. 2 shaft by cross-cuts. The reef consists of a dark-coloured quartz, carrying a large quantity of manganese, and impregnated more or less with very fine iron-pyrites. Its width varies considerably, the greater portion being from 12 ft. to 15 ft. in width. Development work carried on in this section of the mine has been as follows: Sinking Nos. 1 and 2 shafts; driving No. 1 level, No. 1 shaft; driving No. 2 level from No. 1 shaft; opening up and driving No. 3 level, No. 1 shaft; driving No. 2 level, No. 2 shaft. In addition to this, several rises and winzes have been carried through between the various levels to open up the reef.

"Komata section (Te Ao-Marama): The sinking of the shaft has been continued during the year. The greatest depth of workings in this part of the mine is 190 ft. The shaft is now 12 ft. below this level. There are four principal levels—(1) The gully drive, a drive in the side of the hill; (2) the hopper level, a drive in the side of the hill at the same level as the sill of the shaft; (3) No. 1 level, 100 ft. below the level of the sill of the shaft; (4) No. 2 level, 190 ft. below the level of the sill of the shaft. Development work has been carried out during the year as follows: Sinking the shaft to No. 2 level; driving No. 2 level on Nos. 1 and 2 reefs; driving a cross-cut to the west of No. 2 reef at No. 2 level to prospect the ground. A winze has also been sunk from No. 1 level to No. 2 level.

"Old Waitekauri Mine: The work done in this section during the year has been as follows: Sinking a winze below Queen level on a shoot of ore; putting up a rise above this level, and connecting it with the Smithy level; cleaning up, repairing, and extending the Smithy level; putting up a rise above Smithy level, and opening out a new level (called 'Upper level') 90 ft. above Smithy level.

"Mine machinery: At the Golden Cross section we have the following machinery at work: No. 1 shaft: One Hirnant air-compressor, worked by steam, 12 in. cylinder, with 2 ft. stroke, nominal horse-power 15. This compressor is used for working the Tangye pumps, boring-machines, and for ventilation purposes. One Tangye winding-engine, double drum, 25 nominal horse-power. One horizontal high-pressure engine, 18 in. cylinder, 3 ft. stroke, and 30 nominal horse-power, for working the pumps. The pumps are of the Cornish type, and consist of one 14 in. forcing-set, 175 ft. of column, discharging at the adit-level, 130 ft. below the surface, and one sinking-set, 14 in. draw-lift, 110 ft. of column, discharging to the forcing-set. There is also one 6 in. Tangye pump at this shaft, which can be used as an auxiliary to the other pumps if required. The engines at this shaft are worked from one multitubular boiler of 30 nominal horse-power, and one Babcock and Wilcox boiler with Scott's patent furnace of 30 nominal horse-power.—No. 2. shaft: One Fowler winding-engine, double drum, of 25 nominal horse-power. One horizontal tandem compound non-condensing engine, with 13 in. high-pressure cylinder and 20 in. low-pressure cylinder, 3 ft. 6 in. stroke, 35 nominal horse-power. The pumps are of the Cornish type, and consist of one 14 in. draw-lift, with 115 ft. of column, discharging at the adit-level, 80 ft. below surface. There is also at the shaft one 4 in. Tangye pump, which is used for sinking shaft. The engines are worked from one Babcock and Wilcox boiler similar to the one at No. 1 shaft.—Low-level tunnel: At this tunnel there is one Hirnant air-compressor, 10 in. air-cylinder with 18 in. stroke, belt driven from 5 ft. 10in. Pelton wheel. This is for working rock-drills in the tunnel. These drills are of the 'Slugger' make.—Tram roads: There are four miles and a half of tram-road connecting the mine with the forty-stamp mill.—Milling machinery (dry and wet crushing): One forty-stamp mill of 1,000 lb. weight each stamper and a crushing-capacity of 1·60 tons dry and 2 tons wet per stamp-head per twenty-four hours. The full forty head of stamps were employed daily. The number of days during the year on which this mill was worked was 306. The ten-stamp mill of 600 lb. weight each stamper and a crushing-capacity of 0·70 ton per stamp-head per twenty-four hours. The full ten head of stamps were employed daily. The number of days during the year on which this mill was worked was 306. One No. 5 Krupp mill, but this is not in use. There are also three stone-breakers—one No. 4 Gates crusher, one Wheeler with 12 in. jaws, and one from Price, of Thames, with 9 in. jaw. Eleven kilns of 250 tons capacity each and two of 200 tons capacity each, nineteen wooden cyanide-vats of 30 tons capacity each, ten steel vats of the same capacity, and three wooden cyanide-vats of 25 tons capacity each, five sumps (four wood and one iron), three wooden mixing-tanks, and eight zinc filter precipitating boxes. The power for the milling plant is water, with an auxiliary steam-power.—Water-power: Two 6 ft. 8 in. Pelton wheels to work the forty-stamp mill. Head of water, 195 ft.; length of wrought-iron pipe 2,000 ft., 28 in. in diameter. One 6 ft. Pelton wheel to work the ten-stamp mill. Head of water, 162 ft.; length of wrought-iron pipe 835 ft., of 10 in. diameter. One 4 ft. Pelton wheel for working the vacuum-pump of the cyanide-vats, one 3 ft. Pelton wheel for working the dynamo for electric light, and one 5 ft. Pelton wheel for Gates crusher. Also, one water-wheel, 36 ft. in diameter, 9 ft. wide, high breast, driven for working lathes, &c., in the machine-shop.—Auxiliary steam-power: One Tandem compound condensing-engine, by Yates and Thom, of 40 nominal horse-power, worked from two Babcock and Wilcox boilers of 30 nominal horse-power each, for the forty-stamp mill, and one high-pressure horizontal engine (double cylinder) of 14 nominal horse-power, worked from one multitubular boiler of 14 nominal horse-power, for the ten-stamp mill.—Water-races: One for forty-stamp mill, three miles and a quarter long, of ten sluice-heads capacity. One for ten-stamp mill, 123 chains long, of five sluice-heads capacity. One for low-level tunnel, 63 chains long, of five sluice-heads capacity. Three for working water-wheel, of a total of twenty-nine sluice-heads.

"The total quantity of quartz crushed for the twelve months was 22,840 tons, yielding 73,450 oz. of bullion, value £66,585 3s. 4d., extracted by the cyanide process. Cost of mining and milling per ton (approximate), £1 15s. Average number of men employed during the year, 280, all wages-men."

Waitekauri Union Mine (Area, 625 acres; owner, the Waitekauri Union Claims, Limited; general manager, N. D. Cochrane).—The chief work in this mine during the year was driving a low-level prospecting tunnel. The following information about the company and mine-workings was furnished by Mr. N. D. Cochrane, general manager:—

"The chief work at the western group of claims has been the extension of the low level, the face of which is now in a distance of 1,716 ft. Hard bars of andesite continued to be occasionally intersected, varied with decomposed andesite, dacite, and breccias. The latter were less frequent as the tunnel advanced, and the face was left standing in a good class of sandstone or grey andesite. Work was continued till the end of the year, when want of capital caused a stoppage, pending a reconstruction of the company, which is at present being arranged. It is to be regretted that a suspension of operations took place at the time it did, as a few months' more driving with the

rock-drills would have reached the line of the Komata reefs, and which is marked on the surface of the claims by a belt or channel of kindly country. These reefs, as they are followed towards the Waitekauri Union claims, appear to run in a rather more northerly course, which will entail correspondingly greater driving. However, as the face of the low level is still several hundred feet short of where the reefs were expected to be cut, it is no case of disappointment, but simply that the scheme of development as drawn up by Mr. St. Auburn, the consulting engineer, and carried out by Mr. N. D. Cochrane, the resident mining engineer, has not been completed. With an adequate amount of driving very fair prospects should await these claims. At the eastern group of claims very little has been done since last annual report, protection having been granted while the western claims were being prospected."

Waitekauri Cross Mine (Area, 100 acres; owners, Waitekauri Cross Gold-mining Company, Limited; mine-manager, Thomas James).—Mr. James gives the following account of the mine and workings during the year:—

"The whole of our energies are at present being directed to prospecting the large reef, known as the Taranaki, to a greater depth than our present adit-level, where a large amount of driving has been done by the present company, both on the reef and in cross-cutting the country. For this purpose we are sinking an underlie shaft in the hanging-wall portion of the lode, the angle of dip being 67°, and the dimensions of the shaft 10 ft. by 5 ft. The shaft is divided into two compartments, in one of which is fixed a permanent iron-runged ladderway; in the other, two steel-rail ways are fixed, on which the skips for hauling the broken material out of the shaft run. At the top of the shaft a self-tipping arrangement is fixed, whereby the material is tipped out of the skip into the truck without any further handling. The winding is done by means of an electric hoist, which is fixed in an underground chamber cut out at the head of the underlie shaft. The electric motor is a compound four-pole iron-clad type machine of 40 brake horse-power. The winding-drums are arranged in tandem; each is capable of raising 1 ton, *plus* the weight of the rope, up an incline of 60°, at the rate of 300 ft. per minute. The chamber, main adit, tip-head, and office are illuminated by electric lamps. A triplex-action electric pump has also been provided, which is geared to run at four distinct speeds, to suit the different depths and volumes of water met with; it is capable of lifting 2,400 gallons per hour from a depth of 300 ft. Water having been met with at 180 ft., which is making at the rate of about 500 gallons per hour, it is the intention of the management to open out at that level and test the reef there by driving north and south along its course. The pump above referred to will also be fixed at that level: it being a pump which has to work on a fixed bed, it is not capable of being used as a sinking-pump. A sinking-pump to lift to this one has been ordered, and upon its arrival sinking operations will again be resumed. The station at which the power for driving the above machinery is generated is situated at Maratoto, about two miles from the mine. The power is generated by two compound dynamos, which are driven by belts off massive fly-wheels, on either side of a 3 ft. Pelton wheel, which is supplied with water at 210 ft. of head, from two water-races, being connected to the penstock at the junction of these two races by iron piping 2 ft. in diameter. An elaborate switch-board contains all the necessary measuring instruments, switches, safety fuses, lightning-arresters, and magnetic cut-outs; spare instruments, switches, &c., being arranged to permit of the duplicating of the plant without any alteration. The current is conveyed to the mine by two pairs of copper cables, on fluid insulators fixed on cross-arms to the poles erected for their support. A distributing switch-board is fixed at the mine, for the proper control of the current in the different circuits, to hoist-pumps, lamps, stamps, &c. Telephonic communication between the mine and generating station is also established."

Waitekauri Extended (Area, 95 acres 2 roods 19 perches; owner, Waitekauri Extended, Limited).—During the year the low level has been advanced to the reef and communication been effected with the levels above. The reef, which varies in thickness from 25 ft. to 30 ft., is well opened, and stoping operations have been carried on. 1,011 tons of quartz was crushed, for a yield of 925 oz. 4 dwt. of gold, valued at £920 14s. 6d. The aërial tramway has been completed between the mill and the hoppers at the low level. This tramway is now one mile and a half in length, having seventy-two buckets capable of holding 160 lb. each. 35 tons of ore can be conveyed to the mill in eight hours. Forty-five men were employed.

Grace Darling Mine (Area, 90 acres; owner, Grace Darling Gold-mining Company; manager, Samuel Draffin).—Work in this mine has been confined to further developments in the levels already opened on the reef, which averages about 6 ft. in width, the greatest body of quartz being about 20 ft. in width. The company has had the property under offer to a syndicate, which is endeavouring to introduce capital for the more thorough working of the mine, and the erection of improved machinery for ore-treatment. Mr. Samuel Draffin, mine-manager, gives the following information about the mine:—

"No. 1 level has been extended 40 ft., and another rise has been put up a height of 40 ft., the ore from both places being of fairly good quality. In No. 2 level, five additional rises have been put up an average height of 38 ft. each. The ore from some of these rises is of good quality, the reef averaging about 6 ft. in thickness. The stone is of a friable description, and favourable assays are generally obtained, valued at £1 5s. and upwards per ton. Two winzes have been sunk from this level to a depth of 70 ft. and 50 ft. respectively. The ore in the deepest winze is of rather low grade, but the lode is about 20 ft. in width. In the other winze the reef is about 6 ft. wide, and some first-class ore has been obtained from it. These winzes have been suspended, owing to the influx of water, but this will be drained off as soon as the low level is extended. The Portsea low-level cross-cut has been cut down and enlarged for a distance of about 100 ft. When this has been completed it will form the main travelling-way in the projected scheme for future operations. The levels are all securely timbered and ready for stoping out the quartz. A large quantity of kauri timber has been felled and crosscut, which is intended for use

in the erection of a new plant. The water-race is in a very bad state of repair, owing partly to the want of funds, and partly to the fact that an entirely new race has been provided for in the scheme of operations proposed by the option-holders. A plan of a complete plant of twenty head of stamps, with all the most modern improvements, has been submitted to the London syndicate for their approval; and it is intended to use the wet cyanide process. The London syndicate has been granted an extension of their option by paying £100 per month. The option expires shortly, but it is probable another month may be granted in order to complete arrangements. Summary of work for the twelve months: Total length of rises, 230 ft.; winzes, 120 ft.; enlarging cross-cut, 160 ft. The total number of men employed was five."

Alpha Mine (Area, 97½ acres; owner, Alpha Gold-mining Company, No Liability; mine-manager, Charles Collins).—Development was carried on in the mine during the year. 480 ft. of driving and 192 ft. of winzes were opened. This, in addition to the work previously performed, leaves the mine-workings in an advanced stage. The levels are connected by passes from No. 5 upwards, a distance of 400 ft., and a rise is at present being put up on the reef from No. 6 to No. 5 level. This will be used for conveying the quartz down from the upper levels to the No. 6, from whence it will be trucked direct to the mill, a distance of about 500 ft. The reef varies from 4 in. to 4 ft. in width, and tests from it are stated to have given excellent results. Much delay was experienced during the year in the erection of the new battery on account of the difficulty of getting material and machinery on to the ground. The erection of the plant will shortly be completed, and the mine should add to the yield of gold for next year. The battery will consist of twenty stamps, weight 900 lb.; one stone-breaker, by Union Ironworks, San Francisco; three berdans; six vats, 22 ft. diameter, depth 4 ft., with self-acting distributers; amalgam plates in front of stamps. The motive-power will be steam. The whole of the machinery for the battery with the exception of boiler and berdans is from the Union Ironworks, San Francisco; the boiler by Seager and Son.

New Zealand Jubilee Mine (Area, 292 acres 2 roods 2 perches).—A great many men were employed on this property in the early part of the year, in work mostly of a development character, but latterly very little has been done.

Grafton United Mine.—From three to eight men were employed in this mine a portion of the year only.

Wharekiraupunga District.

Royal Standard Mine.—Very little work was done during the year.

Waihi District.

Waihi Mine (Area, 480 acres 3 roods; owner, Waihi Gold-mining Company, Limited; superintendent, H. P. Berry; mine-manager, T. Gilmour).—Three shafts are used in working this mine—viz., No. 1, 350 ft.; No. 2, 445 ft.; and No. 3, 305 ft.—and the greatest depth of workings below surface is 445 ft., or 310 ft. below adit. There are also four levels opened below the adit. The number of reefs are six, named as follows: Martha, Welcome, Victoria, Magazine, Regina, and Surprise. The following is a description of the development work carried out during the year: No. 1 shaft was sunk 66 ft.; No. 2, 17 ft.; No. 3, 226 ft.: driving at No. 1 level, 1,019 ft.; No. 2, 2,282 ft.; No. 3, 2,287 ft.; and No. 4, 1,246 ft.: also driving at the adit-level 557 ft., and above the adit-level 1,316 ft.

The following table gives the battery returns for the year ending the 31st March, 1899:—

Period ending	Crushed.	Yield.	Value.
	Tons.	Oz.	£ s. d.
30th April, 1898	6,690	22,903	22,851 18 2
28th May, „	6,150	19,643	18,708 18 2
25th June, „	5,891	19,984	18,127 10 4
23rd July, „	6,845	22,219	20,722 0 3
20th August, „	6,821	25,229	23,449 0 8
17th September, „	6,762	22,336	21,151 6 9
15th October, „	7,156	21,027	21,611 18 4
12th November, „	7,759	22,710	24,123 3 11
10th December, „	7,684	23,873	25,285 10 9
31st December, „	3,701	10,261	11,879 13 5
4th February, 1899	8,538	23,736	24,256 1 2
4th March, „	7,152	21,535	22,076 6 2
1st April, „	7,635	20,885	22,095 17 4
Totals...	88,784	276,341	£276,339 5 5

In this mine the development work at No. 4 level has shown that the reefs as they continue downwards furnish quartz of greater value than what was obtained from the other levels. The ores change in character and are more mineralised as depth is attained, and, no doubt, the treatment of this class of quartz will entail modifications and further improvements on the present process. The vast quantities of quartz that will be available from those blocks already opened up show several years' work ahead, and as sinking is continued and fresh levels opened up very great additions will be made to the ore reserves. The future yield of gold is certain to be very great even should the present output not be augmented; but, with the knowledge of such extensive ore reserves, and the probability of successful deep-level mining, the company will of necessity be

justified in largely increasing their milling plant. The value of the yield of gold from the Waihi Mine since 1890 up to the 4th April, 1899, was £958,091 6s. 8d., and it may be confidently anticipated that when the returns for the next quarter are added the yield will be in excess of £1,000,000.

Union Waihi Mine (Area, 253 acres 1 rood 32 perches; owner, Union Waihi Gold-mining Company, Limited; mine-manager, J. E. Wearne).—The work carried on in this mine during the year has been chiefly toward development. The main shaft has been continued to a depth of 470 ft., No. 1 shaft 70 ft., and No. 2 shaft 240 ft. There are three reefs opened in the mine—viz., the Union reef, of a width of 5 ft.; the Amaranth, of a width of 20 ft.; and the Winner reef. The two former reefs are opened at No. 3 level, and No. 4 level is being opened out 85 ft. below No. 3, and it is proposed to open No. 5 level at 85 ft. below No. 4. The greatest length driven on the Union reef at any of the levels is 900 ft., on the Amaranth reef 1,400 ft., and the Winner reef 50 ft. The amount of new work during the year was as follows: Driving, rising, and cross-cutting, 336 ft.; and two cross-cuts—one 85 ft. and one 170 ft.—below No. 3 level, which are being pushed on with all speed towards the Union reef, on which most of the development work is being done. The machinery consists of one 14 in. Plunger pump with steam pumping-engine, made by A. and G. Price, Thames; one Tangye winding-engine, also driven by steam, with safety-cages from G. Fraser and Sons, Auckland; one air-compresser and receiver (Hirnant); two boilers, multitubular, one from Golden State and Miners' Ironworks, San Francisco, and one Babcock and Wilcox, England. The number of men employed during the year was fifty, exclusive of clerical, management, and firewood-cutters. The following extracts from the superintendent's report, read at the annual meeting of the company, held in London on the 21st December last, contain much information about the mine:—

"Mine-development: The greater part of mine-development work, such as driving on the reefs, cross-cutting, shaft-sinking, and sinking winzes, has been done by contract, eighteen contracts in this connection having been let during the year. Latterly there has been a tendency for these works to be taken at a cheaper price than we have hitherto been obliged to pay. This fact is, no doubt, due to general slackness of work in the district, several of the neighbouring claims having either temporarily or permanently ceased operations.

"No. 1 Shaft: The present depth of this shaft is 440 ft., and another 10 ft. of sinking, exclusive of 17 ft. for a pump-well, will enable two new levels, giving 170 ft. of backs, to be opened up on the Union and Amaranth reefs. The sinking of this shaft has somewhat retarded the development of the Union reef at the lower levels, as it was not thought advisable to continue the cross-cut at the No. 4 level to the Union reef—which cross-cut is now in about 20 ft.—for fear of bringing in more water than the sinking-pump could cope with. The next few months, however, should open up a very large body of ore, both on the Union and Amaranth reefs.

"No. 2 Shaft: In the cross-cuts driven off this shaft several bodies of ore were met with, which were followed for some distance. The water in this section was raised by means of a sinking-pump, driven by compressed air, supplied from the air-compressor at No. 1 shaft. As the developments were not very encouraging, and as the compressor was taxed to its utmost capacity to keep this pump going in addition to the pump at bottom of No. 1 shaft, it was deemed advisable to suspend operations here. If at any time it is thought advisable to recommence work here, it can be done at very little extra expense. In any case they would have, of necessity, been stopped, or the water raised by other means, owing to increased water in the No. 1 shaft.

"Hikurangi Water-race: Some work has been done during the year in extending the benching of the race, and widening it out in parts of the benching previously made, where necessary."

Waihi Grand Junction (Area, 280 acres; owners, Waihi Grand Junction Gold-mining Company; mine-manager, J. W. Walker).—The land held by this company consists of two blocks, known as the eastern and western sections, which adjoin the two ends of the Waihi Company's property. During the year a large amount of work was done. At the western end the shaft was enlarged and sunk to a depth of 260 ft., at which level the reef was cut, and a considerable amount of work done on it. At the eastern end a new shaft was sunk to a depth of 494 ft., but at the level opened the reef was not found. At the eastern end also a branch drive was put in at the deepest level, and the reef was tapped 70 ft. nearer the Waihi Company's boundary. The influx of water was so great that the pumps in the shaft were unable to cope with it, consequently operations were suspended until such time as sufficiently powerful pumping machinery would arrive from England. The mining manager, Mr. J. W. Walker, has furnished me with the following notes about this mine:—

"The Junction section adjoins the Waihi Company's ground on their eastward boundary, on the direct line of the great Martha, Welcome, and Victoria reef system. The main, or No. 1, shaft has been sunk to 500 ft., at which depth a cross-cut reached the reef in two places, but the heavy influx of water mastered and drowned the steam-pumps on the 28th January last, and since that time the property has remained unworked and under special protection, pending arrival from England of a mining engineer (Mr. Simmons) and a complete Cornish pumping equipment. Mr. Simmons is due in Auckland on the 10th May, and the machinery is under contract for due delivery in Auckland in October. It is proposed to enlarge the present pumping compartment of No. 1 shaft by removing the division between that and the northern winding compartment. This will make ample room for pump-gear; but the winding will be restricted to one shaft and one cage until more permanent arrangements are made, which will follow later on. The No. 1 level (from No. 1 shaft) at its northern extremity intersected about 2 ft. width of an irregularly formed quartz vein of no value. This quartz doubtless represents the Martha reef at this elevation. The work of sinking and driving from No. 2 Junction shaft represents over £6,000. This section of the company's property is 180 acres area, and will require more than one commodious shaft and one powerful pumping and winding plant for its due development. On the 500 ft. level the two cross-cuts proved the presence of

the Martha-Welcome reef system in this company's ground at two distinct points 80 ft. apart, and both on the exact line of the true bearing of these reefs in their progress eastward. The pumping of the Junction water not only completely dried the Waihi Company's lowest levels, but it also drained dry the workings in the Waihi West section of the Junction property (90 acres), which is situated on the extreme westward end of the Waihi Mine, thereby further proving an unbroken continuation of those valuable formations right through both sections of the Grand Junction Mine, which only requires adequate pumping, winding, and reduction machinery to establish its undoubted value."

Waihi-Silverton Mine (Area, 174 acres; owners, Waihi-Silverton Gold-mining Company; mine-manager, H. W. Moore). — Work in this mine was steadily carried on during the year. The shaft was sunk to a further depth of 70 ft., and No. 4 level was opened out at 320 ft. from the surface, from which a cross-cut has been driven, and the reef intersected. Driving on the reef was carried on in a northerly and also in a southerly direction from the cross-cut. The reef is about 10 ft. in width, and the quartz of a more valuable kind than that which has latterly been sent to the mill. Extensive driving and stoping operations were carried out on the reefs at No. 3 level, from which the bulk of the material operated on at the battery was obtained. It was found necessary to overhaul the mill, and in consequence of the stoppage for that purpose a less quantity of quartz than otherwise would have been the case was dealt with, and the returns consequently curtailed. The quartz coming to hand shows improvement, and it may fairly be expected that the returns will show an increase. The quantity of quartz crushed was 8,350 tons, which yielded 6,738 oz. of gold, valued at £11,501 4s. 5d. The average number of men employed was 105 during the year.

Waihi Gladstone Mine (Area, 62 acres and 8 perches; owners, Waihi Gladstone Gold-mining Company, Limited; mine-manager, S. Radford).—This mine, which adjoins the Silverton, has been well prospected since the present owners came into possession. A shaft has been sunk to a depth of 187 ft., and two levels opened at depths of 100 ft. and 200 ft. respectively. There are three reefs on the property, the ore being of a refractory character. No crushing of quartz has been recorded during the year. Seven wages-men are employed.

Favona and Brilliant Mine (Area, 200 acres; owners, Waihi Consolidated Gold-mine, Limited; mine-manager, Charles McLean).—This mine is worked from a shaft, the depth of which is 310 ft., and the greatest depth of workings below surface is 300 ft. Three levels are opened—at 80 ft., 200 ft., and 300 ft. During the year the shaft was sunk 110 ft. and a level opened at 300 ft. At this level cross-cuts were driven both to the eastward and westward. In the eastern cross-cut four reefs were cut, and in the other a reef formation 60 ft. in width was driven through. The machinery consists of one compound tandem condensing engine, 250 nominal horse-power, used for pumping and driving 12 in. plunger and draw-lift; one Tangye winding-engine, 20-horse power; one steel boiler, 60-horse power; one Tangye boiler, 12-horse power; one duplex engine, 2½-horse power, for feeding boiler: value, £2,775.

Waihi Extended Mine (Area, 100 acres; owner, Waihi Extended Gold-mining Company; mine-manager, Thomas Johns).—Owing to the mine being protected for a part of the past twelve months, very little development work has been done. The greater portion of the ground is very flat country, and the only prospecting done was on the hilly ground, by driving adit-levels, but so far no reefs or leaders have been intersected. The mine adjoins the Grand Junction on its north-east boundary. The development work done by that company proves that the reefs in the Waihi Mine traverse through the Grand Junction Company's ground, and probably through the flat portion of the Waihi Extended. This part of the property can only be tested by sinking a shaft, and the erection of machinery which will entail the outlay of a considerable amount of capital.

Waihi Consols Mine (Area, 200 acres; owners, Waihi Consols Gold-mining Company).—Operations in this mine have been confined to further sinking the shaft, which has now attained the depth of 160 ft. It is intended to sink the shaft to a depth of 500 ft. before levels are opened to prospect for reefs. Steam-pumps are used for the water. Fourteen men were employed.

Waihi Beach Claims.—The work done in the above claim has been of a very limited nature, and negotiations were in hand for the amalgamation of the properties and raising capital to work the claims, but the result so far is not to hand. A reef 3 ft. 6 in. wide was exposed, on which a little prospecting was done, and the result of testing proved satisfactory. In the Ocean View Extended a reef 5ft. wide was driven on for about 100 ft.

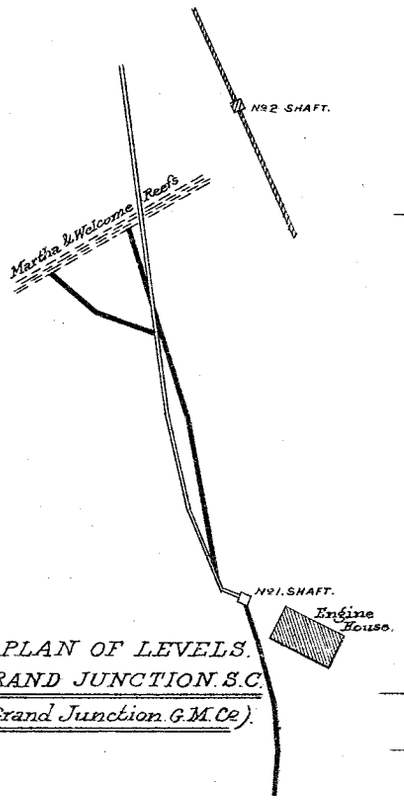
Karangahake District.

Woodstock Mine (Area, 72 acres; owner, Woodstock Gold-mining Company, Limited; mine-manager, Clement Augustus Cornes).—This mine is worked from levels, the longest or lowest adit-level being 1,100 ft. in length, and the greatest depth of workings below the surface is 709 ft., six levels being opened, at the following depths: No. 1, 150 ft.; Interim, 270 ft.; No. 2, 418 ft.; No. 3, 553 ft.; No. 4,629 ft.; and No. 5, 709 ft. There are three reefs—the Maria, Shepherds, and the Woodstock—which are of a hard flinty quartz, with good standing-walls, and the country rock andesite. The development work consisted of the extension of levels, with rises and winzes to connect them. The milling machinery consists of forty stamps, 850 lb.; two Blake-Marsden stone-breakers; one Gates crusher; two berdans; fourteen Vanner concentrators; and twelve cyanide percolation vats, 62 tons capacity each. The amount of quartz crushed was 19,850 tons, yielding bullion to the value of £7,671 0s. 10d. by amalgamation, £1,923 14s. by concentration, and £7,202 7s. 5d. by the cyanide treatment, making a total value of £16,797 2s. 3d. The average number of men employed during the year was 161. The general manager (Mr. Frank Rich) gives the following description of the mine and workings for the year:—

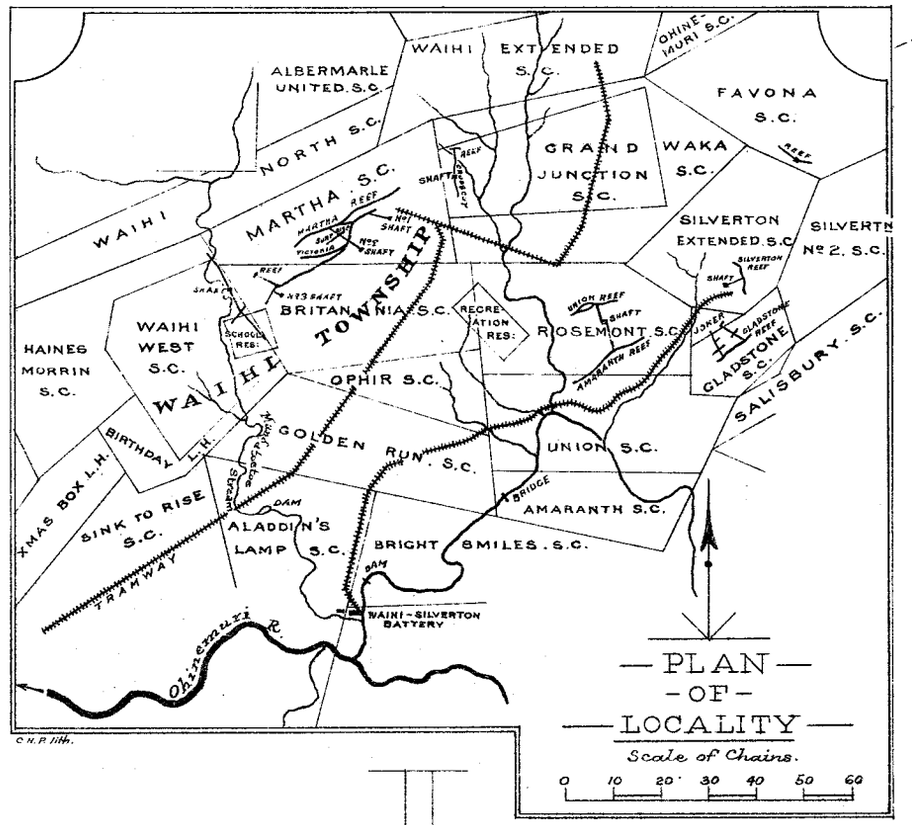
"All the levels of the Maria lode, in the Woodstock Mine, are now being worked, and the ore won therefrom is of very varying mineral character and quality, in the upper levels being generally more oxidized, lower in value, and containing less silver-value than the average; it is also more

BOUNDARY

Represents drives at №2 Shaft 241'.5" deep.
" " " №1 Level №1 Shaft 314'.9" deep.
" " " №2 " №1 " 494'.1" "



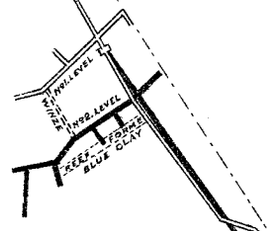
— PLAN OF LEVELS. —
GRAND JUNCTION S.C.
(Grand Junction G.M.Co).



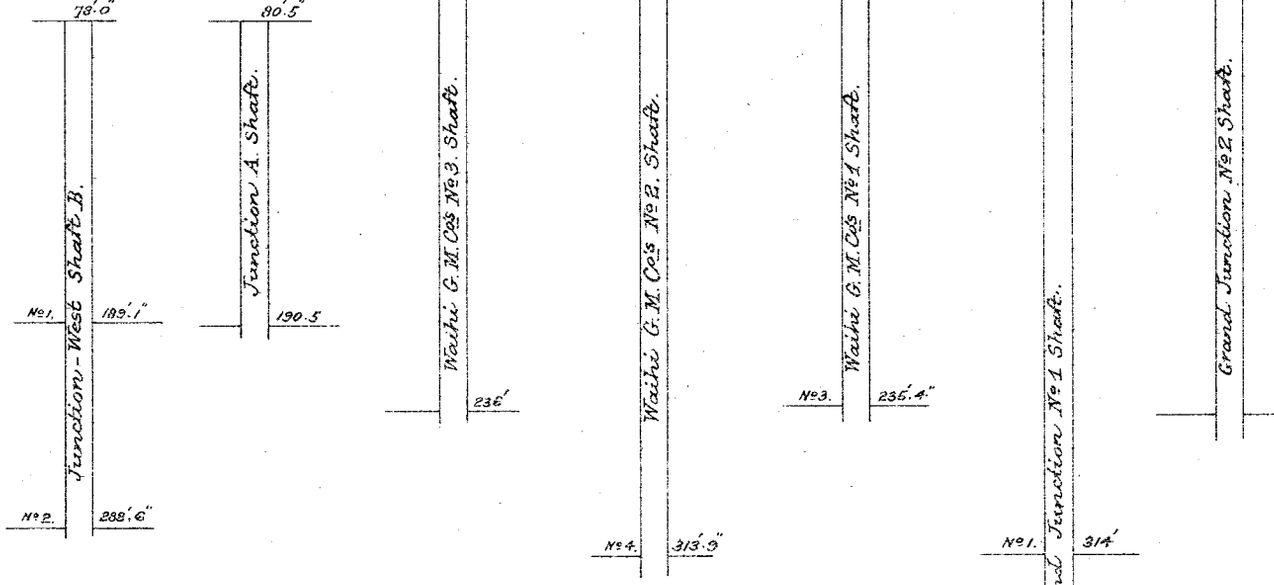
— PLAN —
— OF —
— LOCALITY —
Scale of Chains.
0 10 20 30 40 50 60

The level shown thus ═ is 298'.6" below Datum line.
The level shown thus ▬ is 189'.1" below Datum line.
Datum line being the collar of the Waihi Company's №1. Shaft.

BOUNDARY



— PLAN OF LEVELS. —
— WAIHI WEST S.C. —
(Grand Junction G.M.Co.)



— Comparative depths of Shafts at Waihi. —

— PLAN OF WORKINGS &c —
— GRAND JUNCTION G.M. Co. —
— WAIHI. —

J. W. Walker.
Manager.

easily mined generally. The tendency in the lower levels is towards more mineral sulphides and higher values; whilst throughout the whole there is considerable variance in the character of the free gold, sometimes being mostly coarse and at others almost microscopically fine, yet in all there is present some of the very fine gold. The ore in the middle and lower levels is, as a rule, hard, and more costly to mine than that of the upper levels. The variable condition of the ore often rendered the results of the treatment by cyanide alone very uncertain, as when the combination of conditions happened to predominate towards coarse gold and valuable sulphides the extraction would necessarily be low, even at the cost of very strong cyanide solutions and lengthened leaching, which would make an almost prohibitive cost under such conditions of treatment. A tolerably regular extraction could be maintained by blending all descriptions of ore; but this would only mean a deceptive improvement, for the coarse gold and valuable sulphides would still escape the cyanide, though in lesser ratio to the quantity of ore treated. Blankets save a large proportion of these values as very bulky and low-grade concentrates, generally too low-grade to admit of any more expensive treatment than berdan pan-grinding, which used to be the practice here. By this means almost all the free gold in these blanket-concentrates is amalgamated, and practically all the sulphide-values escape. Formerly the ore was treated by roasting and dry crushing. This method, though giving a good extraction, was very costly. Then crushing with cyanide solution in the mortars was adopted. This method did not give reliable results, as considerable coarse gold and almost all the sulphide-values escaped the cyanide. Concentration by blankets was used with both these methods, followed by amalgamation treatment of the low-grade blanket-concentrates in berdan pans. By this means all the amalgamable gold caught by the blankets was recovered, but coated gold and the valuable sulphides passed the berdans unrecovered; besides, there was much valuable concentrates which escaped the blankets entirely. The process now adopted is a combination process which, after careful and exhaustive investigation, was found to be most suitable and adapted to our ore. It is as follows: The ore, after passing through two Blake crushers, is elevated by a 12 in. belt elevator to the mill ore-bins. It is then fed to the forty stamps, which weigh about 850 lb. each, and strike 104 blows per minute, with a 6 in. drop. After passing through 30-mesh wire screens the pulp flows over amalgam plates, being then delivered to the elevator wheel, 34 ft. in diameter, and thus raised to the top of the mill. It now passes through a hydraulic sizer of the Spitzlutte type. The slimes are here separated from the sands, and treated separately from this on. The pulp now passes over the concentrating plant, and thence by launders is delivered to the rotary distributers in the cyanide-vats, to be treated by leaching with cyanide solution. The coarser amalgamable gold has been extracted by the plates; the concentrates, consisting of the sulphide-values and any coarser non-amalgamable gold, has been extracted by the vanners; and there is only left for the cyanide the finest gold and the most finely comminuted sulphide-values, which latter in this condition are much more amenable to cyanide treatment. The vanner plant consists of fourteen 6 ft. Union vanners and two 4 ft. Frue's. The overflow from the general cyanide-vats, whilst being filled, passes on by launders to the slime-vats, where the contained slime is settled with that previously separated by Spitzlutte. These slimes are then treated with weak cyanide solution by agitation, and good extraction effected. The concentrates from the vanners are also treated by agitation with extra-strong cyanide solution, and an extraction of over 93 per cent. of the bullion-value is maintained, at a cost of less than £1 per ton of concentrates treated. By actual experiment it is found that 75 per cent. of the values of the concentrates are quite unaffected by ordinary cyanide treatment, and therefore under that treatment would be lost. The principal points of the treatment are—(1) That the amalgamable bullion is at once extracted from the ore by amalgamation, the cheapest method of recovery; (2) that the non-amalgamable bullion and valuable sulphides are removed from the ore by concentration for separate treatment; (3) that the slimes are separated from the ore, and separately and rapidly treated with cyanide by agitation and decantation, effecting a good recovery; (4) that the remaining sands thus depleted of non-cyanidable values and obstructions to percolation are rapidly and perfectly treated by cyanide; (5) that the large quantity of water (from stamping, hydraulic-sizing, and concentration) which passes through the ore-pulp almost completely washes out the soluble cyanicides, thus reducing the loss of cyanide by chemical decomposition."

Crown Mine (Area, 135 acres 1 rood 31 perches; owners, New Zealand Crown Mines Company, Limited; general manager, R. H. Daw; mine-manager, G. N. McGruer).—Operations to a very great extent have been carried on during the year. The adit-level and other levels have been extended, and a considerable amount of stoping done. Below the adit the underlay shaft has now reached a depth of 150 ft., and two levels opened out from it—No. 1 at a depth of 70 ft. and No. 2 at a depth of 140 ft. A chamber has been excavated above the adit and over the underlay shaft, and in this the winding machinery, which is driven by compressed air, is erected. Another shaft further in has been sunk from the adit, and has reached a depth of 140 ft. Towards this shaft the levels opened from No. 1 shaft are being driven, and, as the reef varies from 4 ft. to 16 ft. in width, extensive blocks will be opened, from which a very large quantity of quartz will be derived.

The quantity of quartz crushed for the year was 27,860 tons, which yielded 28,234 oz. 18 dwt., valued at £55,483 5s. 4d., and 180 men were employed. Developments in this mine have conclusively pointed out that quartz for several years' profitable work is available, and, as the battery consists of sixty stamps, the returns from this mine will help to increase the yield from the Ohinemuri district. The battery, which is now used in crushing with cyanide solution, is capable of putting through a much greater quantity than could possibly be done under the dry-crushing process.

Talisman Mine (Area, 60 acres; owner, New Zealand Talisman Gold-mining Company, Limited).—A large amount of development work has been carried out in this mine during the year. The reef has been driven on a considerable distance in the adit-levels. In consequence of the mine

being situated at a considerable elevation on the north-eastern side of the mountain, it can be worked from adit-levels, and sinking and pumping will be unnecessary for some time to come. In the Bonanza section a chute of payable ore was discovered, and when worked on has been the means of adding materially to the returns. The milling machinery consists of two stone-breakers, twenty head of stamps, one Krupp ball-mill, six berdans, and fourteen vats (of 18 ft. and 22 ft. diameter), and also a revolving drying-furnace, with a capacity of 40 tons a day. The quantity of quartz crushed was 8,696 tons, yielding 44,541 oz. 19 dwt. of gold, valued at £32,648 13s. 1d. Ninety-four men were employed.

Imperial Mine (Area, 62 acres and 15 perches; owners, Imperial Gold-mining Company).—This mine has constantly been worked, principally putting in a low-level, and driving on the reef for 143 ft.; but so far the prospects have not been very important. Seven men were employed.

Talisman Extended (Area, 72 acres 2 roods 15 perches; owners, Talisman Extended Gold-mining Company, Limited).—The principal work in this mine was the extending of the adit-level, but, as no discovery of importance was made, work was suspended. The owners are trying to arrange an amalgamation with the New Zealand Talisman Company. Four men were employed.

Woodstock Main Reefs.—The company owning this property had twenty men prospecting for some time, but, as no payable quartz was met with, the work was stopped.

Prospecting-works have been carried on at Rotokohu and other parts of the district.

Owharoa District.

Ohinemuri Syndicate Mine (Area, 677 acres 1 rood 34 perches; owner, Ohinemuri Syndicate, Limited; mine-manager, William Morgan).—Prospecting has been steadily carried on in this mine throughout the year, but without any important discovery. In a reef that was driven on a little gold was obtained, but not in payable quantities. A large quantity of water had to be contended with in the shaft, but the pump was sufficiently powerful to deal with it. An average of about twenty-seven miners and eight bushmen were employed. The shaft is 150 ft. in depth, and a level has been opened at 125 ft. The mine machinery consists of one pumping-engine, 30-horse power; one double-cylinder engine, 10-horse power; driven by steam. The battery consists of fifteen stamps of old pattern and two berdans, the motor being a turbine driven by water brought in a race from Waterfall Creek, and siphoned across the Ohinemuri River.

In the early days of Ohinemuri Goldfield the Smile of Fortune and Radical Mines were successfully worked, and yielded very profitable returns. The ground which comprised those old mines is now occupied by the Ohinemuri Syndicate, and is being prospected at a deep level.

Rising Sun Mine.—The principal work carried out in this mine was in driving a low-level cross-cut tunnel to intersect the reef upon which work had been formerly done at the surface. It is now intended to follow the reef downwards by sinking a winze downwards from No. 1 level. Four men were employed.

Remarks on Ohinemuri District.

There is every evidence that the returns from the various mines will next year be in excess of the amount of this year's yield. The exploitation of the low levels in the Waihi Mine has resulted in revealing the existence of the reefs to greater depth, and has proved that they are not falling off in size and richness. Operations in the Waihi Grand Junction have shown that the line of the Martha reef is being traced both to the eastward and westward, and that large quantities of payable quartz exist in the ground adjoining the Waihi Mine. This will, no doubt, give further encouragement in prospecting all along the line in both directions. The returns from the Waihi-Silverton may still be expected to continue, and as further prospecting is carried on other lodes of payable quartz will most probably be discovered, and in time add to the returns. In the Waitekauri Mine the mining operations point to increase in future yields. The Komata Reefs Mine is being energetically opened up, and large quantities of quartz are available, the results of the treatment of which will yield greater returns in the future. The Crown and the Talisman Mines at Karangahake are both developing valuable quartz at low levels, and producing rich returns of gold. The reef in the Crown Mine is now opened to a depth of 150 ft. below the bed of the Waitawheta River; it is of large size and of high value: this indicates future success at the deep levels. The Woodstock Mine also continues to be a steady producer, and as improvements are being made in the methods of treatment increased yields may in future be expected. The old mines at Maratoto are again being opened, and the result of operations is sufficient to warrant the erection of a crushing-mill. This will shortly be ready, and the proceeds will add to next year's yield of gold from the district. Ohinemuri is, without question, the premier quartz-mining field in the colony, and bids fair to maintain the position for a long time to come.

Te Aroha District.

This district is situated to the southward of Ohinemuri, and includes portions of the Tauranga and Ohinemuri Counties, but the largest area lies in the Piako County. Mining-works for the year have not been conducted on a very extensive scale. The efforts made to deal with the refractory ore have not demonstrated in a practical manner that all low-grade material can be economically and profitably dealt with; extensive mining-works are therefore not likely to be carried on until a process of profitably working those low-grade ores is introduced.

The following list shows the claims held in this district :—

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Office at Te Aroha, in the Hauraki Mining District, and registered on or before the 31st March, 1899, in the Books of the Mining Registrar at Te Aroha.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
	A. R. P.					
1/6/95	26 2 32	Waiorongomai	X.	Aroha ..	New Find No. 1 ..	Aroha Gold-mines (Ltd.).
1/6/95	10 1 2	"	"	" ..	New Find No. 2 ..	"
28/6/95	28 1 25	"	"	" ..	Loyalty Palace ..	P. Snewin.
26/9/95	20 0 0	Te Aroha ..	IX.	" ..	Mount Morgan ..	J. Williams.
25/10/95	10 2 34	Waiorongomai	XII.	" ..	Welcome ..	R. Burke.
13/11/95	100 0 0	"	X. XI.	" Katikati	Empire	Aroha Gold-mines (Ltd.).
10/1/96	49 1 20	Te Aroha ..	IX.	Aroha ..	Montezuma ..	J. Williams.
1/2/96	43 2 23	Tui ..	X.	" ..	Day Dawn ..	J. A. Pond.
29/6/96	94 0 0	Waiorongomai	"	" ..	New Munster ..	New Munster Gold-mining Co. (Ltd.).
29/4/96	94 0 9	Tui ..	IX.	" ..	Waitara.. ..	J. Wallace.
16/10/96	100 0 0	" ..	IX., X.	" ..	Merchant of Venice	R. Kelly.
16/10/96	100 0 0	" ..	"	" ..	Gipsy King ..	A. E. Langley.
20/10/96	99 1 21	" ..	IX.	" ..	Te Aroha ..	R. Dovell.
24/10/96	99 0 17	" ..	X.	" ..	Grand Result ..	T. McIndoe.
30/11/96	46 3 32	" ..	V., IX.	" ..	Te Aro Extended..	R. Dovell.
30/11/96	99 0 0	..	X.	" ..	Mount Ryan ..	W. Shaw.
11/12/96	27 2 0	..	"	" ..	Manchester ..	A. A. Lockwood.
13/1/97	100 0 0	Tui ..	"	" ..	Waitara Extended	A. B. Millar.
13/1/97	96 0 4	..	IX., X.	" ..	Ethel Reef ..	Ethel Reefs Gold-mining Co.
21/1/97	19 1 0	..	X.	" ..	Ballarat.. ..	C. J. Sanderson.
22/3/97	79 2 0	..	"	" ..	Ajax	R. Lohest.
22/3/97	99 2 16	..	"	" ..	Ajax Extended ..	"
22/3/97	98 1 6	Tui ..	"	" ..	Tui	Tui Gold-mines (Ltd.).
10/5/97	27 0 15	..	..	..	Edendale ..	J. Campbell.
26/6/97	99 0 0	Tui ..	X.	Aroha ..	Mount Ryan Ext.	W. Shaw.
24/3/98	78 1 34	Waiorongomai	XII.	" ..	Cadman ..	J. Mills.
24/3/98	30 2 0	..	..	..	Montezuma Ext.	J. Campbell.
13/5/98	28 1 8	Tui ..	X.	Aroha ..	Puakaka ..	Montezuma Gold-mining Co. (Ltd.).
10/1/99	96 1 2	Te Aroha ..	IX.	" ..	Hot Springs ..	Daniel Redwood.
10/1/99	53 2 12	" ..	"	" ..	Golden Crown ..	"
27/1/99	4 3 19	" ..	"	" ..	Golden Lead ..	A. W. Edwards.

Montezuma Mine (Area, 179 acres; owner, The Twentieth Century Gold-mining Company; mine-manager, Hubert A. Clapezzouli).—The reefs have been proved by cross-cuts for some 10 or 12 chains, and levels put in along the lines of reef in preparation for stoping, and a fair quantity of ore is available. There are three reefs in the ground, from 2 ft. 6 in. to 6 ft. in width, and consisting of mineralised quartz, encased in andesite country An aërial tram and ground tramway to connect with the mill cost £800. The mill machinery consists of one 30-horse-power gas-engine; one 5-horse-power steam-engine; one Merrall's mill, capacity 40 tons; one Lockwood and Nicholson's pan, capacity 8 tons; one Triumph ore-concentrator; one thermo-hyperphoric furnace, capacity 30 tons; one Dodge stone-breaker, 4 tons per hour: the whole valued at £7,500. The mill was worked experimentally for fifty days; 307 tons of quartz were dealt with, some being treated and amalgamated, some concentrated raw, and concentrate treated. Some of the ore was worth 12s. 6d. per ton, and some of greater value. The total value of the bullion extracted was £191 15s., the price per ounce being from 5s. to 10s. An average number of twelve men were employed during the year. The Rev. Joseph Campbell, who has the control and management of this property, has afforded the following information, under date of 10th April, about the company and mine :—

"In March the company went into voluntary liquidation, owing to differences of opinion between the managing director and the company's representative director sent out from London to report on the property. Although his estimate of the value of ore was £1 10s. to £1 16s. per ton, bulk assays giving £2 16s., he condemned the property, and the company declined to subscribe an additional sum of £3,000, required for further developing the property and completing the plant, when it was decided to go into liquidation. The whole concern was purchased by the New South Wales shareholders, who did not agree with the action of the London directorate, and the necessary work is now being carried out under the direction and personal supervision of the Rev. Joseph Campbell, who is satisfied, after the full test made with various classes of ore, that from 80 to 95 per cent. of the value of any refractory ore in New Zealand can be saved by his thermo-hyperphoric system. In three months everything will be ready for a start under the new company, which is styled 'The Twentieth Century Gold-mining Company (Limited).'"

Waiorongomai District.

Empire and New Find Claims (Area, 126 acres 2 roods 32 perches; mine-manager, Arthur Marsh).—Very little work was done in the beginning of the year, but since that time Mr. E. H. Hardy, who has taken an option over the properties and battery, has made preparations and again opened up the mine. About 200 tons of quartz is broken and ready to be operated on, which it is believed will give profitable results. The county tramway has been put in repair, and is now in good working-order. Twelve men were employed.

Alexander Mine.—This ground is worked by the owner, Mr. Newsham, who had 3 tons of quartz crushed at the Thames, which yielded 56 oz. 11 dwt., valued at £190.

Prospecting-work has also been carried out in the Welcome and Loyalty and in the Cadman and Munster Mines during the earlier part of the year.

Tauranga District.

This field is situated within the northern portion of Tauranga County. Prospecting operations have occasionally been carried on, but no fresh discoveries have been made. Attention, however, is still being directed to test the reef first discovered in Fleming's freehold. The following list shows the claims held in this district:—

Abstract of Licenses for Special Claims issued from the Warden's Office at Tauranga, in the Hauraki Mining District, and registered on or before the 31st March, 1899, in the Books of the Mining Registrar at Tauranga.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
	A. R. P.					
7/10/96	100 0 0	Aongatete ..	IV.	Aongatete ..	Eliza	Henry M. Shepherd.
28/10/97	100 0 0	Te Puke ..	V.	Maketu ..	The Sisters ..	K. te Atirau and M. te Atira
15/10/97	100 0 0	" ..	Waitaha No. 1	" ..	Patience ..	D. Lundon.
28/10/97	100 0 0	" ..	V.	" ..	Pukekura ..	Te Puke Gold-reefs.
28/10/97	100 0 0	" ..	"	" ..	Pukerima ..	"
28/10/97	100 0 0	" ..	"	" ..	Puke Pai ..	"
28/10/97	100 0 0	" ..	"	" ..	Pukehina ..	"
28/10/97	100 0 0	" ..	"	" ..	Pukema ..	"
28/10/97	100 0 0	" ..	"	" ..	Puketora ..	"
22/4/98	97 2 29	" ..	"	" ..	Problem ..	C. McLean.

Te Puke District.

Te Puke Gold-reefs Mine (Area, 1,087 acres; owners, Te Puke Gold-reefs, Limited; mine-manager, R. R. Morrison).—This is the principal claim worked in the district, and the work for the year consisted of developing the large lode, and the driving of an adit-level on the south 100 ft. below the former level, which gives a depth of 320 ft. of backs below the crown of the hill. The adit was driven northwards for 200 ft., and the reef picked up in broken country; it also passed through a number of bands of gold-bearing quartz from 2 ft. to 12 ft. in width. After the reef had been found work was suspended in that portion of the mine, and a winze started from the low level. There are five known reefs on this property, and the character of the quartz is somewhat similar to that of the Waihi district, and will require similar treatment to that at the Crown Mine. The casing-walls are of a decomposed andesite. No. 1 reef in No. 2 level is 25 ft. wide. No. 2, or white lode, has given some assays worth £1 5s. per ton. No. 3, or blue lode, is heavily mineralised, and gives assays slightly in excess of No. 2 reef values. No work has been done on other lodes yet. The main lode, or No. 1, is the one that has been chiefly operated on. The cost of mining, trucking, and wet-crushing with cyanide solution is estimated by the owner not to exceed 11s. per ton on a basis of twenty stampers, and inclusive of management. The facilities for mining are very great, as all the reefs crop on the south side of the hill, where a stream for water-power runs at the foot of it. 550 ft. of backs can be got at from the adit-levels. Three places from the Raparapahoe Stream are suitable for building dams for storage of water at a moderate cost, so that when the time comes there will be plenty of water-power to drive the battery, and there seems to be plenty of quartz available should the mine ultimately prove worthy of a large number of stampers being erected here. Terms for a working option have been agreed upon to get English capital to develop the mine, and shareholders are in hopes that this will soon be settled and a large staff of men at work. In the meantime the company have let a contract to drive the western adit, which will cut the blue and white lodes at a point 200 ft. north of the other workings, at which place these lodes appear to be making a junction with the main or No. 1 lode, and towards which the chute of the best-looking ore is trending, as all the best assays are from stone towards the north. Four wages-men were employed.

Clark's Freehold (Area, 300 acres; owner, John Angus Clark; mine-manager, J. A. Clark, jun.).—A considerable amount of prospecting has been done in the ground, five drives having been put in—viz., No. 1, 80 ft.; No. 2, 80 ft.; No. 3, 30 ft.; No. 4, 70 ft.; No. 5, 100 ft.—and a cross-cut 50 ft. in length. The greatest depth of any of the drives below the surface is 100 ft. Three reefs have been discovered, blue and white quartz cased in brown sandstone, varying from 2½ ft. to 8 ft. in width. Two men were employed. The owner reports that the mine is now at a standstill, owing to want of capital to properly work the property.

Ben Lomond.—This is a special claim on Native land, and during the year the owners put in a drive close to the boundary of Clark's freehold, which it adjoins, with a view of picking up the Te Puke lode, but after driving for 100 ft. nothing of a payable nature was disclosed.

The Sisters is another freehold property, but no work of any importance has been done on it.

Mr. Alexander McKay, F.G.S., Government Geologist, has furnished the following account of the auriferous cement met with in this district. He says,—

"The claim in which cement was discovered was about two miles north of The Sisters, and two men were employed prospecting. Towards the north it was rhyolite and andesite gravel mixed, varying from 2 ft. to 8 ft. in thickness, showing traces of gold, but nothing payable. The cement is underlayed and overlaying by pumice sands, and it appears in lenticular patches in this pumice

formation. This description applies to the further south point in which the cement has been found. In a branch creek to the north alluvial gold was obtained, evidently derived from cement of a similar character. In this neighbourhood several holes and drives were made, and gold was said to be obtained from these, but I judged that the excavations were made in the solid rock of a rhyolyte type. Also in this branch creek is exposed a small reef containing traces of cinnabar."

Remarks.

There does not appear cause to expect any great returns from Te Aroha or Tauranga districts, although from the former field small returns continue to come to hand.

Hauraki District.

The amount and extent of operations carried on throughout the whole of the Hauraki district, the vast quantities of valuable quartz in sight, together with the erection of new batteries and improvements in treatment of ores, clearly indicate continued prosperity. The development of deep-level mining may be also an important factor in the future success of the field.

Wellington District.

The party or company formed to prospect some ground near the water-reservoir at Karori did a considerable amount of work in driving tunnels, but, although a little fine gold was sometimes obtained in soft seams running through the slate rock, the veins were so small as to be of no value; the ground was therefore abandoned.

Prospecting-work to a small extent was carried on at Terawhiti, but, beyond a little gold being seen in small veins, nothing of any value was discovered, and the ground has been for a considerable time abandoned.

The ground on which prospecting has been done at Karori and Terawhiti is owned by private individuals, and is not included in any mining district.

Machinery.

Mr. John Chambers, of Auckland, who supplies most of the mining machinery, has afforded the following information, and also gives a list of plants erected by his firm during the year:—

The following batteries have been fitted up with electric light by our company during the last year: Tararu Creek Company, forty lights; Waikino Battery, Waihi Gold-mining Company, 180 lights; Whangamata Gold Corporation, sixty lights; Kauri Gold Estates (not finished), 200 lights.

The Waitekauri Cross Company have put down an electric motor installation.

The following batteries have been put down: A five-stamp battery, complete, for the Four-in-Hand Company, with an aërial tramway connecting battery to mine.

The Mahara Royal Company have added another ten stamps to their battery at Tapu, making it twenty stamps.

The Alpha Company's battery, of twenty stamps, is almost finished (at Waitekauri).

The Maratoto Company have a fifteen-stamp battery in course of erection. This has been removed from Whangapoua.

The Hikutaia Syndicate are erecting a Dodge crushing plant, equal to a ten-stamp battery.

The Premier Company have about finished their new ten-stamp battery.

The Whangamata Gold Proprietary are erecting a large crushing plant, with three Krupp mills and cyanide.

The Kauri Freehold Gold Estates have completed their forty-stamp mill, but their cyanide plant is not finished, and it will take some six weeks to finish. This is a really first-class plant.

The Royal Standard Company have sold their plant and mine, and the same has been bought by Captain Hodge, who intends to give it a further trial.

The Waitekauri United plant (compressor, &c.) has been sold, and is being removed by Mr. Sorrenson to the Great Barrier.

The Grand Junction Mine is now under protection, but the company has put down during the year two 120-horse-power water-tube boilers and air-compressor plant, and now has a large pumping plant on order, 150-horse power.

The Woodstock Company have put in wet-crushing plant, and should be putting through at least 1,800 tons per month.

The Royal Oak, Coromandel, have put down a compressor plant of 40-horse power to drive their battery and pumps, &c. It is working well.

During the year very few large orders have been given for mining plant, but we are expecting an improvement as soon as these new batteries are turning out the gold.

Our business has been good during the year, but it has been in minor matters—fittings and small machines.

RETURN OF STONE, ETC., CRUSHED—AUCKLAND DISTRICT.

District.	Quartz and Mullock crushed or sold.	Yield of Gold or Bullion.	Average Yield of Gold or Bullion per Ton.
	Tons.	Oz.	Oz. dwt. gr.
Coromandel—			
Output for 10 years previous to 1st April, 1890	15,101	56,232	3 14 11
1st April, 1890, to 31st March, 1891 ...	5,650	9,838	1 14 19
" 1891, " 1892 ...	13,029	12,191	0 18 17
" 1892, " 1893 ...	15,163	12,954	0 17 2
" 1893, " 1894 ...	12,629	9,969	0 15 18
" 1894, " 1895 ...	15,451	22,632	1 9 18
" 1895, " 1896 ...	27,439	48,378	1 15 6
" 1896, " 1897 ...	18,848	35,886	1 18 2
" 1897, " 1898 ...	13,666	27,428	2 0 3
" 1898, " 1899 ...	12,269	30,139	2 9 3
Totals	149,245	265,647	1 15 12
Thames—			
Output for 12 years previous to 1st April, 1890	441,388	556,878	1 5 6
1st April, 1890, to 31st March, 1891 ...	61,756	38,113	0 12 8
" 1891, " 1892 ...	86,150	45,735	0 10 15
" 1892, " 1893 ...	78,547	31,336	0 7 23
" 1893, " 1894 ...	62,444	34,637	0 11 2
" 1894, " 1895 ...	48,464	22,810	0 9 10
" 1895, " 1896 ...	44,342	26,332	0 11 21
" 1896, " 1897 ...	27,061	13,440	0 9 22
" 1897, " 1898 ...	20,850	13,482	0 12 22
" 1898, " 1899 ...	31,339	18,004	0 11 11
Totals	902,341	800,767	0 17 18
Ohinemuri—			
1st April, 1887, to 31st March, 1888 ...	2,388	3,406	1 8 13
" 1888, " 1889 ...	3,795	3,679	0 19 9
" 1889, " 1890 ...	4,773	8,564	1 15 21
" 1890, " 1891 ..	9,902	12,914	1 6 2
" 1891, " 1892 ...	13,865	23,659	1 14 2
" 1892, " 1893 ...	22,771	43,405	1 18 3
" 1893, " 1894 ...	31,281	35,666	1 2 18
" 1894, " 1895 ...	51,058	110,628	2 3 8
" 1895, " 1896 ...	57,008	147,499	2 11 18
" 1896, " 1897 ...	66,985	148,626	2 4 9
" 1897, " 1898 ...	105,126	280,708	2 13 9
" 1898, " 1899 ...	170,881	459,651	2 15 19
Totals	539,833	1,278,405	2 7 9
Te Aroha—			
1st April, 1883, to 31st March, 1884 ...	4,262	4,629	1 1 17
" 1884, " 1885 ...	11,042	9,506	0 17 5
" 1885, " 1886 ...	6,552	4,489	0 13 17
" 1886, " 1887 ...	4,743	3,658	0 15 10
" 1887, " 1888 ...	7,166	2,918	0 8 3
" 1888, " 1889 ...	1,381	1,113	0 16 3
" 1889, " 1890 ...	4,894	20,416	4 3 10
" 1890, " 1891 ...	280	557	1 19 18
" 1891, " 1892 ...	2,722	979	0 7 5
" 1892, " 1893 ...	3,169	1,178	0 7 2
" 1893, " 1894 ...	2,270	833	0 7 8
" 1894, " 1895 ...	1,121	628	0 11 5
" 1895, " 1896 ...	172	168	0 19 12
" 1896, " 1897 ...	934	376	0 8 1
" 1897, " 1898 ...	...	...	...
" 1898, " 1899 ...	325	279	0 17 4
Totals	51,033	51,727	1 0 6
Great Barrier—			
1st April, 1896, to 31st March, 1897 ...	3	219	73 0 0
" 1897, " 1898 ...	2	45	22 10 0
" 1898, " 1899 ...	...	...	...
Totals	5	264	52 16 0
Grand totals from North Island ...	1,642,457	2,396,810	1 9 4

STATEMENT SHOWING THE WHOLE OF THE QUARTZ-CRUSHING MACHINES AND APPLIANCES FOR TREATING AURIFEROUS AND ARGENTIFEROUS ORES IN THE HAURAKI MINING DISTRICT FOR THE YEAR 1898–99.

Locality where Machine is situated.	Name of Machine.	Name of Owners.	Number of Rock-breakers.	Number of Stamps.	Number of Ore-crushers, Lamberton or Krupp Mills.	Number of Berdans.	Number of Pans.	Number of Settlers.	Number of Mortars.	Number of Retorts.	Number of Furnaces for Gold-melting.	Number of Furnaces for Assay Purposes.	Number of Plants for Cyanide Process.	Number of Concentrating Plants.	Driven by Steam-power.	Driven by Water-power or Hand-power.
Coromandel County.																W. H.
Coromandel ..	Kapanga ..	Kapanga Gold-mining Co.	..	10	..	2	..	..	1	2	..	..	..	..	1	..
" ..	Telephone ..	Hauraki Gold-mining Co.	..	15	..	8	..	..	2	3	..	..	..	..	1	..
" ..	Corby ..	Scotty's Gold-mining Co.	..	9	..	8	..	..	1	2	..	..	..	..	..	1 0
" ..	Hauraki North ..	Hauraki North Gold-mining Co.	..	..	1	1	..	..	1	1	..	..	..	..	1	..
" ..	Success ..	Success Gold-mining Co.	..	10	..	4	..	..	1	1	..	..	..	..	1	..
" ..	Hauraki Associated	Hauraki Associated Gold-mining Co.	..	12	..	4	..	..	2	2	2	..	..	..	1	1 0
" ..	Tokatea ..	Royal Oak of Hauraki Gold-mining Co.	..	15	..	2	..	..	1	1	..	..	..	..	..	1 0
" ..	Triumph ..	Triumph Gold-mining Co.	..	10	..	2	..	..	1	1	..	..	..	..	1	..
" ..	Four-in-Hand ..	Four-in-Hand Gold-mining Co.	..	5	..	2	..	..	1	1	..	..	..	..	1	..
Tiki ..	Pohutu ..	Pohutu Gold-mining Co.	..	2	..	1	..	..	1	1	..	..	..	..	1	..
" ..	Vizard's ..	..	..	4	..	1	..	..	1	1	..	..	..	..	..	1 0
Opitonui ..	Lanigan's ..	Kauri Freehold Gold Estates Mines (Ltd.)	..	10	..	2	..	..	1	1	..	..	..	..	..	1 0
" ..	Owera ..	Ditto	..	10	..	4	..	..	2	2	..	..	..	..	..	1 0
Kuaotunu ..	Try Fluke ..	Mariposa Gold-mining Co.	..	16	..	3	..	..	2	2	..	..	..	..	1	..
" ..	Great Mercury ..	Great Mercury Gold-mining Co.	..	10	..	1	..	..	4	2	..	..	..	..	1	..
" ..	Irene ..	Irene Gold-mining Co.	..	10	..	2	..	..	2	1	..	..	..	..	1	..
" ..	Kapai-Vermont ..	Kapai-Vermont Gold-mining Co.	1	..	1	1	..	..	2	1	..	..	..	..	1	..
Manaia ..	Golden Hill ..	Golden Hill Extended Gold-mining Co.	..	2	..	1	..	..	1	1	..	..	..	..	1	..
Thames County.																
Tapu	Sheridan ..	Sheridan Gold-mining Co.	..	15	..	4	..	..	3	3	..	..	..	..	..	1 0
"	Mahara Royal ..	Mahara Royal Gold-mining Co.	..	10	..	4	..	..	2	2	..	..	..	..	..	1 0
Waiomo	Monowai ..	Monowai Gold-mining Co.	..	10	..	1	..	1	1	1	1	1	1	..	1	1 0
Puru	Puru Consolidated	Puru Consolidated Gold-mining Co.	..	10	..	2	..	..	1	1	..	..	..	..	..	1 0
Tararu	Scandinavian ..	Scandinavian Gold-mining Co.	..	8	..	4	..	..	1	1	..		..	..	..	1 0
"	New Alburnia ..	New Alburnia Gold-mining Co.	..	20	..	7	2	..	1	3	..	..	..	..	..	1 0
"	Norfolk ..	Tararu Mines Gold-mining Co.	..	30	..	6	..	..	3	2	..	1	1	..	..	1 0
"	Chicago	Chicago Gold-mining Co.	..	10	..	..	..	..	1	1	..	..	..	..	..	1 0
"	Berry's ..	Charles Berry	..	1	..	3	..	..	1	2	1	..	..	..	..	0 1
Karaka	Claremont ..	George Bryant	..	1	..	1	..	..	1	3	..	..	..	..	..	0 1
Otonui	Eureka ..	James Renshaw ..	..	12	..	4	..	..	1	1	..	..	..	..	..	1 0
Hape	Anchor ..	Ethel Reefs Gold-mining Co.	..	4	..	1	..	..	1	1	..	..	..	..	..	1 0
"	Fortuna ..	Fortuna Gold-mining Co.	..	5	..	..	..	..	1	1	1	1	1	..	..	1 1
Kerikeri	Kerikeri ..	M. Fleming	..	4	..	1	..	..	1	1	..	..	..	..	..	1 0
Puriri	Puriri ..	Puriri Gold Estates Gold-mining Co.	..	8	..	2	..	..	1	1	..	..	..	..	..	1 0
"	Hit or Miss ..	M. Bedford	..	6	..	2	..	..	1	1	..	..	..	..	..	1 0
Tairua	Bonnie Scotland ..	Mrs. McLiver	..	20	..	6	..	..	2	1	..	..	..	..	1	1 0
"	Ajax ..	"	..	12	..	4	..	..	1	1	..	..	..	..	1	1 0
Thames Borough ..	Brown's ..	James Brown	..	4	..	1	..	..	1	1	..	..	..	..	..	1 0
" ..	Kuranui ..	Kuranui Gold-mining Co.	..	20	..	10	..	..	1	1	1	1	..	..	..	..
" ..	Moanataiari ..	Moanataiari Gold-mining Co.	..	60	..	21	4	..	2	6	3	1	1	1	1	1 0
" ..	Comer's ..	Kuranui-Caledonian Gold-mining Co.	..	..	..	2	9	..	1	1	..	..	..	..	..	1 0
																1 0
" ..	Judd's ..	Charles Judd	..	20	..	5	..	..	1	2	..	1	..	..	..	1 0
" ..	May Queen ..	May Queen Gold-mining Co.	..	33	..	8	3	..	2	3	2	..	..	..	..	1 0
" ..	Cambria ..	Moanataiari Gold-mining Co.	..	21	..	13	1	..	2	5	1	..	..	..	..	1 0
" ..	Waiotahi ..	Waiotahi Gold-mining Co.	..	21	..	5	..	..	2	2	1	..	..	..	..	1 0
" ..	Fame and Fortune	E. K. Cooper	..	21	..	16	..	..	1	1	1	..	..	..	..	1 0
" ..	Hauraki Golden Age	Hauraki Golden Age Syndicate	2	40	..	13	..	..	..	..	..	..	..	..	..	..
" ..	School of Mines ..	F. B. Allen	..	2	..	1	1	1	3	3	1	4	1	..	..	1 0
" ..	Bank of New South Wales	Reginald Smith ..	..	..	..	..	..	..	1	..	1	1	..	..	..	0 1
" ..	Bank of New Zealand	A. Smith	..	..	..	..	..	..	2	..	1	3	..	..	..	0 1
" ..	May Queen Extended	May Queen Extended Gold-mining Co.	..	23	..	14	..	..	2	4	1	..	..	..	..	1 0
" ..	Fairmile ..	W. Manning	..	..	..	1	..	..	1	1	..	..	..	..	..	0 1

STATEMENT SHOWING THE WHOLE OF THE QUARTZ-CRUSHING MACHINES AND APPLIANCES FOR TREATING AURIFEROUS AND ARGENTIFEROUS ORES IN THE HAURAKI MINING DISTRICT FOR THE YEAR 1898–99—*continued*.

Locality where Machine is situated.	Name of Machin	Name of Owners.	Number of Rock-breakers.	Number of Stamps.	Number of Ore-crushers, Lamberton or Krupp Mills.	Number of Berdans.	Number of Pans.	Number of Settlers.	Number of Mortars.	Number of Retorts.	Number of Furnaces for Gold-melting.	Number of Furnaces for Assay Purposes.	Number of Plants for Cyanide Process.	Number of Concentrating Plants.	Driven by Steam-power.	Driven by Water-power or Hand-power. W.	H.
Ohinemuri County.																	
Paeroa	Bank of New Zealand	G. Burgess	1	..	..	..	..	..	2	1	1	1	..	..	..	0	1
Karangahake ..	Crown	New Zealand Crown Mines Co. (Ltd.)	2	60	..	1	..	..	2	2	1	1	1	..	..	1	0
" ..	Woodstock ..	Woodstock Gold-mining Co.	2	40	..	1	..	..	2	2	1	1	1	1	..	1	0
" ..	Talisman ..	Talisman Gold-mining Co.	1	20	1*	2	..	..	2	2	1	1	1	..	..	1	0
Owharoa	Smile of Fortune ..	Ohinemuri Syndicate ..	..	15	..	2	..	..	1	2	1	..	..	..	..	1	0
Komata	Komata	Komata Reefs Gold-mining Co.	2	20	..	4	..	..	2	2	1	1	1	1	1	1	0
Waitekauri ..	Waitekauri ..	Waitekauri Gold-mining Co.	2	40	1*	6	..	..	3	1	4	2	1	1	1	1	0
" ..	Golden Cross ..	Ditto	1	10	..	2	..	..	2	2	1	1	1	..	1	..	
" ..	Jubilee	Jubilee Syndicate ..	..	10	..	5	2	1	1	2	1	1	1	..	1	..	
" ..	Grace Darling ..	Grace Darling Gold-mining Co.	..	10	..	3	..	..	1	2	1	1	1	..	1	..	
" ..	Mangakara ..	Reginald Smith ..	..	9	..	3	..	..	1	2	..	..	..	..	..	1	0
Maratoto	Waitekauri Extended	Waitekauri Extended Gold-mining Co.	1	40	..	3	..	..	2	2	1	1	1	..	..	1	0
Waihi	Waihi	Waihi Gold-mining Co. ..	2	90	..	1	..	..	3	6	1	1	1	..	1	1	0
Waikino	Victoria	" ..	2	100	..	6	..	..	1	2	2	..	..	..	..	1	0
Waihi	Waihi-Silverton ..	Waihi-Silverton Gold-mining Co.	2	40	..	2	..	..	2	2	1	1	1	..	1	1	0
Ohui	Last Chance ..	G. Clarkson	..	3	..	1	..	..	1	1	..	..	..	..	..	1	0
Piako County.																	
Waiorongomai ..	Te Aroha Gold-mining Co.	E. H. Hardie	1	10	..	2	..	..	1	1	1	1	1	1	..	1	0
" ..	Great Western ..	Great Western Co. ..	..	8	..	1	..	..	1	1	..	..	..	..	1	..	
Te Aroha	Montezuma ..	Rev. Joseph Campbell ..	1	..	..	1	1	..	1	1	..	..	..	..	1	..	
City of Auckland ..	Bank of New Zealand	..	..	..	..	..	1	1	2	6	4	2	..	..	..	0	1
" ..	Fraser's	George Fraser	..	..	1	1	2	2	2	2	1	1	..	..	1	..	
			21	1116	5	248	26	6	100	127	41	31	17	5	27	45	7

*Krupp machines.

BATTERIES IN COURSE OF CONSTRUCTION.

Locality.	Name of Company,	Number of Stamps.	Remarks.
Coromandel County.			
Opitonui	Kauri Freehold Gold Estates Mines (Ltd.)	40	
Thames County.			
Tararu	Eclipse Gold-mining Co. ..	10	
Tapu	Mahara Royal Gold-mining Co.	10	
Whangamata	Whangamata Proprietary ..	..	1 No. 5 Krupp mill.
Ohinemuri County.			
Karangahake	New Zealand Crown Mines ..	20	
Waitekauri	Alpha Gold-mining Co. ..	20	
Maratoto	Maratoto	10	
"	Hikutaia Gold Syndicate ..	..	1 No. 5 Dodge crusher, equal to 5 stamps.
		110	

STATEMENT SHOWING QUANTITY OF QUARTZ CRUSHED AND GOLD OBTAINED for the Year ended 31st March, 1899 (compiled from Monthly Returns by Quartz-crushing-machine Owners).

Locality and Name o Mine.	Average Number of Men employed —Wages-men or Owners.	For Owners.			Estimated Value of Gold or Bullion.
		Quartz crushed.	Gold obtained.		
			Amalgamation.	Cyanide.	
COROMANDEL COUNTY.					
Port Charles—		Tons. cwt. lb.	Oz. dwt.	Oz. dwt.	£ s. d.
Eva	2	0 0 105	85 0	..	229 10 0
Cabbage Bay—					
Jersey	2	2 10 0	1 4	..	3 4 10
Belgic	2	1 10 0	2 0	..	5 8 0
Beattie and Ford	2	1 10 0	3 10	..	9 9 0
Queen Victoria of Hauraki	4	7 0 0	42 5	..	29 2 0
City of Gisborne	2	1 19 0	14 15	..	41 5 10
	12	14 9 0	63 14	..	88 9 8
Kennedy Bay—					
Flossie tributers	2	1 12 0	11 7	..	31 15 7
Morning Star tributers	2	2 2 0	2 1	..	5 14 9
Bay View "	4	5 10 0	22 15	..	63 14 0
Vanderbilt "	3	2 0 0	0 18	..	2 10 7
Evening Star "	2	0 11 0	0 4	..	0 11 2
Simond's	2	1 5 0	0 14	..	1 19 2
Dyer's Claim	2	0 0 3	11 7	..	31 15 7
Rose	2	0 0 47	5 0	..	14 0 0
	19	13 0 50	54 6	..	152 0 10
Waikoromiko—					
Tandem	..	20 0 0	6 0	..	16 16 0
Napier tributers	4	2 0 0	6 7	..	17 15 7
Four-in-Hand	13	1 0 0	0 4	..	0 11 2
	17	23 0 0	12 11	..	35 2 9
Tokatea—					
Royal Oak	75	267 0 7,203	5,137 13	..	12,942 8 0
Hauraki Associated	27	506 8 7	1,352 0	..	3,850 7 8
Tokatea Consols	3	72 11 382	223 2	..	630 5 2
Karaka Block	6	32 0 0	11 15	..	33 18 9
Harbour View	4	4 11 0	28 4	..	81 7 4
" tributers	8	5 10 170	102 19	..	293 8 1
Queen of the North	..	0 3 30	23 18	..	68 2 3
" tributers	6	3 14 92	33 8	..	95 3 9
East Hauraki	4	12 10 81	78 7	..	223 5 11
Hauraki Gem	2	3 0 0	30 9	..	86 15 5
	135	907 7 7,965	7,021 15	..	18,305 2 0
Sundries	10	7 5 31	69 9	..	197 18 9
Kapanga—					
Kapanga	55	272 11 184	995 9	..	2,951 18 4
" tributers	..	38 4 1,236	1,604 14	..	4,680 7 6
Kathleen Crown	23	5 0 7	5 8	..	15 15 0
	78	315 15 1,327	2,605 11	..	7,648 0 10
Kauri Block—					
Hauraki	102	2,090 0 72	5,645 11	..	16,545 7 4
Golden Pah	31	35 0 57	104 4	..	312 12 0
Welcome Find	13	19 10 100	59 15	..	179 5 0
New Golconda	3	0 0 51	25 2	..	71 10 8
Hauraki North	3	8 0 0	3 16	..	10 8 0
Bunker's Hill	9	0 0 165	260 17	..	783 0 0
Hauraki South tributers	22	29 0 0	70 7	..	218 1 8
Wynyardton tributers	4	31 0 0	52 11	..	153 5 4
	187	2,212 0 445	6,222 3	..	18,273 10 0
Tiki—					
Matawai	2	3 0 0	2 18	..	8 14 0
Pohutu	6	50 13 0	30 19	..	92 17 0
Golden Butterfly	2	0 15 0	5 12	..	16 16 0
Coromandel Freehold	8	5 0 0	1 15	..	5 5 0
	18	59 8 0	41 4	..	123 12 0
Kuaotunu—					
Mariposa	33	2,812 0 0	770 19	858 0	3,740 13 2
Great Mercury	18	1,202 0 0	518 18	613 2	2,527 6 4
Waitaia	16	110 0 0	102 0	68 0	427 0 0
Irene	2	163 0 0	91 0	43 10	283 1 1
Aorere	4	89 10 0	87 0	128 16	500 10 6
Handsworth	2	0 0 170	107 10	..	295 12 6
	75	4,376 10 170	1,677 7	1,711 8	7,774 3 7
Sundries	20	403 0 0	502 12	..	1,001 19 3
Total	573	8,336 3 105	18,355 2	1,711 8	53,829 9 8

Number of men employed on development work from which no returns have been obtained, 320.

STATEMENT SHOWING QUANTITY OF QUARTZ CRUSHED AND GOLD OBTAINED for the Year ended 31st March, 1899—*continued*.

Locality and Name of Mine.	Average Number of Men employed—Wages-men or Owners.	For Owners.			Estimated Value of Gold or Bullion.
		Quartz crushed.	Gold obtained.		
			Amalgamation.	Cyanide.	
THAMES COUNTY.					
		Tons. cwt. lb.	Oz. dwt.	Oz. dwt.	£ s. d.
Tapu—					
Sheridan	9	285 18 224	105 17	..	312 5 2
City of Santa Rosa	2	13 2 0	8 14	..	25 13 4
Comet	2	5 0 0	1 15	..	5 3 3
Shannon	2	0 0 2	0 10	..	1 9 6
Golden Point	2	10 0 0	0 8	..	1 3 7
Little Jessie	2	22 0 0	4 11	..	13 8 5
Mahara Royal	33	2,488 0 0	1,556 9	..	4,236 15 9
	52	2,824 0 226	1,678 4	..	4,595 19 0
Waiomo—					
Monowai	40	963 0 0	126 4	..	347 1 0
Puru—					
Puru Consolidated	7	994 0 20	163 1	..	489 3 0
Tararu—					
Tararu Creek	70	8,479 0 0	2,240 7	1,397 2	8,985 15 10
Scandinavian	..	82 0 0	17 17	..	44 14 6
Chicago	9	156 0 0	26 13	..	73 5 9
Eclipse	42	106 0 0	136 16	..	396 14 4
Kaiser	7	13 0 0	7 1	..	21 0 3
	128	8,836 0 0	2,428 14	1,397 2	9,521 10 8
Kuranui—					
Kuranui	8	7 0 0	1 2	..	3 0 6
" tributers	3	125 0 0	89 5	..	194 11 5
" Caledonian	..	180 10 144	204 16	..	550 4 10
" " tributers	50	412 0 795	1,044 18	..	2,792 4 2
	61	724 10 939	1,340 1	..	3,540 0 11
Moanataiari—					
Moanataiari	34	3,102 0 0	1,367 0	..	3,844 7 9
" tributers	72	1,049 0 0	1,811 11	..	4,588 0 10
New Alburnia	28	1,385 0 30	252 19	..	659 14 3
	134	5,536 0 30	3,431 10	..	9,092 2 10
Grahamstown—					
Victoria tributers	9	131 0 0	58 17	..	158 17 10
Judd's*	7	..	805 14	..	2,517 16 3
	16	131 0 0	864 11	..	2,676 14 1
Waiotahi—					
Waiotahi	16	1,090 0 0	1,653 16	..	4,571 5 0
Nonpareil	6	34 0 0	208 11	..	570 18 0
" tributers	10	154 0 0	234 15	..	642 11 6
West Coast	2	16 0 0	7 19	..	21 17 3
Fame and Fortune	6	225 0 0	30 1	..	81 2 8
	40	1,519 0 0	2,135 2	..	5,887 14 5
Waiokaraka—					
May Queen	23	2,139 0 0	1,866 10	..	5,167 13 10
" tributers	34	199 0 0	351 0	..	963 15 6
Cardigan	..	112 0 10	245 1	..	648 0 9
" tributers	..	97 0 10	121 11	..	331 12 4
	57	2,547 0 20	2,584 2	..	7,111 2 5
Karaka—					
Adelaide tributers	4	18 10 0	12 0	..	36 0 0
May Queen Extended	2	33 0 0	9 8	..	28 4 0
Gloucester	3	1 0 86	29 17	..	90 3 10
Manchester	4	59 0 0	43 18	..	131 14 0
Claremont	1	0 0 345	255 9	..	689 14 3
Karaka (Limited)	13	100 0 0	27 11	..	80 18 6
	27	211 10 431	378 3	..	1,056 14 7
Una Hill—					
Occidental	7	89 10 0	84 4	..	227 6 10
Hape Creek—					
Anchor (Ethel Reefs)	29	655 0 86	176 10	..	467 14 9
Fortuna, Hauraki	18	349 10 0	61 3	..	158 2 9
	47	1,004 10 86	237 13	..	625 17 6
Kerikeri—					
Kerikeri	6	77 0 15	108 7	..	292 19 9

* 5,150 tons tailings.

STATEMENT SHOWING QUANTITY OF QUARTZ CRUSHED AND GOLD OBTAINED for the Year ended 31st March, 1899—*continued.*

Locality and Name of Mine.	Average Number of Men employed—Wages-men or Owners.	For Owners.			Estimated Value of Gold or Bullion.
		Quartz crushed.	Gold obtained.		
			Amalgamation.	Cyanide.	
THAMES COUNTY—*continued.*					
Puriri—		Tons. cwt. lb.	Oz. dwt.	Oz. dwt.	£ s. d.
Empress of India	10	50 0 0	34 0	..	91 16 0
Ohui—					
Last Chance	2	25 0 0	0 15	..	2 4 3
Sundries	60	806 2 10	1,012 4	..	2,021 19 0
Totals	677	26,338 17 97	16,606 15	1,397 2	47,580 6 3
Number of men employed on development work from which no returns have been obtained, 83.					
OHINEMURI COUNTY.					
Waihi—					
Waihi	710	86,809 0 0	..	273,817 0	272,688 9 10
Waihi-Silverton	105	8,350 0 0	..	6,738 0	11,501 4 5
	815	95,159 0 0	..	280,555 0	284,189 14 3
Waitekauri—					
Waitekauri	280	22,840 0 0	..	73,450 3	66,585 3 4
Karangahake—					
New Zealand Crown	180	27,860 0 0	..	28,234 18	55,483 5 4
Woodstock	161	9,850 0 0	..	17,427 0	15,692 3 6
New Zealand Talisman	94	8,696 0 0	490 1	44,051 18	32,648 13 1
	435	46,406 0 0	490 1	89,713 16	103,824 1 11
Komata—					
Komata Reefs	85	5,435 0 0	..	14,477 14	17,795 3 6
Maratoto—					
Waitekauri Extended	45	1,011 0 0	..	925 4	920 14 6
Sundries	12	30 0 11	40 16	..	83 0 8
Total	1,672	170,881 0 11	530 17	459,121 17	473,397 18 2
Number of men employed on development work from which no returns have been obtained, 180.					
PIAKO COUNTY.					
Te Aroha—					
Montezuma	12	301 0 0	194 4	..	549 7 6
Alexander	1	23 0 0	84 8	..	282 14 7
Golden Lead	1	1 0 10	0 14	..	2 7 2
Total	14	325 0 10	279 6	..	834 9 3
Number of men employed on development work from which no returns have been obtained, 20.					

COMPARATIVE STATEMENT of RETURN for HAURAKI DISTRICT for the Years ended 31st March, 1898 and 1899 respectively.

1898.

Name of County.	Average Number of Men employed: Wages-men or Owners.	For Owners.			Estimated Value of Gold or Bullion.
		Quartz crushed.	Gold obtained.		
			Amalgamation.	Cyanide.	
		Tons cwt. lb.	Oz. dwt.	Oz. dwt.	£ s. d.
Great Barrier	6	1 16 108	45 8	..	122 11 7
Coromandel	741	13,665 16 46	24,137 1	3,290 17	73,337 10 0
Thames	528	20,850 6 15	11,487 8	1,995 0	32,177 14 0
Ohinemuri	1,480	105,126 15 0	248 14	280,460 0	300,107 17 8
Totals	2,755	139,644 14 57	35,918 11	285,745 17	405,745 13 3

1899.

Name of County.	Average Number of Men employed.		For Owners.				For Tributers.				Tailings.			Estimated Value of Gold or Bullion.
	Wages-men or Owners.	Tributers.	Quartz crushed.	Mullock crushed.	Gold obtained.		Quartz crushed.	Mullock or Gravel.	Gold obtained.		Quantity treated.	Gold obtained.		
					Amalgamation.	Cyanide.			Amalgamation.	Cyanide.		Amalgamation.	Cyanide.	
			Tons cwt. lb.	Tons.	Oz. dwt.	Oz. dwt.	Tons cwt. lb.	Tons.	Oz. dwt.	Oz. dwt.	Tons cwt.	Oz. dwt.	Oz. dwt.	£ s. d.
Coromandel	512	61	8,213 17 1	..	16,448 1	..	122 6 104	..	1,907 11	..	3,933 0	..	1,782 15	53,829 9 0
Thames	495	182	24,152 16 34	..	12,878 18	..	2,186 1 63	..	3,727 17	..	5,000 0	..	1,397 2	47,580 6 3
Ohinemuri	1,672	..	170,881 11 0	..	530 17	459,121 17	..	..	..	..	..	..	..	473,397 18 2
Piako	34	..	325 10 0	..	279 6	..	..	..	..	..	..	..	..	834 9 3
Totals	2,713*	243	203,573 14 35	..	30,137 2	459,121 17	2,308 8 55	..	5,635 8	..	8,933 0	..	3,179 17	575,642 2 8

GOLD OR BULLION, AND VALUE.

	Bullion. Oz. dwt.		£ s. d.
Value for 1899	498,074 4	..	575,642 2 8
„ 1898	321,664 8	..	405,745 13 3
Increase for 1899	176,409 16		£169,896 9 5

	£ s. d.
Decrease, Great Barrier	122 11 7
„ Coromandel	19,508 1 0
Increase, Thames	15,402 12 3
„ Ohinemuri	173,290 0 6
„ Piako	834 9 3

* Number employed in gold-producing mines.

Waihi Mine.

The following are the returns from this famous mine since 1890:—

	Tons.	£	s.	d.
1890	...	21,112	13	0
1891	...	23,935	5	11
1892	18,236	44,888	2	4
1893	19,805	61,900	10	11
1894	24,864	82,827	2	2
1895	33,670	120,334	2	2
1896	34,400	137,321	8	2
1897	40,764	144,040	9	7
1898	77,929	253,304	12	5
Period ending 4th February, 1899	8,538	24,256	0	0
Period ending 4th March, 1899	7,152	22,076	0	0
Period ending 4th April, 1899	7,635	22,095	0	0
Total to date		£958,091	6	8

Waitekauri Mine.

The following are details of the returns up to date:—

	£	s.	d.
To December, 1897	85,490	11	0
For the year to December, 1898	64,052	6	0
Period ended 28th January, 1899	8,731		0
Period ended 25th February, 1899	6,018	0	0
Period ended 25th March, 1899	5,629	0	0
Total	£169,920	17	0

New Zealand Crown Mines.

The details of the returns are as under:—

	Tons.	£	s.	d.
Prior to 1898	...	138,104	0	0
In the year 1898	25,563	52,024	0	0
January, 1899	2,664	5,592	0	0
February, 1899	2,524	4,889	0	0
March, 1899	2,730	5,652	0	0
Total to date		£205,261	0	0

MIDDLE ISLAND.

Nelson and West Coast Districts.

The chief quartz-mining centre in the Middle Island is the Reefton district. A number of mines continue to be worked for a satisfactory yield of gold, and a considerable amount of prospecting and development work has been carried on. In the Lyell district the chief work has been confined to one mine—the United Alpine. In the Collingwood district some of the mines at West Wanganui are giving satisfactory yields. At Paparoa Range some encouragement is being derived from the recent yields from the Crœsus Mine.

Abstract of Licenses for Special Claims and Licensed Holdings issued from the Wardens' Offices, and registered on or before the 31st March, 1899, in the Books of the Mining Registrars.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
		Havelock.				
	A. R. P.					
6/8/88	225 2 0	Endeavour Inlet	..	..	Star	Star Antimony Co. (Ltd.).
6/8/88	287 0 0	"	..	..	"	"
6/8/88	300 0 0	"	..	..	"	"
1/10/94	30 0 0	Waikakaho ..	..	..	Captain Cook No. 1	Robert Ewing.
30/6/94	30 0 0	Wakamarina ..	..	Wakamarina	Empire City ..	Golden Bar Gold-mining Co.
13/11/95	8 2 15	" ..	..	"	Federation Extd. ..	Walter J. Hunt.
13/11/95	24 2 21	" ..	..	"	Great Yorkshire ..	"
30/7/96	20 1 0	Waikakaho ..	..	..	Captain Cook No. 2	Robert Ewing.
19/8/96	30 1 8	Wakamarina ..	..	..	Golden Bar ..	Golden Bar Gold-mining Co.
27/9/98	47 0 0	Pelorus ..	..	Blenheim ..	Queen of Sheba ..	Alfred Rogers.
27/9/98	41 0 0	" ..	..	" ..	Pelorus	G. B. Richardson.
11/10/98	61 0 0	Wairau Valley	..	" ..	Prospectors ..	Rountree and Bradcock.
22/10/98	87 1 24	"	..	" ..	Trocadero ..	Palliser and Raymond.
		Collingwood.				
3/3/87	16 2 0	Bedstead Gully	VIII.	Aorere ..	..	Johnston's United Mining Co.
5/7/88	63 3 34	"	"	" ..	..	"
6/10/96	16 0 0	Onakaka ..	II.	Waitapu ..	..	I. S. M. Jacobsen.
12/8/97	19 0 0	Boulder River..	X.	Aorere ..	..	J. Taylor and others.
29/3/97	100 0 0	Cole's Gully ..	VIII.	" ..	..	D. C. Tana.
21/7/97	38 3 18	" ..	"	" ..	..	Josiah Corby.
15/4/98	29 3 30	..	II.	Waitapu ..	Licensed holding ..	Joseph Jacobsen.
13/5/98	30 0 0	..	"	" ..	" ..	Samuel G. Robinson and W. P. Scott.
14/9/98	28 3 29	..	VIII.	Aorere ..	" ..	William Johnston.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices—*continued*.

Date of License.	Area.			Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
	A.	R.	P.			*Lyell.*		
16/1/96	57	3	2	Lyell Creek ..	XIII.	Lyell ..	Alpine Extended ..	Alpine Extended Gold-mining Co. (Ltd.).
7/7/96	100	0	0	New Creek ..	"	" ..	Surrey Quartz-mining Co.	James Welman.
25/7/92	76	0	4	Alpine Range ..	"	" ..	Alpine Extended ..	Alpine Extended Gold-mining Co. (Ltd.).
17/2/97	50	0	0	Lyell Creek ..	I.	Maruia ..	Golden Crown ..	James Grieve.
19/8/97	49	1	0	Alpine Range ..	XIII.	Lyell ..	Irishman's Creek ..	Charles Jacobs and William Green.
22/5/96	8	1	24	" ..	"	" ..	Alpine Extended ..	Alpine Extended Gold-mining Co. (Ltd.).
17/2/97	12	2	0	" ..	"	" ..	..	Ditto.
17/2/97	30	0	0	Lyell Creek ..	I.	Maruia ..	No. 2 Alpine Quartz-mining Co.	Charles H. Junker and Edward Morris.
						Westport.		
13/7/96	100	0	0	Stony Creek, Waimangaroa	X.	Ngakawau ..	Welcome Company	Great Republic Gold-mining Co. (N.L.).
1/12/97	100	0	0	Cascade Creek ..	"	Kawatiri ..	Prince of Wales Gold-mining Co.	Alexander McKay.
7/12/97	99	3	23	Waimangaroa ..	VI.	" ..	St. George's Gold-mining Co.	Westport Twin Gold-mines (Ltd.).
3/11/97	30	0	0	Stony Creek, Waimangaroa	X.	Ngakawau ..	South British Gold-mining Co.	Edward Robert Issell.
15/2/98	39	0	23	Seatonville ..	XIII.	Maruia ..	Red Queen Gold-mining Co.	Arthur William Mills.
19/10/98	99	3	39	Stony Creek, Waimangaroa	X.	Ngakawau ..	Britannia Gold-mining Co.	James Gardner.
19/10/98	97	1	10	Waimangaroa ..	VI.	Kawatiri ..	Westport Twin Gold-mines (Ltd.)	Westport Twin Gold-mines (Ltd.).
15/1/95	30	0	0	Seatonville ..	IX.	Maruia ..	Swanston Gold-mining Co.	Swanston Gold-mining Co. (Ltd.).
15/5/95	7	1	19	Cascade Creek ..	III.	Oheka ..	Cascade Mining Co.	Joseph Saunders and party.
						Reefton.		
28/6/93	73	0	19	Merrijigs ..	VI.	Waitahu ..	Golden Lead ..	Golden Lead Mining Co.
23/5/95	89	1	16	Devil's Creek ..	II.	" ..	Progress	Progress Mines of New Zealand (Ltd.).
19/8/95	31	0	23	" ..	"	" ..	Progressive ..	Ditto.
1/11/95	100	0	0	Murray Creek ..	XIV.	Reefton ..	Gladstone ..	Consolidated Goldfields of New Zealand (Ltd.).
1/11/95	100	0	0	" ..	"	" ..	Beaconsfield ..	Ditto.
1/11/95	100	0	0	Devil's Creek ..	II.	Waitahu ..	Larnach	"
1/11/95	100	0	0	Rainy Creek ..	"	" ..	Carbine	New Inkerman Mines (Ltd.).
1/11/95	57	2	0	" ..	"	" ..	Revival	"
6/1/96	33	0	0	" ..	"	" ..	"	"
25/11/95	100	0	0	Larry's Creek ..	VII.	Reefton ..	Caledonia ..	Consolidated Goldfields of New Zealand (Ltd.).
25/11/95	100	0	0	" ..	"	" ..	Rosebery	Ditto.
6/1/96	100	0	0	Boatman's ..	XI.	" ..	Seddon	"
25/11/95	100	0	0	" ..	"	" ..	Cadman	"
1/5/96	100	0	0	Devil's Creek ..	II.	Waitahu ..	Carroll	Progress Mines of New Zealand (Ltd.).
2/6/96	100	0	0	" ..	"	" ..	Ballance	Ditto.
2/6/96	100	0	0	Murray Creek ..	XIV.	Reefton ..	Salisbury ..	Consolidated Goldfields of New Zealand (Ltd.).
2/6/96	49	2	0	" ..	"	" ..	Juno	Ditto.
2/6/96	100	0	0	Boatman's ..	XI.	" ..	Blake	"
2/6/96	100	0	0	Devil's Creek ..	II.	Waitahu ..	Rose	Progress Mines of New Zealand (Ltd.).
2/6/96	100	0	0	Snowy River ..	X.	" ..	Matthias	H. F. Doogan.
21/9/96	58	0	0	Merrijigs ..	VI.	" ..	A1	A1 Gold-mining Co.
21/9/96	67	0	0	Murray Creek	XIV.	Reefton ..	Golden Treasure Ext.	Anglo-Continental Gold Syndicate (Ltd.).
7/9/96	50	0	0	" ..	XV.	" ..	Union Jack ..	John Knight.
21/9/96	85	3	24	Devil's Creek ..	XIII.	" ..	Revival	Gerald Perotti.
21/9/96	51	0	0	Rainy Creek ..	II.	Waitahu ..	Clarence	New Inkerman Mines (Ltd.).
5/11/96	98	3	6	Devil's Creek ..	"	" ..	Deep	Progress Mines of New Zealand (Ltd.).
21/9/96	99	2	0	Murray Creek	XIV.	Reefton ..	Royal	Consolidated Goldfields of New Zealand (Ltd.).
21/9/96	54	0	0	"	"	" ..	Energetic ..	Ditto.
21/9/96	95	0	0	"	"	" ..	Golden Fleece ..	"
10/12/96	99	0	9	Rainy Creek ..	II.	Waitahu ..	Wilson	New Inkerman Mines (Ltd.).
26/11/96	100	0	0	Snowy River ..	XIII.	" ..	Snowy River ..	Snowy Creek United Gold-mining Co.
6/7/96	100	0	0	Merrijigs ..	II.	" ..	Sir F. Drake ..	T. Hubert Lee and three others.
7/1/97	100	0	0	Snowy River ..	XIII.	" ..	Kiwi	Bernard Duffy.
19/3/97	29	3	22	Victoria Range	XVI.	Reefton ..	Big Reef	G. J. Willis.
4/2/97	29	3	20	"	XII.	" ..	Earl Brassey ..	Kirwan's Reward Gold-mining Co.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices—*continued.*

Date of license.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
		Reefton—continued.				
	A. R. P.					
4/2/97	29 3 20	Victoria Range	XVI.	Reefton ..	Kirwan's Reward ..	Kirwan's Reward Gold-mining Co.
4/2/97	29 3 31	"	XII.	" ..	Lady Brassey ..	Ditto.
4/2/97	93 2 4	"	XVI.	" ..	Lord Brassey ..	"
19/3/97	30 0 0	"	"	" ..	Luck's Way ..	George Walker.
23/10/97	100 0 0	Painkiller ..	X.	" ..	Ulster	George Black.
23/12/97	63 1 13	Crushington ..	XIV.	" ..	Wealth of Nations	David Ziman.
7/1/98	99 1 0	Boatman's ..	XI.	" ..	Golden Apple ..	Thomas Naysmith.
7/1/98	100 0 0	Crushington ..	II.	Waitahu ..	New Globe ..	Charles Clifford.
		Under "Mines Act, 1877."				
7/9/87	37 3 0	Big River ..	X.	Waitahu ..	Big River ..	Big River Gold-mining Co.
5/12/82	52 2 12	Devil's Creek ..	II.	" ..	Globe	Progress Mines of New Zealand (Ltd.).
		Gold-mining Leases (Quartz).				
6/7/86	13 2 30	Devil's Creek ..	II.	Waitahu ..	Globe ..	Progress Mines of New Zealand (Ltd.).
28/9/86	15 3 33	" ..	"	" ..	" ..	Ditto.
4/10/86	5 0 0	" ..	"	" ..	" ..	"
1/11/86	16 1 37	Crushington ..	XIV.	Reefton ..	Hercules	Hercules Gold-mining Co.
		Reefton (Inangahua District).				
29/5/90	30 0 0	Painkiller ..	X.	Reefton ..	Dillon Extended ..	Dillon Extended Gold-mining Co.
28/10/91	10 0 0	Merrijigs ..	VI.	Waitahu ..	Cumberland ..	Cumberland Extended Gold-mining Co.
1/6/92	28 2 25	Crushington ..	XIV.	Reefton ..	No. 2 South Keep-it-Dark	No. 2 Keep-it-Dark Gold-mining Co.
25/1/93	16 0 26	Boatman's ..	XI.	" ..	Welcome ..	Welcome Gold-mining Co.
17/8/94	21 1 36	Crushington ..	XIV.	" ..	Keep-it-Dark ..	Keep-it-Dark Gold-mining Co.
17/8/94	16 2 0	" ..	"	" ..	Hercules ..	Hercules Gold-mining Co.
5/10/94	28 2 8	Boatman's ..	XI.	" ..	Welcome ..	Welcome Gold-mining Co.
17/6/95	30 0 0	Big River ..	X.	Waitahu ..	St. George ..	William J. Sunderland.
29/6/95	16 2 6	" ..	"	" ..	Lord Edward ..	Lord Edward Gold-mining Co.
16/9/95	30 0 0	" ..	"	" ..	Star	John Trennery.
4/10/95	28 3 0	Merrijigs ..	VI.	" ..	Cumberland ..	Cumberland Extended Gold-mining Co.
4/10/95	29 3 36	" ..	"	" ..	" ..	Ditto.
25/11/95	16 2 0	Boatman's ..	VII.	Reefton ..	Golden Arch ..	Francis Rogers.
25/11/95	16 2 4	" ..	"	" ..	Golden Crown ..	John Williams.
1/11/95	16 0 21	Rainy Creek ..	II.	Waitahu ..	Carbine	New Inkerman Mines (Ltd.).
19/2/96	30 0 0	Painkiller ..	X.	Reefton ..	Dillon Extended ..	Dillon Extended Gold-mining Co.
2/6/96	29 1 11	Murray Creek..	XIV.	" ..	Percival	David Ziman.
2/6/96	6 3 22	Rainy Creek ..	II.	Waitahu ..	Zenith	H. F. Budge.
2/6/96	30 0 0	Murray Creek..	XIV.	Reefton ..	Victoria Extended..	William J. Collins.
5/11/96	24 1 30	Merrijigs ..	II.	Waitahu ..	Maritana ..	Charles Anderson.
5/11/96	22 3 20	Devil's Creek ..	"	" ..	Wedge	Progress Mines of New Zealand (Ltd.).
26/11/96	9 2 8	Merrijigs ..	"	" ..	Elliston	Thomas H. Lee and three others.
19/3/96	29 3 11	Victoria Range	..	Reefton ..	Young New Zealand	Henry Smith.
19/3/97	28 3 26	"	..	" ..	Lady Agnes ..	George J. Willis.
19/3/97	30 0 0	"	..	" ..	Mutual	Boatman's Exploration Co.
19/3/97	29 3 30	"	XII.	" ..	Golden Pebble ..	Charles Williams.
19/3/97	29 3 30	"	XVI.	" ..	Aide-de-camp ..	Boatman's Exploration Gold-mining Co.
19/3/97	30 0 0	"	XII.	" ..	Hidden Mystery ..	Edward Silcock.
19/3/97	29 3 30	"	"	" ..	Governor	Boatman's Exploration Gold-mining Co.
19/3/97	15 3 0	"	XVI.	" ..	City of Derry ..	John McLaughlin.
19/3/97	29 3 37	"	"	" ..	Napier	George G. Dixon.
19/3/97	17 0 31	"	"	" ..	Lady Antrim ..	Patrick Cooney.
19/3/97	29 3 22	"	XII.	" ..	Newhaven ..	Newhaven Gold-mining Co.
23/4/97	5 3 10	"	"	" ..	Surplus	Boatman's Exploration Gold-mining Co.
7/5/97	28 2 24	"	"	" ..	Colonial Company	John H. Howell.
21/5/97	14 1 21	"	XVI.	" ..	Mount Victoria ..	George Wells.
18/6/97	30 0 0	"	XII.	" ..	Emancipator ..	Frank Payne.
8/10/97	27 0 30	Devil's Creek ..	II.	Waitahu ..	Prince	John Dick.
23/10/97	16 1 0	Boatman's ..	XI.	Reefton ..	West Welcome ..	Charles Clifford
18/2/98	30 0 0	Merrijigs ..	VI.	Waitahu ..	Last Chance ..	James Morris.
18/3/98	29 3 38	..	XI.	Reefton ..	Victory	Alexander McCloy.
20/5/98	30 0 0	..	XVI.	" ..	..	Boatman's Exploration Co.
7/4/98	99 0 25	..	X.	Waitahu ..	Comet	James Stevenson.
24/6/98	9 2 35	..	VI.	" ..	Merrijigs Sluicing Co.	William King.
24/6/98	16 1 27	..	XIX.	Reefton ..	No. 2 Keep-it-Dark	No. 2 Keep-it-Dark Gold-mining Co.
24/6/98	34 3 38	..	XIV.	" ..	Keep-it-Dark ..	Keep-it-Dark Quartz-mining Co.
20/5/98	73 3 27	..	XII.	" ..	Kirwan's Hill Co. ..	George Walker.
24/6/98	52 2 12	..	II.	Waitahu ..	Progress	Progress Mines of N.Z. (Ltd.).
20/5/98	57 2 9	..	VI.	" ..	Cumberland Extd...	Cumberland Extd. Gold-mining Co. (Ltd.)

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices—*continued*.

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
				Reefton (Inangahua District)—continued.				
22/7/98	62	3	15	..	X.	Waitahu ..	No. 2 Big River Co.	Richard Dunphy.
7/10/98	30	0	0	..	XII.	Reefton ..	Sunbeam Co. ..	George Langdon.
7/10/98	49	3	15	..	II.	Waitahu ..	Louisa	New Inkerman Mines (Ltd.).
23/9/98	99	3	11	..	XIV.	Reefton ..	Albion	James Stevenson.
14/12/98	100	0	0	..	"	" ..	Low-level Tunnel Co.	Consolidated Goldfields of N.Z. (Ltd.).
14/12/98	23	0	36	..	XI.	" ..	Welcome	WelcomeGold-mining Co.(Ltd.).
6/1/99	30	0	0	..	VI.	" ..	Reward Co. ..	Henry F. Budge.
6/1/99	29	3	35	..	"	" ..	Balfour Co. ..	Walter Irving.
				Ahaura.				
27/4/96	100	0	0	Moonlight ..	X.	Waiwhero ..	Moonlight Gold-mining Co.	Richard Devereux, Hugh Magill, Robert Mitchell, and ten others.
22/6/96	100	0	0	Paparoa ..	XIV.	" ..	Crœsus	Crœsus Gold-mining Co. (Ltd.).
22/6/96	95	3	17	" ..	"	" ..	Minerva	Gerald Perotti.
28/9/96	100	0	0	" ..	"	" ..	Triple Alliance ..	William Dunn.
28/9/96	100	0	0	" ..	"	" ..	Imperial	Imperial Gold-mining Co.(Ltd.).
28/9/96	98	2	36	" ..	X.	" ..	Premier	James Marshall.
26/10/96	93	2	0	" ..	XIV.	" ..	Victoria	Victoria Gold-mining Co.(Ltd.).
26/10/96	100	0	0	" ..	"	" ..	Corrie's Reward ..	James McMeekin and three others.
19/11/96	100	0	0	" ..	"	" ..	Sunlight	Sunlight Gold-miningCo.(N.L.).
7/12/96	97	0	0	" ..	IX.	" ..	Trilby	Joseph Billingham.
25/1/97	100	0	0	" ..	"	" ..	Alpha	Alpha Gold-mining Co. (N.L.).
7/12/96	100	0	0	" ..	X.	" ..	Comstock ..	Henry Watterson and Edward Carton.
7/12/96	97	1	26	" ..	"	" ..	Paparoa	Joseph Mandel.
25/1/97	100	0	0	" ..	XIV.	" ..	Taffy	Taffey Gold-mining Co. (Ltd.).
25/1/97	99	1	10	" ..	"	" ..	South Pole ..	B. Ballin and W. B. Scott.
25/1/97	99	0	0	" ..	"	" ..	Nil Desperandum ..	John Leitch.
22/2/97	100	0	0	" ..	IX.	" ..	Golden Lead ..	Thomas George Davies.
22/2/97	95	0	13	" ..	X.	" ..	Golden Gully ..	Gerald Perotti.
22/2/97	100	0	0	" ..	IX.	" ..	Midland Consolidated	Alpha Gold-mining Co. (N.L.).
22/2/97	98	1	32	" ..	"	" ..	Red Lion	George Brown.
26/4/97	96	2	7	" ..	X.	" ..	Princess	"
26/4/97	99	2	16	" ..	"	" ..	Prophet	Christchurch Wilson Gold-mining Co. (N.L.).
21/3/98	99	2	38	" ..	XIV.	" ..	Lord Harris ..	Thomas H. Garth.
21/3/98	99	3	26	" ..	X.	" ..	Mount Cashel ..	Patrick O'Boyle.
21/3/98	100	0	0	" ..	"	" ..	Kumara	Gardiner Wilson.
21/3/98	99	3	7	" ..	XIII.	" ..	El Dorado ..	Thomas Jolliffe.
22/6/96	30	0	0	" ..	XIV.	" ..	Roaring Meg ..	Gerald Perotti and five others.
24/8/96	20	0	17	" ..	"	" ..	Aurora Gold-mining Co.	Roaring Meg Sluicing and Hydraulic Power Co. (Ltd.).
				Greymouth.				
1/9/94	32	0	0	..	V.	Mawheranui	Julian Gold-mining Co. (Ltd.).	Julian Gold-mining Co. (Ltd.).
21/12/96	99	0	0	..	"	"	..	T. W. Tymons.
22/11/94	16	2	1	..	"	"	..	Julian Gold-mining Co. (Ltd.).
22/11/94	30	0	0	..	"	"	..	John McGain and others.
24/1/95	15	0	28	..	"	"	..	Julian Gold-mining Co. (Ltd.).
24/1/95	15	0	28	..	"	"	..	Harry Feary.
24/1/95	16	0	1	..	"	"	..	Richard Green.
24/10/95	8	3	24	..	"	"	..	Thomas Jones.
9/1/96	16	2	33	..	"	"	..	Thomas Bland.
22/10/96	16	0	36	..	"	"	..	John McGain.
1/10/88	13	2	20	..	XVI.	Greymouth	..	J. Keith and M. McGillicuddy.
17/2/92	16	1	0	..	IV.	Hohonu ..	..	Low Hoyd and party.
28/6/94	10	0	0	Paroa ..	"	Waimea ..	..	John Byrne.
23/4/96	20	2	0	" ..	"	" ..	..	John Walsh.
12/11/96	7	3	6	..	I.	Hohonu ..	..	Claus H. Lins.
21/12/96	49	0	6	Paroa ..	XII.	Greymouth	..	John Druce.
28/1/97	20	0	0	..	V.	Cobden ..	..	William Maddox.
1/6/97	100	0	0	Barrytown ..	IX.	Waiwhero ..	Barrytown Flat Gold-mining Co.	Barrytown Flat Gold-mining Co. (Ltd.).
1/6/97	92	2	12	" ..	"	" ..	Ditto	Ditto.
10/7/97	37	3	18	..	III.	Waimea ..	..	James D. Gillies.
14/4/97	25	0	0	..	I.	Waiwhero ..	..	Evan H. Lewis.
1/6/97	50	0	0	Barrytown ..	"	Te Miko ..	Pactolus Co. ..	William Morris.
26/5/97	30	0	0	Paparoa ..	V.	Mawheranui	Kohnui Co. ..	Cornelius R. Skelly.
3/8/97	100	0	0	North Beach ..	I.	Waiwhero ..	Inverness Co. ..	Alexander MacDougall.
29/12/97	100	0	0	Barrytown ..	"	" ..	Barrytown Flat No. 2 Co.	Barrytown Flat No. 2 Gold-mining Co.
2/3/98	100	0	0	..	X.	Arnold ..	Record Find Co. ..	Alfred Yeadon.
10/5/98	99	3	7	Barrytown ..	I.	Waiwhero ..	Waimangu Co. ..	Waiwhero Sluicing Co.
10/5/98	99	3	30	" ..	"	" ..	Waipuke Co. ..	"
10/5/98	47	2	38	" ..	II.	Te Miko ..	Te Miko Co. ..	William Morris.
10/5/98	99	1	0	" ..	I.	Waiwhero ..	Hibernia	John Martin Hogg.
5/8/98	96	3	12	" ..	"	" ..	Waiwhero ..	Thomas George Davis.
23/11/98	15	1	2	..	XV.	Arnold ..	..	James Ring.
23/11/98	11	2	9	..	"	..	..	John T. Tidd.

COLLINGWOOD DISTRICT.

Golden Ridge Mine (Area, 88,350 acres; owner, Taitapu Gold Estates, Limited; mine-manager, Hugh Fulton).—The mine is worked from an adit-level at a depth of 270 ft. below the surface. 600 tons of quartz was crushed, for a yield of 154 oz. of gold, value £616. All operations were suspended on the 31st August, 1898. Since that date ten men have been prospecting on the surface all over the estate. The battery consists of twenty stamps, one Blake stone-breaker, and four berdans, driven by a Pelton water-wheel.

Aorangi Mine, late Pioneer (Area, 100 acres, in two blocks of 50 acres; owner, the Australasian Gold Trust, Limited; mine-manager, Frank H. Johnson).—The mine is worked from adit-levels. The 100 ft. level is 115 ft. long, the 200 ft. level is 300 ft. in to reef. The greatest depth prospected is 200 ft. vertically below surface. The reef varies in size from 1 ft. to 6 ft. The quartz is also various, in some places being hard and solid, and slightly glassy; in others it is crushed, and more of a friable nature. The reef lies between two belts of hard sandstone, almost a quartzite, cased in slates in thickness from 2 ft. to 30 ft. The walls in No. 1 level are sound and strong. The casing in No. 2 level, being much thicker and softer, causes the roof to be in places somewhat heavy. During the past year No. 2 level has been prospected by driving 250 ft. on reef north and 80 ft. south. Two rises have also been put up to No. 1 level, some 200 ft. apart. In No. 1 level the drive on the reef has been extended north to connect with the rise from No. 2. Reef has been winzed on in two places; and three rises have been put up towards surface, carrying a strong and good reef the whole way. The machinery consists of a three-stamper battery of 250 lb. stamps, with copper tables and inside copper plates, by Fraser and Chalmers, driven by a 2-horse-power horizontal engine with vertical boiler. The stamps have a 7 in. drop, and are run at 90 drops per minute. The average quantity of quartz crushed varies from 2 tons to 2½ tons per day for the three stamps, depending on the hardness of the stone. The battery has been worked for ninety-seven days, and crushed 223½ tons of quartz, which produced 691 oz. 19 dwt. bullion. In addition to this, 20 tons was crushed at Taitapu battery early in the year, producing 65 oz. gold. Fourteen men were employed.

LYELL DISTRICT.

Alpine Extended (Area, 57 acres 3 roods 2 perches; owner, Alpine Extended Gold-mining Company, Limited).—Operations on this property continue to be actively carried on, but the general character of the stone throughout the mine is of comparatively low grade, with occasional patches of better quality. The development work consisted of opening up at No. 10 level two blocks of stone from 60 ft. to 80 ft. in length, the reef being from 4 ft. to 20 ft. in width. The No. 10 prospecting-drive north has been enlarged and retimbered for 192 ft. preparatory to sinking a winze at the face. The country passed through for the first 50 ft. was a mixture of broken quartz and slate, and in the next 30 ft. solid stone was struck about 2 ft. in width. At a depth of 80 ft. a cross-cut was put in which intersected a solid reef; work was then suspended pending the extension of No. 11 level north. The shaft from No. 10 level has been sunk to a depth of 110 ft. and fitted with winding machinery actuated by compressed air. No. 11 south has been driven 249 ft., making a total distance of 409 ft., of which the first 170 ft. was on a reef from 4 ft. to 5 ft. wide. Afterwards the country was hard and of an unfavourable character. During the driving of this level several cross-cuts were put in on both sides without favourable results. Stoping at the back of No. 11 level has been carried to a height of 39 ft., the reef varying in width from 2 ft. to 8 ft. No. 9 was driven north 111 ft. on a reef which varies from 5 ft. to 8 ft. in width, at which point it pinched to 1 ft., but shortly widened out again. Since September stoping has been vigorously carried on, the reef ranging from 4 ft. to 7 ft. wide, and the stopes averaging 111 ft. in length. In the early part of the year prospecting was done on the upper levels, but beyond a few gold-bearing quartz boulders no reef of a solid character was found. The mine machinery consists of one air-winch, two 10-horse-power air-compressors, one Tangye pump, and the mill machinery (twenty stamps, 8 cwt. each, and four berdans). Two Pelton wheels drive the whole. These are driven by water derived from Lyell Creek, the race being 35 chains in length, carrying fifteen sluice-heads of water; from Irishman's Creek, 15 chains, five-eighths of a head; from Brown's Creek, 27 chains, one head—the whole giving 60-horse power. The quantity of quartz crushed for the year was 11,286 tons, for a yield of 3,245 oz. 7 dwt. of gold, valued at £12,656 10s. Fifty men were employed.

WESTPORT DISTRICT.

Waimangaroa.

Britannia Mine (Area, 99 acres 3 roods 39 perches; owner, James Gardener and party).—The reef which was discovered in this ground exists in broken country, and the lode itself is of a similar nature, fragmentary and disjointed. The company intends erecting a small battery, to be driven by water, for the purpose of crushing a quantity of ore that has already been brought to grass from portions of the reef 6 in. to 18 in. in width, and carrying on mining on a small scale. Beaconsfield Creek will supply the water for the motive-power, which will be conveyed by a flume race of 5½ chains long. Six men were employed.

Twins Mine, late Beaconsfield (Area, 97 acres 1 rood 10 perches; owner, Mr. C. Lempert, as attorney for British syndicate; mine-manager, George Edwards).—The works are situated on the Waimangaroa Stream, about a quarter of a mile south from the foot of the Denniston incline. Water for motive-power and other purposes is obtained from the Waimangaroa, and conveyed by a race half a mile in length, which carries fifteen heads. The race is chiefly fluming, with 300 ft. of tunnelling. A substantial and complete ten-head battery, with one berdan attached, is driven by a 6 ft. Pelton, under a pressure due to 46 ft. The ore delivered to the battery is raised through the shaft, 110 ft. in depth, by means of a 24 ft. diameter water-wheel with 8 ft. winding-drums attached. The shaft, which has three equal compartments, is fitted with substantial poppet-head

gear, and the cages with safety appliances. A 10 in. diameter hollow plunger, with 3 ft. stroke, driven from a 30 ft. diameter water-wheel, raises the water direct to the surface. Mining operations are chiefly confined to the west side of the stream, from an adit 20 ft. above ordinary stream water-level. The quartz is passed down to the low level, which connects with the shaft. A considerable amount of prospecting in cleaning out and extending old workings has been done, but no developments of importance have been made, and all work has been suspended for some time past.

Kirwan's Hill, Victoria Range.

In October, 1897, the Anglo-Continental Gold Syndicate took up an option of four properties belonging to the Kirwan's Reward Gold-mining Company (Limited)—namely, the Lord Brassey, Earl Brassey, Lady Brassey, and Kirwan's Reward Special Claims. At the time the option was taken up a large amount of highly auriferous quartz was scattered over a considerable area on the surface of the Lord Brassey Special Claim. Gold could be seen freely in most of the stones, and the shareholders were in high expectation that a reef would be easily found. Since then a large amount of surface-prospecting, as well as tunnelling, has been carried on without a reef being struck *in situ*. The work now done shows clearly that a large slip has at one time taken place from the western ridge eastwards. Several shafts have been sunk on different portions of the property through broken rock for a depth of from 40 ft. to 60 ft. A large quantity of highly auriferous quartz has also been found, almost in the same position as it had originally occupied in the lode, 40 ft. below the surface, with broken rock and clay on top of it. At the place where this broken material joins the solid rock there is a layer of very soft puggy clay, indicating the direction the slip had taken. From what is now known of the quantity of rich stone that can be got on the surface, it is something like 1,700 tons, which is expected to average fully 1 oz. to the ton. There is an area of about 8 acres covered with fine quartz and clay, where good prospects of loose gold can be got. This material could all be treated with a profit if a small crushing plant were on the ground. The Anglo-Continental Syndicate has lately given up the option of the property, the reason assigned being that the price they originally arranged to pay is now considered far too high for the chance of finding a lode. They still, however, retain over one-third of the property, and have taken up their position as shareholders. A meeting of the Kirwan's Reward Gold-mining Company is to be held in June to decide as to the method of further working the property, and also to arrange for erecting a battery to treat the quartz now lying on the surface.

Boatman's Exploration.

On this property prospecting is principally carried on by sinking shafts 6 ft. by 3 ft. No. 1 shaft is situated about 4 chains east of Kirwan's Reward, and No. 2, 3 chains south of the Lord Brassey, and are sunk to depths of 12 ft. and 15 ft. respectively, and close-timbered. The ground sunk through is a formation of loose slate intermixed with small particles of quartz. Mr. J. McPafferty is mine-manager.

REEFTON DISTRICT.

Crushington.

Hercules Mine (Area, 16 acres 1 rood 37 perches; owners, Hercules Gold-mining Company).—Operations in this mine for the year have consisted in prospecting, which was principally carried on in No. 7 level. It is now proposed to do some prospecting in the No. 6 level, to further develop the reef formerly worked at this level.

Keep-it-Dark Mine (Area, 56 acres 1 rood 14 perches; owner, the Keep-it-Dark Gold-mining Company, Limited; mine-manager, Edwin Bray).—This mine is worked from two shafts, the depths of which are—main shaft, 500 ft.; No. 2 shaft, 525 ft.; the greatest depth of workings below the surface being 992 ft. from the brace of the main shaft, and 1,180 ft. from the outcrop of the reef perpendicularly. The number of levels opened is seven, but those in which most of the work is being carried on are the Nos. 1, 2, and 3. The principal operations for the year were the opening-up and developing of a new reef which was disclosed early in the year 1898 in close proximity to the main shaft. The reef was discovered while driving from No. 1 level (which is 150 ft. in depth from the brace), and is driven on in this level for more than 156 ft., and measures fully 9 ft. in width. In No. 2 level —which is 313 ft. down from the brace—the reef was also met with, and driven on for a distance of 174 ft., still maintaining the same width as in the level above, but showing a better quality of stone. A rise has been put up from this level to the No. 1 level, and from the No. 1 to the surface, which is the means of supplying good ventilation, and these rises will greatly facilitate the filling-in of the stopes with mullock from the surface as the reef is taken out. In the No. 3 level, which is 476 ft. in depth from the brace, a drive is being put in to intersect the reef, which is expected to be met with at about 60 ft. from the present face, and, should the lode prove to be of the same dimensions on this as on the two levels above, there will be a height of over 400 ft. of backs to be stoped out. The stone that was crushed during the year was that taken from the driving of levels and putting up rises on this reef, consequently the battery has only been running intermittently. By various tests which have been made of the tailings it is found that a very large amount of fine gold escapes, therefore the company is erecting an extensive plant for the treatment of the whole of the tailings by cyanide, which will no doubt greatly increase the yield. The mining machinery consists of one overshot water-wheel, 16-horse power, used for winding, and valued at £225. The milling machinery, which is driven by a Pelton wheel, consists of a twenty-stamp battery of 7 cwt. each stamp, and three berdans; value, £3,400. The total quantity of quartz crushed for the year was 2,184 tons, for a yield of 911 oz. 9 dwt. 13 gr. of gold; value, £3,639 15s. 11d. Thirty men were employed for the year.

The Keep-it-Dark cyanide plant, the erection of which is nearly completed, consists of six circular vats, each 22 ft. 6 in. diameter and 5 ft. deep. Each vat will hold for treatment rather over 50 tons of tailings. There are also three solution-sumps—one is 18 ft. diameter and two are each

13 ft. 6 in. diameter, and 4 ft. deep. The vats and sumps are constructed of $\frac{3}{16}$ in. steel plates, firmly riveted together. Three bands of $2\frac{1}{2}$ in. angle-iron go round each vat. The bottoms of the vats have a fall of 3 in. from the outside to the centre, where the opening is placed, to run out the sand after treatment. The vats have all received, both inside and outside, a good coating with a mixture of coal-tar and kauri-gum. Messrs. A. and G. Price, of the Thames, supplied the plant. The company's battery having a low situation, being very little above the level of the Inangahua River, the tailings require to be lifted, and for that purpose a wheel has been constructed, 22 ft. in diameter, the motive-power being water. The elevating buckets are placed on one side of the wheel, and a box leading the tailings from the battery drops them into the buckets as they revolve, whence they are conveyed along another box and distributed in the vats. The whole of the plant is very compact, and will, when finished, be most complete.

No. 2 South Keep-it-Dark Mine (Area, 47 acres 2 roods 32 perches).—There is no manager at present in this mine. It is worked from a shaft, the depth of which is 500 ft.; and the greatest depth of workings below the surface, 475 ft. There are three levels opened up, at the following depths: 100 ft., 300 ft., and 475 ft. Prospecting operations have been carried on during the whole of the year. The principal work was the driving of a cross-cut to the west from the old line of reef on the No. 3 level, which is 475 ft. in depth from the brace. This drive, which is now in 516 ft. from the old line of reef, is directly crossing the strata. The rock passed through was of a mixture of sandstone and slate; one or two narrow belts of soft slate intermixed with pug have been passed through, but, with the exception of a few small leaders, no quartz, so far, has been met with. A 10-horse-power portable steam-engine (Marshall) is used for winding, and is valued at £260. No milling machinery at present in use. A trial crushing of quartz—12 tons—yielded 4 oz. 7 dwt. 12 gr.; value, £16 18s. 10d. The number of men employed during the year was five (on contract).

Golden Treasure.—This mine has been reopened by the Anglo-Continental Gold-mining Syndicate (Limited), with Mr. James Naismith as mine-manager. The shaft from which the mine is worked is 308 ft. in depth, and divided into two winding and one ladderway compartments. The work principally done was repairing No. 1 level. Five men were employed.

The following mining properties—viz., the Wealth of Nations group, the Golden Fleece group, the Caledonian group, the Welcome (Boatman's), and Progress—are controlled and managed from the office of the Consolidated Goldfields of New Zealand (Limited), at Reefton. I am indebted to Mr. E. W. Spencer, the company's engineer, for the following description of those mines, machinery, methods of working, and gold-extraction:—

"*Wealth of Nations Group* (which comprises Wealth of Nations, Energetic, and portions of the Gladstone, Beaconsfield, and Undaunted).—During the period under review 811 ft. of driving and cross-cutting has been completed, mainly with a view to opening up new ore-bodies, also trying to locate what is known as the Energetic body of stone at both the 350 ft. and 500 ft. levels. Attention is now again concentrated at the bottom of the new shaft, which has recently been unwatered, and excavating for the chamber for No. 6 level is now proceeding, besides sinking this incline shaft a little deeper, so as to give sump-room. The bottom of the new shaft has been connected with an old winze, which will help the ventilation. Chambers have been formed at both the 200 ft. and 350 ft. levels for the incline shaft. Hoisting is at present done by the old water-wheel hoist, but there is new gear on order which will be operated by water under great pressure. No milling has been done on this property during the year. Seventeen men were employed on the 31st March.

"*Golden Fleece Group* (comprising the low level and adjoining leases): During the earlier portion of the period under review our attentions were restricted to the No. 6 level in the Golden Fleece, where we were drifting along north, and followed a good track until we holed into the old workings of the Ajax. The total drifting on this level is 623 ft., and a cross-cut west 62 ft. In the low level itself we have done a lot of drifting and cross-cutting to explore the country, which we are doing with machines. The total drifting to date is 557 ft.; cross-cutting, 226 ft. Thirty-five men were employed on the 31st March—six rock-drill men, six rock-drill helpers, three compressor drivers, two timber-men, and eighteen truckers, &c.

"*Caledonian Group* (Larry's Creek): Work on this property can only be termed prospecting. The Argyle tunnel was worked until the air became too poor. During the summer months our attentions have been devoted to surface-prospecting, which in this densely wooded district is necessarily very slow and tedious work.

"*Welcome Gold-mining Company, Limited* (Boatman's): The principal work done here has been on the Welcome No. 5 tunnel, where we have drifted 253 ft. on the line of reef, cross-cut 246 ft., raised 149 ft., winze sunk 100 ft. No. 2 and No. 4 levels have been retimbered 173 ft. At the present time we are engaged in opening out No. 6 tunnel, and catching up the water to prevent it getting back to the Fiery Cross Mine, and thence to the Just-in-Time. The Just-in-Time shaft is shortly to be overhauled and reworked. Specimen Hill (low level): This tunnel has also been repaired and retimbered for a distance of 1,600 ft. We are now putting in air-boxes, and hope to start drifting south as soon as this is done. A small crushing of 60 tons was put through the Fiery Cross mill for 108 oz. amalgam, 33 oz. gold. Fifteen men were employed in March.

"*Progress Mines of New Zealand (Limited):* This property is situated four miles south-east of Reefton. In extent it is 527 acres; and the mine itself, at the present time, is managed by James Martin. Work is carried on through two vertical shafts, shaft A being 820 ft. from surface to No. 6 level, and shaft B is 927 ft. from surface to No. 7 level, which at the present time is our bottom level. The B shaft is, however, now being sunk down to the 8th level (100 ft. vertically below No. 7). We are now down far enough, and the 8th chamber will be commenced as soon as the shaft is down about 10 ft. below the chamber. The bulk of the mining timber is lowered from No. 1 level in the old shaft, also from Progress No. 1 level in the new shaft, both of which are adit-levels. This is a small consideration, as it avoids carting all the timber up to the brace of the respective shafts. Work is carried on in No. 4, No. 5, No. 6, and No. 7 levels. Also, coal is brought through the Progress battery-level, and eventually hoisted up B shaft to the boilers. In the mine several

blocks of auriferous quartz are worked, which in all probability are parts or offshoots of one and the same quartz lode, though in some cases no connection can be traced. The casing consists in shale more or less decomposed, carrying in many cases a pug seam on either one or both walls of the lode. The country rock consists almost entirely of slates and altered shale; portions of the latter when hard are locally termed 'sandstone.' During the period under review several winzes and raises have been connected, and a considerable amount of drifting and cross-cutting done, principally with the object of developing old and exploiting new bodies of stone. The actual development work done is as follows:—

"Work in the Mine: In No. 4 level, on the eastern end, 188 ft. of drifting has been completed, to explore a low-grade body of ore, also a winze put down on it 82 ft., besides which a cross-cut towards the new shaft has been put out 440 ft. This cross-cut, when through, will be of great service to us in handling our coal, which at present is lowered to No. 6 level, on the old shaft, and hoisted up the new shaft to surface. No. 5 level has been drifted 30 ft. east, and a cross-cut put in 100 ft. to try and tap the Union body of ore. On the western end we have drifted 245 ft. to connect with a pass from the Progress battery-level, through which we hope to be able to bring filling. Besides this a cross-cut 420 ft. has been driven, in order to connect with new shaft. This is not yet complete. Also a winze put down 100 ft. and two intermediate drifts, the combined length of which is 183 ft. In No. 6 level a raise has been put up 150 ft. on the eastern end, and 20 ft. of drifting on the south-east. No. 7 drive east has been advanced 404 ft., cross-cutting 53 ft., and further drifting 95 ft. On the western end 90 ft. of drifting, and on No. 7 Progress level 100 ft. has been completed, besides a winze down 74 ft. from No. 7, to insure good ventilation for No. 8 level. This winze will be down before the cross-cut from the shaft is out to the reef. The shaft has also been sunk a further distance of 75 ft., and is now down to No. 8 level. We shall sink about 10 ft. below No. 8, there cut the station and place the chamber timber in position, and resume sinking to No. 9 level as speedily as possible. Average rate of sinking, 15 ft. per week, besides hoisting sufficient quartz for both mills.

"Machinery: A description of the machinery used in hoisting at shaft B appears in the annual report of 1898, issued by the Mines Department, since which date there is no alteration to report in the equipment. The machinery is giving entire satisfaction, and will handle a much larger output than it is now required to do. At the present time, whilst sinking, the whole output from this shaft is hoisted through the west compartment, the eastern cage being in constant attendance on the sinkers. The hoist used at shaft A is a 30-horse-power Hornsby undertype geared engine, with two hoisting-drums.

"The 40-stamp Battery: The 40-stamp battery, by Fraser and Chalmers, has been running nearly continuously since last May, crushing 29,642 tons. Power for the mill is supplied from a 6 ft. Pelton, driven by an effective head of 168 ft. The crushers, which are two in number, by Blake, 9 in. by 15 in., are driven by a 3 ft. Pelton, whilst the Frue vanners are driven by another of the same size. The average speed of the mill is eighty-one drops, of 8½ in. per minute. Screening of various sizes has been used experimentally, with the result that 20- to 25-mesh gives the greatest satisfaction. Value of 40-stamp mill, vanners, crushers, and mill-shed, £12,000. The Frue vanners, sixteen in number, have been constantly running in conjunction with the new mill, and giving good results. The percentage of concentrates extracted by the vanners is about 1·35 per cent. of the rock crushed, of an average value of 5 oz. 6 dwt. per ton. The value of the concentrates, of course, varies nearly inversely as the amount made, but by extracting from 1·3 per cent. to 1·5 per cent. we obtain the greatest value. On making very thorough investigations it has been proved beyond doubt that, owing to the nature of the quartz, a large proportion of the concentrates are in such a fine state that it is impossible to retain them on the vanners. The fineness is not caused entirely by the crushing, but is partially due to the natural state in which the concentrates exist in the quartz, being in places only a stain or thin coating. The old 20-stamp mill has crushed 8,363 tons of quartz during the last twelve months. The cost of milling and concentration by the new mill is 2s. 3·86d.; the cost of milling only by the old 20-stamp mill is 4s. 0·59d. per ton.

"Chlorination: This plant started regular work during the latter part of December. Since the commencement 344·5 tons have been treated, yielding 1,271 oz. 14 dwt. 8 gr. bullion; value, £5,315 15s. 10d; value of plant, £1,600. The furnace is of the reverberatory type, 80 ft. by 14 ft., all on the same elevation, without a drop on to the finishing-hearth, as is often the case. The cooling-floor is on the same ground-level as the furnace. The three treatment-vats, 9 ft. diameter by 3 ft. deep, are on a slightly lower elevation, to facilitate the filling. The tanks have filter-bottoms so arranged that the gas distributes itself evenly over the whole area, and ascends through the charge under treatment. The precipitating- and settling-vats are placed on a lower elevation still, so that the solution gravitates down from the treatment-vats. The whole works are enclosed in a building 142 ft. by 40 ft. The green concentrates, obtained from the Frue vanners or canvas plant, are run on the top of the furnace, next to the smokestack end, and dumped there in small charges to dry, when a certain amount of sawdust is added and intimately mixed. This charge is fed into the furnace through an opening in the top, and forms then part of a stock pile always kept in the cooler part of the furnace. From this pile the working charge is drawn and constantly ravelled forward towards the hotter part of the furnace. The function of the cooler part of the furnace—that is, where the stock pile lies—is in the first place to dry the pile, but it also acts as a condenser, and any metallic gold which may become volatilised in the vicinity of the flame is, in the act of passing this pile, redeposited on the cooler metallic particles. The working charge, after being extracted from the pile, is ravelled forward, and the applied heat very soon induces the whole mass to ignite. If the concentrates themselves contain a large percentage of sulphur they scarcely require the applied heat to start the combustion. When in this stage the sulphur, antimony, and arsenic are being driven off, a large percentage of

which is deposited in the dust-chambers and flues. The working charge during this time is gradually being drawn towards the finishing-hearth, over which the flame plays. When all sparking is finished the charge is roasted dead, and is then drawn from the furnace. Meanwhile another charge has been following up the first one all the way, and is placed on the finishing-hearth when the previous one is withdrawn. The object of roasting the ore before chlorinating is to expel the sulphur, arsenic, and antimony, and to oxidize the metals left behind, so as to leave nothing which can combine with the chlorine when subsequently treated with it in aqueous solution, except metallic gold. From a chemical point of view, a rough explanation of what probably takes place during roasting is this: When the charge gets into such a position in the furnace that it begins to ignite the first effect is to distill off sulphur, reducing the sulphides to a lower stage of sulphurisation. This sulphur burns in the furnace to SO_2, and, coming in contact with material undergoing oxidation, is converted into sulphuric anhydride SO_3. The antimony and arsenic are also being volatised during this period. If the concentrates themselves contain oxides of copper, magnesia, or lime, salt has to be added whilst roasting, to chloridise the material which would otherwise absorb the chlorine whilst being gassed. When salt has to be added it is usual to do this before the roasting is finished. The quantity of gold chloride mixed with the chlorine gas evolved from the red-hot ore when salt is added is large; but these gases have to pass over a long length of comparatively cold, unsalted, unoxidized ore, so the SO_2 from the colder ore combined with the steam from the fuel very soon reduce the gold chloride in the furnace. The loss in bulk caused by roasting varies with the concentrates in different districts. Here it is about 29 to 30 per cent. In other words, 1 ton of green sulphurets is represented by about 1,570 lb. of the roasted material. When roasted this material is spread out on the cooling-floor and damped until it binds in the hand when compressed. It is then screened into vats ready for gassing, about 5 tons green being gassed at once. To generate sufficient gas the chemicals required are 90 lb. sulphuric acid, 90 lb. water, 50 lb. manganese dioxide, and 60 lb. salt; this, of course, varies according to the material treated. The gas remains in contact with the roasted material thirty-six hours, after which water is applied, and the gold chloride is subsequently drawn off into a settling-tank; thence to the precipitating-tank, where it is first violently agitated to liberate any superfluous gas; then the gold is precipitated by the addition of ferrous sulphate solution in excess, stirred again and allowed to settle. After standing forty-eight hours the clear liquid is decanted, passed through filters, and discarded. The brown precipitate of gold remaining in the vat is collected when in sufficient quantity, dried, and then run down with fluxes into the bar, the gold being exceptionally pure—991 fineness, value £4 4s. per ounce.

"Canvas Plant: An addition to the gold-saving appliances is now being erected called a 'canvas plant'; one-half is completed and working, the other nearly so. The object of this arrangement is to arrest the fine particles of sulphurets which do not settle on the Frue vanners, being in very minute form (slime). Thus the pulp as it leaves the mill is classified, the coarse sands being put aside, whilst the slime flows on over a series of canvas tables, on which the fine sulphurets remain. The particles of lighter specific gravity flow away to waste, being practically valueless. The canvas tables are periodically washed down, the sulphurets accruing therefrom are dried, and then pass through the chlorination-works. The value of the plant is £600. Some idea of the general arrangement of the plant may be gathered from the following: The pulp as it leaves the vanners is led away in launders to one or preferably a series of spitzkaste, in which the whole of the coarse sands are separated from the slime, the latter flowing on, the sands themselves being either stored or rejected according to their value. The secret of the successful working of the tables depends largely upon the classification of the pulp, for a little sand going over the spitzkaste will very soon foul the tables. When the slime in suspension reaches the canvas plant it is easily segregated into twelve parts, and flows along a small launder with $\frac{1}{2}$ in. fall to the foot. Each of these twelve small launders feeds a separate table, 12 ft. by 12 ft., divided into four strips, each 3 ft. in width, on which the canvas is spread, having a fall of $1\frac{1}{4}$ in. to the foot. This grade depends largely upon the classification of the pulp, and is so arranged that the slime of lighter specific gravity flows away, whilst the heavier particles remain on the canvas. Between each table, 12 ft. by 12 ft., there is a drop of 6 in.: this enables the supply launder, also the residue launder, to take $\frac{1}{2}$ in. fall to the foot, so that the whole of the worthless material at the bottom of each table finds its way into the same launder. At the top of each table there is a board so shaped that the material it receives is evenly spread out over the whole 12 ft., so that there is an even stream flowing over each table. After the tables have been running a certain time the man in charge proceeds to wash down. First he cuts off the supply of slime from one table (this supply now flows on to an auxiliary table kept for the purpose); he then opens a water-valve, and the table is purified from any worthless material. The water is now stopped, a shutter at the bottom of the table is turned over, and by so doing anything now coming from the table finds its way into another launder down which the valuable material has to go as it is liberated from the canvas by a spray of water under great pressure. This process only requires a few minutes, when the pulp again proceeds to flow over this table, and the operator washes another, the valuable pulp running on down to a sump, from which it is pumped by a centrifugal up into a large tank beside the chlorination-works. The tank is so divided that one compartment or another can receive the pulp until it is full, when it is thrown out on to a draining-floor, after which it is thoroughly dried on the chlorination-furnace, and then passes through in the same manner as the concentrates from the vanners. The centrifugal pump is driven by a small Pelton wheel from the main-pressure pipe. The worthless material flowing away operates an automatic sampler, so a check is kept upon the discarded slime, and a record obtained. The pulp from twenty stamps flows over twelve tables, 12 ft. by 12 ft., on one side of the building, the other twenty stamps taking the other side of the same building. The whole process is on the same principle as the old Cornish frames, but modified and improved to suit the quartz pulp.

"General: The tonnage per stamp per day is about 2·5 tons with the 40-stamp mill, and 1·5 tons with the 20-stamp mill. The capacity of the new mill will very shortly be considerably increased.

The 40-stamp mill has run about 305 days, and the 20-stamp mill about 265 days, since March, 1898, crushing together 37,500 tons, yielding 15,563 oz. 10 dwt. 17 gr. of bullion, to the value of £63,593 3s. 7d. This amount was extracted by amalgamation only. From the new mill 391 tons of concentrates has been made, the majority of which has already passed through the chlorination-furnace. The cost of chlorination has had scarcely time enough yet to adjust itself—it has been about £2 15s. per ton. I think this will be reduced to about £2 10s. per green ton treated in the near future. The freight, duty, and original cost of some of the chemicals—situated as we are—makes the cost of treatment high. The value of the bullion from amalgamation is about £4 3s. per ounce; from chlorination, £4 4s. per ounce. Turning again to the mine, we find that cost of mining, exclusive of development, is about 9s. per ton; or, including a fair proportion of development, 12s. 6d. per ton mined. The average cost of transportation is 6d. per ton over the aërial line, which has transported 32,965 tons since starting work. The number of men employed during March, according to our pay-sheets, is 253, exclusive of timber contractors, coal contractors, &c. The value paid away in wages during March is £3,109 15s. 9d."

Merrijigs District.

New Inkerman Mines, Limited (Supreme, Old Inkerman, New Inkerman, Wilson, Louisa)—(Area, 406 acres 2 roods 5 perches; owners, the New Inkerman Mines, Limited; mine-managers, B. Sutherland and J. Jamieson).—The locality of this mine is Merrijigs and Rainy Creek, Reefton. The machinery consists of one Class C Rand drill and R.R. Company air-compressor, 35-horse power; one winding-engine (shaft), 10-horse power; two Rand drill No. 2 Little Giant B rock-drill; one Tangye pump, at shaft: value, £1,000. Mr. Dixon gives the following account of operations, chiefly of a development character, that have been carried on in these mines:—

"The prospecting and development work carried out at the above mines has been as follows: The low-level tunnel, from Rainy Creek to the New Inkerman shaft at Revival Gully, was connected in August last with the section of the tunnel driven from the shaft during the previous year, thus connecting the two sides of the range. The distance driven for the five months (compressed-air and Little Giant rock-drills being used) was 1,058·18 ft., making the total length of the low-level tunnel 3,752·18 ft. During the year various prospecting-drives north and south were put in from the low-level tunnel; these represent 818 ft. of driving. Two uprises were made—one, of 50 ft., connects the tunnel with the ore-body in No. 3 level from the main shaft, and the other uprise, from No. 3 drive, south low-level tunnel, to connect with No. 3 Inkerman level from Rainy Creek, was started in January last, and at the end of February (when all work at the mines was stopped) had been risen 76 ft. Cross-cuts opened from these uprises represent 50 ft. of driving. At No. 2 Supreme level 1,210½ ft. of ground was opened during the year, representing driving and cross-cutting 1,176½ ft. and sinking 34 ft. No. 3 Supreme level was extended 46 ft. At No. 1 level, Golden Gully, 449 ft. of ground was opened, representing 323 ft. of driving, 122½ ft. of sinking, and 3½ ft. of uprising. No. 3 Golden Gully level and cross-cut was extended 191 ft. No. 4 level Golden Gully was extended 43½ ft., and cross-cuts therefrom were driven for 50½ ft. Excepting No. 3 Golden Gully workings, all the Golden Gully workings and No. 2 Supreme level have been opening on ore. In the surface level and workings (eastward of the main shaft at the New Inkerman Mine) 65 ft. has been opened on a reef-track carrying patches of ore. The work for the year to the 31st March, 1899, may be summarised as follows: Driving, 3,164¾ ft.; sinking, 156½ ft.; uprising, 129½ ft.; and clearing and picking up old ground, 782 ft.: total, 4,232¾ ft. The average number of men employed during the year was thirty-one, exclusive of mine-timber contractors and coal-mine contractors. At the coal-mine, Rainy Creek, 263 tons of coal was mined for use at the boilers driving the air-compressor, and for the blacksmiths, &c."

Sir Francis Drake Mine (Area, 100 acres; owner, T. Hubert Lee).—This mine is worked from a shaft, which has been sunk another 130 ft. during the year, making a total depth of 356 ft. A chamber was opened at a depth of 330 ft., and a cross-cut 25 ft. in length put in when the line of reef was reached, on which 50 ft. further to the eastward was driven and the quartz met with. The lode was driven on for 80 ft., and an uprise made to connect with the No. 1 level, and stoping commenced. The reef, which averages about 3 ft. 6 in. in width, has been stoped to a height of 90 ft., and the top stope is 130 ft. in length. The total quantity of quartz crushed for the year was 1,329 tons—1,069 tons for the owners, which gave a yield of 384 oz. 6 dwt. 21 gr. of gold, valued at £1,538 2s. 6d.; and 260 tons for tributers, yielding 181 oz. 6 dwt. 9 gr. of gold, valued at £732 5s. 7d. Twelve men were employed.

Cumberland Mine.—Prospecting operations have been carried on during the year. The low level was extended to a distance of 350 ft., and a cross-cut driven from it. Some prospecting was also done at a higher level. Work in the mine at present is limited to driving and cross-cutting from the incline level about 150 ft. overhead from the low-level tunnel. Fifteen men were employed.

St. George Mine (Area, 30 acres; owner, St. George Gold-mining Company; mine-manager, James Sutherland).—This mine is situated on a branch of the Big River. The gold-bearing material consists of a mixture of sandstone with quartz stringers. This is worked to a width of 12 ft. The plant consists of a five-head stamp-mill driven by water-power. Up to the present only seventeen loads have been treated, by a party of tributers.

Last Chance (Area, 30 acres; owner, James Morris).—Work in this mine has principally consisted of driving a tunnel 150 ft. in length, and stoping out some 50 ft. in height. Stone has also been taken from an open face 80 ft. long and 20 ft. in width, with a height of 25 ft. The leaders of quartz are encased in bands of sandstone. The quantity of quartz crushed for the year was 350 tons, for a yield of 148 oz. 16 dwt. of gold, valued at £531 8s. 4d.

Big River District.

Big River (Area, 37 acres 3 roods; owners, Big River Gold-mining Company).—The operations in this mine for the past year have consisted of the following works: The block of stone sunk on in No. 5 level to a depth of 60 ft. was stoped out, and a large amount of prospecting was done in No. 6 level, without any success. Prospecting operations were then started between these two levels, and an intermediate level was driven on a good reef-track for 150 ft., bunches of gold-bearing stone being occasionally met with. This drive was then stopped, and a cross-cut put in at a point showing good indications; and after 8 ft. had been driven the reef was found and driven on for 48 ft., averaging from 8 ft. to 10 ft. in width. This proved to be the end of the stone, and since that time stoping in the block has been carried on. The width of the reef in the stopes will average 6 ft., and the stone is of a highly payable quality. A winze has been sunk on the reef to a depth of 28 ft., and driving has been commenced from a second intermediate level to connect with this winze. From this last point to No. 6 level there is 60 ft. vertical, and it is intended to prove the reef to this level. So far there is every indication that the block will also live above No. 5 level, and operations will shortly be started to prove if this is so. In the upper levels prospecting is in progress in No. 1 intermediate, with good indications, and there is a strong probability that the rich reef formerly worked in No. 1 level will be picked up again here. The company shut down the cyanide plant in July last, and disposed of the remaining tailings to Mr. C. Ansley, who finished the heap in December last. Since then all tailings produced have been stacked for future treatment. During the year the company have crushed 730 tons of quartz, which yielded 1,355 oz. 5 dwt. of gold, valued at £5,491 3s. 10d.; and from 3,734 tons of tailings, by cyanide, 823 oz. 1 dwt. 11 gr., valued at £2,212 3s. 7d.

Snowy Creek.

A considerable amount of prospecting has been done on this ground, on a reef which cropped out near the creek; a winze has been sunk to a depth of 118 ft. The reef averages about 2 ft. in width, and the quartz broken out was of a favourable character. To provide capital for the erection of machinery a new company has been formed with a capital of £12,000. Contracts are now in progress for sinking main shaft 110 ft. in depth (9 ft. 6 in. by 4 ft.), and constructing a water-race 70 chains in length to carry twelve Government heads of water delivered at a vertical height of 63 ft. above the proposed machine-site. The main shaft is to be sunk 155 ft. west of the reef in the winze.

GREY DISTRICT.

Paparoa Range District.

Crœsus Mine (Area, 100 acres; owners, the Crœsus Gold-mining Company, Limited; mine-manager, Thomas Crabb).—Development work here has been steadily carried on at this mine during the past year, the adit having been driven to a length of 450 ft., of which 300 ft. is on the reef. There is now a ten-head stamper-battery erected, the stamps being 850 lb. in weight, and a berdan. An aërial tramway has been erected a distance of a mile and a half for the conveyance of the quartz from the mine to the storage-bin at the battery. The erection of the aërial tramway has been a work of considerable difficulty, owing to the precipitous nature of the country, all the material having to be carried by hand to the site for a considerable distance. The motive-power is obtained from the water-race from the creek. The company's engineer (Mr. H. W. Young) has carried out the whole work efficiently. The yield of gold has been 589 oz., valued at £4 2s. per ounce, from 750 tons of stone, an average of 16 dwt. per ton. Some forty wages-men were employed, besides those engaged on the contract for the tramway, &c. The difficulties encountered in opening up a mine at such an altitude are described in the following extracts from the Greymouth *Star*:—

"After many months of strenuous exertion by the management and of tedious expectation by the shareholders, the Crœsus Company's plant, machinery, and mine are at last in working-order, and crushing has begun. The difficulties in the transport of materials due to the absence of tracks, together with the exceptionally bad weather prevalent during the last year, have greatly hindered the progress and enhanced the cost of all works, but, on the other hand, mine-developments have justified sanguine expectations. The mine is accessible from Greymouth by railway to Ngahere Station, and thence by coach to Blackball Township, three miles distant. From Blackball the county bridle-track, with Mr. Perotti's tramway thereon, extends to the Roaring Meg Sluicing-claim, about eight miles distant. Here a steep, rugged, unformed bush foot-track ascends the mountain, and was the only way up until the recent partial completion of the Paparoa bridle-track made horse traffic possible. This bridle-track begins near the Roaring Meg Claim, and ascends the mountains with regular and fairly easy gradients. At an elevation of about 150 ft. above the main Paparoa ridge, and 4,000 ft. above sea-level, rises a prominent landmark now known as the 'Crœsus Knob,' nearly in the centre of the company's 100-acre special claim, and through which the Crœsus reef has been traced. Here the watershed on the south-east slopes steeply down to the Upper Blackball Creek, and on the north-west to the tributaries of the Ten-mile Creek. All of these creeks have proved to contain gold sluiced down from the Paparoa Range.

"The Crœsus reef was discovered by Mr. Harry Neilson, who followed traces of gold from the Ten-mile Creek tributary until he found its source in the lode, and the gold visible in it. The outcropping stone was first cut and tested at close intervals for a distance of 460 ft., and traced for a further length of 250 ft., a winze being sunk near the middle of the proven stone. Then at a level about 100 ft. below that of the average outcrop, giving about 170 ft. of backs, No. 1 adit-tunnel was driven for 130 ft., crosscutting the lode which was followed in No. 1 level for over 250 ft., where the present place looks well. From No. 1 level an uprise winze has been carried to the surface for ventilation, and also passes and other work ready for stoping out have been made. The stone throughout continues good, varying from 18 in. to 6 ft. in thickness. The transit of all timber required for mine-work had formerly to be laboriously carried up to the summit at a great expense,

but since the completion of the aërial tramway this operation is easily performed. The mine is under the management of Mr. Thomas Crabbe, of Reefton. The present mine adit of No. 1 level is near to and 260 ft. below the Crœsus Knob. The sideling into which it is driven slopes steeply down the Ten-mile Creek watershed, and is striated with a series of reefs, running north and south, parallel with the Crœsus stone. Seven of these, varying from 2 ft. to 12 ft. in thickness, have been discovered within 400 ft. westerly from the Crœsus lode, and at from 40 ft. to 250 ft. less altitude. All are as yet unexplored, but will shortly be cut and tested when lower-level tunnels are driven into the hill by the company. From the present tunnel the stone is sent down a shoot to the mine-bin 70 ft. below, whence it is run on a short tramway to the receiving-bin at the upper terminal, where it is automatically filled into the travelling buckets of the aërial tramway. From the upper terminal the aërial tramway rises for nearly 200 ft. to the crest of the mountain, whence it descends for 2,300 ft. to the machine-site, the average gradient being 1 in 3, and the distance between terminals one mile and a half. The upper-terminal wheel, round which the rope passes, and which has to sustain the 8-ton pull, resulting from the rope and its loads, is 10 ft. in diameter, secured in a strong frame anchored into the ground, and provided with powerful lever and screw brakes. Over it a large shelter-shed is erected. The aërial tramway is on the single-rope system, the travelling buckets being clamped to the rope, which is supported at intervals throughout its circuit on trestles bearing cradle-bars, or tumblers, each of which carries a pair of pulleys. The lower trestles within the forest's limits are of usual timber design, furnished with one tumbler for each rope. On and some distance below the summit, where the strains to be borne are great, specially designed trestles carrying from four to eight tumblers are required, and these are constructed of steel, well secured to the rock foundations.

"Owing to the great cost of carriage, due to all material used in the construction of the upper trestles and terminals having to be carried on human shoulders over a bad track for a climb of 2,500 ft., steel construction was actually cheaper than timber-work. For similar reasons the engineer had to solve difficult problems in designing trestles and terminal machinery of great strength, but all built up of small sections which men could carry up the mountains. The greatest strength with lightness being essential for the tramway steel rope, it was specially manufactured for the company by Messrs. Craddock and Co. The lower terminal is within the company's machine-site on the south branch of the Blackball Creek, situated half a mile above the Roaring Meg Sluicing Company's claim, and connected with it by an extension of the county bridle-track. The quartz brought down by the aërial tramway is automatically discharged into a large bin, from which a shoot leads to the battery-bins. The mine and machine-site bins give ample storage-capacity at both ends of the tramway, which is capable of carrying 30 tons of stone in eight hours, a quantity much in excess of present requirements.

"The battery, as now erected, has ten head of 850 lb. stamps. It is well housed in a building designed to accommodate an additional ten head of stampers, together with all necessary ore-breakers, feeders, concentrators, &c., whenever required. It is estimated that the stone available in mine-level No. 1 will afford more than three years' steady work for the present battery. Ample motive-power and water-supply is obtained from the creek by means of the company's race and pipe-line. This also serves to run the sawmill erected close to the lower terminal, which has already cut the timber used in the works constructed. Timber rights over 200 acres of forest adjacent to the machine-site have been secured by the company, ensuring an abundant supply of timber for mining and mill purposes.

"All the machinery and gearing for the mill and tramway has been made by the Dispatch Foundry Company, Greymouth, from the drawings of Mr. H. W. Young, the company's engineer, who located and designed the whole of the works, which were carried out under his charge. Mr. John McGregor executed the battery-erection, and also supervised all construction-work, while Mr. Raithby, late of Reefton, is installed as battery-manager. Mr. John Fitzgerald, contractor for the execution of the aërial tramway, battery premises, and all other works, has admirably carried out his contract in the face of many difficulties. He and his men have shown great pluck and endurance, the natural difficulties of mountain-work with which they had to contend being multiplied and increased by unusually bad weather."

Comstock Mine (Area, 100 acres; owners, Joseph Jay and others).—Work on this section has been confined to surface-prospecting during the year without satisfactory results. Several large outcrops of quartz occur within the claim, but the ore is not of value to warrant further development. The ground will probably be abandoned.

Taffy Mine (Area, 100 acres; owner, Taffy Gold-mining Company, Limited).—Work on this section during the year has consisted chiefly of surface-prospecting. Several gold-bearing leaders exist, but the country rock is broken, and short tunnels which have been driven indicate that the shattered condition of the country continues for a distance of at least 100 ft. into the hill. 30 oz. of gold was obtained by hand-crushing, and it is evident that a considerable quantity of payable ore exists, and probably a five-stamp battery will be erected for the purpose of treating the ore. This, however, will depend on the result of present prospecting-work.

Langdon's District.

Julian and Victory Mine (Area, 47 acres and 28 perches).—During the year a mutual agreement between the Julian Gold-mining Company and the Victory Gold-mining Company was arrived at, and an amalgamation of the two properties under the title of the Julian Gold-mining Company was confirmed. Mr. Charles Curtis, late partner in the Victory, is now mine-manager. Since the amalgamation of the properties a prospecting-tunnel on the west of the Victory line of reef has been driven 260 ft., also 7 chains of tramway have been built, and 260 ft. of shoot to connect the Julian reef with the Victory low-level tunnel, this work being necessary to convey the ore across the Victory ground, and to connect the Julian section of the property with the battery incline. Nine men were employed. The two mines crushed for the year 187 tons 10 cwt. of quartz, for a yield of 212 oz. 18 dwt. 7 gr. of gold, valued at £830 7s.

Battery Returns, Nelson and West Coast District.

The following statement, compiled from the monthly returns furnished by owners of quartz-crushing machines, shows the quantity of stone crushed and the yield of gold from the various mines for year ending the 31st March, 1899:—

Name of Mine.	Ordinary Quartz.		Tailings.		Concentrates.		Approximate Total Values.
	Tons crushed.	Yield to Amalgamation.	Tons treated.	Yield to Cyanide.	Tons treated.	Yield to Chlorination.	
		Oz. dwt. gr.		Oz. dwt. gr.		Oz. dwt.	£ s. d.
Collingwood District—							
Australasian Gold Trust (Limited)	177	510 15 0	..	..	..	..	2,043 0 0
Lyell District—							
Alpine Extended	11,286	3,245 7 0	..	..	..	..	12,981 8 0
Kelly, Edge, and Smith	76	14 10 0	..	..	..	..	58 0 0
Reefton District—							
Progress	37,500	15,563 10 17	..	..	314	1,271 14	68,908 19 5
Welcome	60	33 0 0	..	..	..	..	132 0 0
Keep-it-Dark	2,184	911 9 0	..	..	..	..	3,645 16 0
No. 2 South Dark	12	4 7 0	..	..	..	..	17 8 0
Golden Lead	24	29 18 0	..	..	..	..	119 12 0
Sir Francis Drake	1,573	562 15 0	..	10 19 0	..	..	2,094 16 0
Merrijigs (Fleming and party)	20	24 3 0	..	..	..	..	96 12 0
Last Chance	350	148 16 0	..	..	..	..	595 4 0
Big River	730	1,355 5 0	3,734	823 1 11	..	..	7,703 7 5
Cumberland	..	..	6,335	1,700 10 0	..	..	6,802 0 0
A1 tributers	4	5 15 0	..	..	..	..	23 0 0
Sundries	..	..	800	147 0 0	..	..	588 0 0
Paparoa District—							
Crœsus	750	589 12 0	..	..	..	..	2,358 8 0
Julian	110	129 19 0	..	..	..	..	519 16 0
Victory	77	82 19 0	..	..	..	..	331 16 0
	54,933	23,212 0 17	10,869	2,681 10 11	314	1,271 14	109,019 2 10
Estimated value for 1898	..	..	..	..	..	..	27,030 15 0
Increase for 1899	..	..	..	..	..	..	£81,988 7 10

Remarks on Quartz-mining in the Nelson and West Coast District.

The return of gold from the Progress Mines has been most gratifying, and shows that the resources of this district are by no means exhausted. The quantity of ore operated on was 37,500 tons, which yielded gold to the value of £63,593 3s. 7d.; and the further treatment of 344·5 tons of concentrates by the chlorination process yielded gold of the value of £5,315 15s. 10d.: total value, £68,908 19s. 5d. A fair proportion of the ore was obtained from the deepest levels of the mine, the reef at No. 7 level improving in appearance and in the value of the quartz as operations are being extended. It is therefore apparent that deep mining in this district has so far proved a great success, and this, with the recent discoveries made in other mines, gives promise of a continuation of further dividends.

The returns from the Aorangi Mine, which forms part of the Taitapu Estates Freehold Property, show that, with the conduct of extended exploration, future satisfactory yields may reasonably be expected.

In the Lyell district the consolidation of the Alpine Extended Mine has led to more systematic development, which will probably result in future success.

The fresh developments in the Keep-it-Dark have been the means of an increase in the return from that mine.

In the Big River Mine highly profitable yields have followed the recent development works.

On the whole it may be assumed that the large returns for the past year will be equalled, if not exceeded, by the produce from next year's operations, especially as the prospects in other mines are of a very favourable character.

Otago and Southland Districts.

Quartz-mining is carried on in those localities which in the past have yielded the bulk of the gold obtained from this source. There is no large centre of quartz-mining, and there are few places where more than three or four mines are being worked in the vicinity of each other. The yields of gold have not come up to the previous year's returns. There are, however, indications of an improvement when the development-works now in progress are fully completed in North Otago and at Preservation Inlet.

The following list shows the special claims and licensed holdings in existence on the 31st March, 1899:—

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Offices, and registered on or before the 31st March, 1899, in the Books of the Mining Registrar.

Date of License.	Area.			Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
	A.	R.	P.					
					Arrowtown.			
12/5/93	29	3	12	Macetown ..	XII.	Skipper's Cr'k	Glenrock ..	Glenrock Consolidated (Ltd.).
12/5/93	16	0	0	" ..	"	"	" ..	"
12/5/93	10	0	0	" ..	"	"	" ..	"
12/5/93	52	3	24	" ..	"	"	" ..	"
10/4/94	74	1	20	" ..	XII., XIII.	Skipper's Cr'k and Shotover	..	Westralia N.Z. Gold Exploration.
1/9/98	80	3	35	" ..	XII.	Skipper's Cr'k	Farrell's ..	William John Farrell.
1/9/98	75	2	30	" ..	"	"	..	"
					Queenstown.			
19/6/91	2	1	30	Skipper's Cr'k	III.	Skipper's Cr'k	Achilles ..	Achilles Goldfields.
21/1/96	9	1	27	"	X.	"	Crystal ..	Crystal Mining Co.
31/8/96	20	0	0	"	"	"	" ..	"
2/3/97	20	0	0	"	VI.	"	Dunker ..	Henry Dunker.
7/7/97	12	1	7	"	XI.	Shotover ..	..	August Sorensen and John Henderson.
24/8/98	30	0	0	"	VII., XI.	Skipper's Cr'k	..	William Gregg.
24/8/98	15	0	3	"	XI.	"	..	Shotover Quartz-mining Company.
1/1/99	6	0	0	"	III.	"	Achilles ..	Achilles Goldfields.
13/3/99	2	0	0	"	"	"	" ..	"
30/8/90	24	0	0	"	II.	"	" ..	"
8/2/96	70	3	38	"	X., XXI.	"	Silk's	Silk, Antiss, Dottin.
24/9/96	25	1	0	"	XI.	"	Cotter's ..	R. J. Cotter and party.
7/6/97	45	1	0	"	X., XI.	"	..	Patrick Joseph Flannery.
7/6/97	40	0	0	"	X.	"	..	J. N. and R. Johnston.
1/9/98	67	2	0	"	XI.	"	..	Edward P. Thomas.
1/1/99	93	3	12	"	II., III.	"	Phœnix ..	Achilles Goldfields.
					Cromwell.			
1/12/97	30	3	9	Upper Nevis	III., XIII.	Nevis ..	..	Williamson and Lawrence.
1/12/97	54	0	0	..	II.	Bannockburn	..	Holliday and Butler.
24/12/97	50	0	0	..	I.	"	..	John D. Matthews.
14/2/98	23	1	0	..	..	Motatapu ..	..	David Weir and party.
10/3/98	39	1	0	Bannockburn	I.	Cromwell ..	..	George Gilford.
7/7/98	16	0	0	Carrick ..	II.	Bannockburn	..	Joseph McCabe and Sons.
					Black's.			
21/1/97	30	0	0	Ophir ..	XVIII.	Tiger Hill ..	Green's Reef ..	Robert Sheppard.
					Alexandra.			
3/10/93	9	0	0	Old Man Range	II.	Cairnhill ..	Exhibition ..	Robert Symes.
1/7/92	15	0	0	"	"	" ..	White's Reef ..	"
27/4/97	10	0	0	"	"	" ..	" ..	"
					Lawrence.			
13/7/96	58	3	0	..	XI.	Tuapeka East	..	John Lawson.
28/7/96	28	2	0	..	IV.	Waipori ..	..	Robert Cotton.
15/2/97	100	0	0	..	XIV., XV.	Tuapeka East	Bella	Charles Todd.
15/2/97	20	2	30	..	XIX.	"	Diver	D. C. Simpson.
15/2/97	98	1	0	..	XI.	Table Hill ..	Quiver	William R. Wright and another.
29/3/97	26	1	30	Waitahuna ..	VII.	" ..	Burnt Creek ..	Walter Hislop.
6/5/97	28	0	20	"	VII., V.	" ..	Try Again ..	Alexander Garden.
23/9/97	54	0	11	"	V.	" ..	..	John Lawson.
23/9/97	28	3	34	Waipori ..	IV.	Hedgehope ..	Rodgers and Party	Patrick J. Rodgers and party.
12/11/97	76	1	32	" ..	"	" ..	O.P.Q.	O.P.Q. Gold-mines (Ltd.).
9/12/87	5	2	28	..	"	Waipori ..	..	Robert Cotton.
27/10/96	30	0	0	..	V.	Table Hill ..	Canada Reef ..	A. Kerridge and party.
26/1/99	59	3	30	Waipori ..	XIV.	Tuapeka East	McKeitch and Party	Robert McKeitch and party.
6/3/99	16	2	27	Table Hill ..	V.	Table Hill ..	..	Thomas Thompson Ritchie.
					Naseby.			
1/1/88	20	0	0	Sutton ..	I.	Nenthorn ..	..	John Symes and others.
18/9/96	53	3	10	Nenthorn ..	V.	Budle ..	Blue Slate Junction Gold-mining Co.	James A. Sligo.
16/3/97	82	2	0	Mt. Highlay, Hyde	"	Highlay ..	Mareburn Waterrace and Gold-mining Co.	Alexander Bartleman and J. Hogg.
1/9/95	30	0	0	Ditto	..	" ..	Mount Highlay Syndicate	Ditto.
22/4/97	18	2	9	Dunback ..	V.	Dunback ..	Golden Treasure Quartz-mining Syndicate	Frederick G. Glover and A. Sutherland.
30/9/97	30	0	0	Nenthorn	IV.	Budle ..	..	Francis Phelan and others.
30/9/97	30	0	0	" ..	IX.	Dunback ..	..	"

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Warden's Offices—*continued.*

Date of License.	Area.			Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
	A.	R.	P.					
				Naseby—continued.				
2/2/98	30	0	0	Dunback ..	VIII.	Dunback ..	Golden Bar Quartz-mining Co.	Arnold Sturm.
8/3/98	99	0	0	Rough Ridge	I.	Blackstone ..	London Mining Co.	Richard Henry Browne.
7/7/98	16	3	19	Dunback ..	VIII.	Dunback ..	The Ounce ..	James Cunningham, George Ross, and Charles Cunningham.
20/10/98	27	0	0	Macrae's ..	IX.	Highlay ..	Golden Point Q-mining Co.	George Donaldson.
				Dunedin.				
7/6/97	97	1	17	Nenthorn ..	XII.	Nenthorn ..	..	Peter Montello.
9/9/97	86	0	14	" ..	XI., VII.	" ..	..	Barewood Quartz-mining Co. (Ltd.).
9/9/97	57	3	24	" ..	VI., VII.	" ..	..	Ditto.
9/9/97	52	0	29	..	VII.	" ..	..	"
10/1/96	30	0	0	Nenthorn ..	XII.	" ..	..	Frederick Evans.
7/2/96	30	0	0	" ..	"	" ..	..	Peter Andrew Lyders.
6/3/96	30	0	0	" ..	"	" ..	..	"
6/3/96	30	0	0	" ..	"	" ..	..	Edmund R. Smith.
6/3/96	30	0	0	" ..	"	" ..	..	Ernest Turner.
1/3/98	30	0	0	" ..	XI.	" ..	..	Caledonian Gold-mining Co.
2/10/96	30	0	0	" ..	"	" ..	..	"
2/10/96	30	0	0	" ..	"	" ..	..	"
8/1/97	30	0	0	" ..	"	" ..	..	"
8/1/97	30	0	0	" ..	"	" ..	..	"
1/3/98	26	1	10	" ..	"	" ..	..	"
6/8/97	30	0	0	" ..	VII.	" ..	..	Robert Lee.
3/9/97	16	0	0	" ..	I.	" ..	..	James Hunter.
1/10/97	30	0	0	" ..	V.	" ..	..	"
4/3/98	29	1	23	Waikouaiti ..	VII.	Waikouaiti ..	..	Smith and others.
2/12/98	25	1	0	" ..	VIII.	" ..	..	"
3/2/99	71	2	11	Sutton .. / Lee Stream	X. / VII.	Sutton / Lee Stream	..	James Hewitt.
3/2/99	37	0	0	Sutton .. / Lee Stream	X. / VII.	Sutton / Lee Stream	..	Reuben Trim.
				Waikaia.				
24/8/96	79	2	12	..	VII.	Nokomai ..	Nokomai Quartz Claim	A. Meder and D. McKinnon.
29/1/98	30	0	0	..	V.	Waikaia ..	Record Reign Q.-crushing Co.	D. Ferguson and Co.
30/5/98	100	0	0	Waikaia ..	..	Gap ..	Titan Quartz-crushing Co.	W. Hendry and party.
28/2/99	100	0	0	" ..	V.	" ..	Ditto ..	"
				Riverton.				
9/4/95	23	2	15	Preservation	IV.	Preservation	Geelong Claim ..	R. H. Brodrick and R. Cleave.
27/1/96	77	3	15	"	"	"	Morning Star ..	Morning Star Gold-mining Co.
18/8/96	30	0	0	"	"	"	Golden Site Gold-mining Co.	Golden Site Extended Gold-mining Co. (Ltd.).
18/8/96	29	3	22	"	"	"	Ditto	Ditto.
22/9/96	84	1	31	"	IV., IX.	"	"	"
24/11/96	24	1	0	"	IV.	"	Alderman ..	Guy A. Whealler.
13/4/97	30	0	0	"	I.	"	Alpha	Alpha Gold-mining Co. (N.L.).
13/4/97	30	0	0	"	"	"	Dawn	Ditto.
13/4/97	30	0	0	"	"	"	Winnifred ..	Jessie M. Ellis.
29/4/97	97	1	24	"	VII.	"	Terewai ..	Alpha Gold-mining Co. (N.L.).
4/5/97	24	2	34	"	IV.	"	Last Chance ..	Guy A. Whealler.
4/5/97	30	0	0	"	"	"	Dot	Richard Allen.
4/5/97	11	1	6	"	"	"	Little Dot ..	"
6/5/97	92	0	0	"	I.	"	Jessica ..	Jessie M. Ellis.
31/5/97	95	0	25	"	IV.	"	Geelong Extended	Radford H. Brodrick.
25/1/98	29	3	15	"	I.	"	Reward ..	Reward Gold-mining Co.
31/5/98	18	0	38	"	IX.	"	Lucky Shot ..	Michael Greene.
29/7/98	70	0	20	"	II.	"	Stewart and Party	James Stewart and John W. Mitchell.
29/7/98	100	0	0	"	IV.	"	Te Oneroa ..	George Lee.
20/9/98	30	0	0	"	VII.	"	Filthy Lucre ..	Guy A. Whealler.
4/10/98	21	3	8	"	III.	"	Venus Gold-mining Co.	William Robinson.
21/10/98	59	1	23	"	IV.	"	Progress Reefing Co.	Archibald F. Hawke.
1/11/98	30	0	0	"	I.	"	Canterbury Gold-mining Co.	Robert Henry Rattray.
1/11/98	30	0	0	"	IV.	"	Victoria Gold-mining Co.	"
14/12/98	100	0	0	"	"	"	Beatrice ..	Richard Allen.
14/1/99	98	2	6	"	IX.	"	Rob Roy ..	David Roberts.
7/2/99	7	2	0	"	III.	"	Venus Extended	William Robinson.
7/2/99	41	1	38	"	IX.	"	Aureus Reefing Co.	Edward P. Dalton and David Wylie.
30/9/98	98	1	28	Alton ..	VII.	"	Groveburn ..	Duncan Dundas and Charles McLean.

Macetown District.

Premier Mine (Area, 108 acres 2 roods 33 perches; owners, Glenrock Consolidated, Limited; general manager, Walter J. Stanford).—This mine continues to be worked in a systematic manner. The long incline has been further extended, the haulage from which is effected by electric power, a very compact and useful machine being placed underground at the head of the incline. The yield of gold has been somewhat less this year than that of the previous year, although the tonnage of quartz treated was 1,278 in excess of the quantity operated on during that period. The manager has furnished the following information about the mine and workings:—

"Incline-work has been the principal work of the mine during the year. For the twelve months 312 ft. have been driven, and the tunnel measured on the 31st December, 1898, 979 ft. The cost of driving this 312 ft., all charges included, came to £917 19s., or an average of £2 19s. per lineal foot to drive and timber. For the greater part of the year the tunnel was not on gold, but was being driven immediately adjacent to the golden stone. The ground was very hard, but, owing to the fact that we were going to stope in close proximity to the incline, we had to timber all through, which increased the expense considerably. The grade of the incline was never altered, and is still maintained at its original grade of 1 in 4, and at this grade has kept below the golden stone. During the year 5,126 tons of quartz was crushed for a total yield of 2,787 oz. 4½ dwt. melted gold, valued at £11,211 15s. 8d., or an average yield of 10 dwt. 21 gr. per ton crushed, the highest yield being 18 dwt. 2 gr. in January, and the lowest 8 dwt. in September. To obtain this 5,226 tons a great deal of dead-work had to be done. We were stoping on two lines of reef, one of which was easily got at from the incline, but the other line of reef was at a considerable distance from the incline on the foot-wall side, and inclined rises had to be put up every 45 ft. to pick up the foot-wall stone. The chutes are very small, both in width and thickness. All our time and money has to be expended opening up new ground, which, when opened up, yields a comparatively small quantity of stone. Latterly the stone on both chutes has pinched considerably, and it has been a great struggle to keep the mill going. Prospecting in the mine for a new chute has been carried on in the old high-level tunnel. This tunnel has been during the year retimbered practically from end to end, and the old wooden rails replaced by steel rails. Some prospecting was done by means of cross-cuts from the tunnel, but without success. On the 31st December, 1898, the tunnel measured 2,113 ft., giving a distance of 149 ft. driven during the year. There is just a chance of striking a new chute in this tunnel as we proceed westwards into the mountain, and if such a chute were struck it would convert the mine into a very valuable property. In the Sunrise Mine work was carried on from the 1st January, 1898, until the 30th April. The work was confined entirely to prospecting in the old company's lowest tunnel, and, while a little gold was discovered here and there, nothing really payable was disclosed. We are too near the surface of the mountain, and the ground is broken and disturbed. I have a very high opinion of this property; but to prospect it successfully a long cross-cut tunnel will have to be driven at a much lower level and solid country obtained. During the year the mill ran 214 days 18½ hours. The greater part of that time twenty head of stamps were running, but occasionally when the supply of stone was short, we reduced it to fifteen. Appended is a tabular statement showing the returns for 1898, month by month. There is a slight falling-off in the returns from the mill of about £100 as compared with the previous year, but there is an increase of over £300 in the gold obtained from concentrates by the cyanide process, making the total result of the year's operations the best the company has ever had. The Glenrock Company first took an interest in this mine in 1890, and since that date to the 31st December, 1898, 18,184½ tons of quartz has been crushed for 10,110 oz. 19 dwt. melted gold, of a total value of £40,672 17s. 10d.; thus the yield of gold averages 11 dwt. 3 gr. per ton throughout the eight years' operations. The tabular statement attached shows that 185 tons of concentrates has been treated during the same period, yielding 461 oz. 0½ dwt. melted gold, valued at £1,411 9s. 8d. The financial result of the year's operations has, on the whole, been satisfactory; the mine has paid its way from start to finish, and remitted a sum of £18,050 to the London office. In addition to this we have spent £400 on New Plant Account, £270 on New Buildings Account, £458 on Prospecting Account, and £265 on Sunrise Account; also, on Mine-development Account, or the driving of the incline, £917 19s.—all of which works are chargeable to capital. On Mining Account—that is, stoping pure and simple—the sum of £4,424 2s. has been spent to obtain 5,126 tons, or an average of 17s. per ton. To mill this quantity it has cost £981 14s. 9d., or an average of 3s. 7d. per ton. The total expenditure on Revenue Account for the year, all charges, amounts to £9,009 18s. 2d., or an average of £1 15s. per ton. The total expenditure on the mine for the twelve months amounts to £11,322 16s. 6d., or an average of £2 4s. per ton mined and milled. 24 tons of concentrates was treated during the year, producing 142½ oz. melted gold, which sold for £477 18s. 9d. Since the Glenrock Company first took an interest in this mine, in 1890, capital remitted from London amounts to £20,802 2s. 6d., and there has been remitted back to London during the last two years the sum of £4,150. Gold has been won during the same period, £42,084 7s. 6d., making the total expenditure on the mine £58,736 10s., of which capital has supplied £16,652 2s. 6d. A number of new huts has been erected for the use of the workmen, and the whole of the buildings, machinery, and plant have been kept in good repair. The electric-power plant used for hauling in the mine, which was erected in October, 1895, continues to give the greatest satisfaction. On an average about forty men have been employed by the company throughout the year, though at times there were as many as sixty names on the pay-sheet. Mr. William Patton, who has recently obtained a first-class mine-manager's certificate under the 1897 Act, takes Mr. Stanford's place in charge of this property from the 1st April."

The following table gives the ore stamped, tailings treated, and gold produced from the Premier Mine for the year 1898 :—

Month.	Quartz stamped.	Bar-gold extracted.	Produce per Ton of Quartz.	Concentrates by cyaniding.		Total Value.
	Tons.	Oz. dwt.	Dwt. gr.	Tons.	Oz. dwt.	£ s. d.
January	410	371 5	18 2·63	...	...	1,494 11 2
February	430	242 7	11 6·53	...	...	968 16 2
March	526	361 0	13 17·42	...	...	1,452 11 7
"	...	...	...	24	142 10½	477 18 9
April	605	244 17	8 2·26	...	...	987 6 9
May	680	273 17	9 0·18	...	...	1,104 17 5
June	625	260 0¼	8 7·69	...	...	1,049 18 10
July	335	215 3½	12 20·31	...	...	1,490 9 3
August	305	155 7½	10 4·52			
September... ...	485	206 1½	8 11·95	...	...	831 7 11
October	310	123 16	7 23·68	...	...	496 14 6
November	200	149 12	14 23·04	...	...	599 2 1
December	215	183 17½	17 2·45	...	...	726 0 0
	5,126	2,787 4¼	10 21	24	142 10½	11,679 14 5

The following table gives the total returns from the Premier Mine for the years from 1890 to 1898 (inclusive) :—

Year.	Quartz stamped.	Bar-gold extracted.	Produce per Ton of Quartz.	Concentrates by cyaniding.		Total Value.
	Tons.	Oz. dwt.	Dwt. gr.	Tons.	Oz. dwt.	£ s. d.
1890	161	107 14	13 19·09	...	...	432 0 0
1891	270	76 6½	5 15·68	...	...	303 15 8
1892	1,178	482 19¾	8 4·8	...	...	1,943 1 9
1893	3,163½	1,976 17	12 11·93	...	...	7,988 19 3
1894	3,137	1,238 3¾	7 21·45	...	...	5,003 14 0
1894	...	...	...	100½	206 17	629 13 10
1895	597	397 19¼	13 7·97	...	...	1,594 13 1
1896	704	221 3¼	6 6·79	...	...	886 10 11
1896	...	...	...	17½	44 0	138 6 7
1897	3,848	2,822 11¼	14 16	...	...	11,308 7 6
1897	...	...	...	43	67 13	165 10 6
1898	5,126	2,787 4¼	10 20·99	...	...	11,211 15 8
1898	...	...	...	24	142 10½	477 18 9
	18,184½	10,110 19	11 2·88	185	461 0½	42,084 7 6

Total cyanide gold value, £1,411 9s. 8d.

Tipperary Mine (Area, 105 acres; owner, the Westralia and New Zealand Gold-explorers, Limited; manager, Walter J. Stanford).—The returns for the past year have again been disappointing, and of less value by £1,738 17s. 2d. than the previous year's yield. The manager has furnished the following account of the operations in the mine during last year :—

" Work in the low-level adit-drive west has only been carried on from time to time during the year when funds permitted. A total length of 160 ft. was driven during the twelve months, making a total of 550 ft. driven westwards on the line of reef from the junction with the adit cross-cut. In February, 1898, a very good patch of stone was struck in this tunnel, but it proved to be of such small extent that very little gold was obtained from it. The line of reef has split into two at the extreme face of the tunnel, but if work is resumed again we intend to follow the hanging-wall line, being the reef which keeps more truly to the general course of the lode. The driving of level No. 6 and its connection with the surface at the mouth of the high-level tunnel was one of the very important works commenced and finished during the year. Up to the completion of this work there was no true ventilation in the mine. The work was begun on the 25th February, acting on the Inspector's orders, and was continued day and night until the 6th November, when the connection was completed. The total length of No. 6 tunnel is 680 ft., and all but 95 ft. of this was driven during the current year. In addition to the tunnel to complete the surface connection, we had to sink a shaft 155 ft. to meet level No. 6. The whole of this work was unremunerative, but there is now splendid ventilation in the mine. The main work of the year has been the sinking of a shaft from the low-level adit to open up a fresh level, to be known as No. 9. Towards the close of 1897 this work was started, and, in order to avoid interference with our main roads in the low-level adit, a cross-cut was driven into the hanging-wall clear of the main tunnel, and the shaft sunk in this cross-cut. It was sunk vertically about 29 ft. until it struck the reef on its underlie. The underlie

was then followed down to a depth of 90 ft. The shaft was sunk so far by means of a windlass. In sinking we were on quartz practically the whole way, some of it poor and some fairly rich, and as we drew near the bottom we found a marked improvement in the stone, and I had every reason to think that when the levels were opened out payable stone would be obtained. I then went into the question of power-haulage, and decided that, considering the position of the shaft, and the impossibility of obtaining a permanent water-supply, that an oil-engine would be the most suitable power for our purpose. At the same time, as there is an intermittent water-supply that could be used for power, I determined to have the engine so arranged that a Pelton wheel could be put on to drive the machine when water was plentiful. An oil-engine and hoister combined were ordered through Messrs. Murray Roberts from Messrs. Weber and Co., Kansas City, America. The engine was to be 20-horse power, and to be capable of hauling a load of 1 ton up a vertical shaft at the rate of 350 ft. a minute. The contract price was £370 in Dunedin. An engine-chamber 30 ft. long was cut out behind the shaft, with a width of 9 ft. A rise of 65 ft. was put up over the shaft to be used as poppet-heads, and to clear all the material hauled from the shaft away from our tunnel a cross-pass, at an incline of 1 in 1, was dropped into the tunnel from the poppet-heads rise. This rise and cross-cuts cost us over £700. While waiting for the engine we arranged a whip worked by a horse, and started to open out a level, to be known as 'No. 9,' at a depth of 85½ ft. below the adit. We drove 75 ft. westwards and about 60 ft. east. From the east tunnel a considerable quantity of fair-value stone was obtained, but from the west tunnel up to the time of our ceasing operations, although we were driving on quartz, nothing valuable was secured. To keep these levels hauled clear of dirt it required two horses with three men attending to each horse. The engine was ordered in May, but did not arrive until December, and was not then in working-order. Up to the 17th January no satisfaction could be got out of the machine, and even after that date its working was so unsatisfactory that it was impossible to keep the men steadily employed. Considerable liabilities had accrued while waiting for the engine, and at the end of January it was found impossible to carry on the work, and the mine was closed down, and six months' protection applied for and obtained. During the year 579 tons was crushed, for a yield of 287 oz. 13½ dwt. melted gold, or an average yield of 9 dwt. 22½ gr. per ton, valued at (including 19 oz. 1 dwt. obtained from discarded copper plates) £1,950 16s. 6d. The total gold won from the mine since the London Company took up their interest in 1893 amounts to 1,552 oz. 5 dwt. 23 gr., valued at £5,983 4s. 7d. To obtain this gold 3,617 tons was treated, but of this quantity 137 tons was concentrate tailings, which yielded gold to the value of £546 16s. 6d. There has been expended on the property since 1893 a total sum of £24,150, of which gold has supplied £5,983 and London capital £15,100. We are liable for the balance. As far as this mine is concerned the results have proved it very patchy in the lower level. The original company are said to have obtained fifty-seven thousand pounds' worth of gold from the surface with an expenditure of about £200 capital, but this patch of gold has apparently not descended to the lower level. Generally speaking the mine is worth further prospecting, and I am now proceeding to London to try and make fresh financial arrangements."

The following table gives the ore stamped and gold produced from the Tipperary Mine for the year 1898:—

Month.	Quantity of Quartz stamped.	Bar-gold extracted.	Produce per Ton of Quartz.	From Copper Plates.	Total Value.
	Tons.	Oz. dwt.	Dwt. gr.	Oz.	£ s. d.
January	80	19 5½	4 19·64	...	77 17 4
February	54	7 14	2 20·44	...	31 0 2
March	94	81 10	17 8·17	177 1 0	1,045 12 7
April	53	43 14½	16 12	17 0 0	246 2 7
July	90	6 0	1 8	...	24 0 0
September	88	61 14	14 0·54	...	250 17 3
November	120	67 15½	11 7·10	...	275 6 7
	579	287 13½	9 22·48	194 1 0	1,950 16 6

Farrell's Consolidated Mines, Macetown (Area, 156 acres).—Under the above heading is comprised the following well-known mines, viz.: The Victor Emmanuel, Morning Star, Black Angel, Garibaldi, Maryborough, Homeward Bound, Lady Fayre, and Golden Treasure. There are several reefs running through the ground, some of which formerly gave good returns. The configuration of the ground is such that a low-level adit would command backs of from 1,500 ft. to 1,700 ft.

Shotover District.

Shotover Quartz-mining Company, No Liability (Mine-manager, D. B. Waters).—This company's property consists of a special claim of 46 acres, being Sections 6, 7, and 8, Block XI., Skipper's Creek District. The claim was formerly held by the Gallant Tipperary Company, which company worked the reef from what is known as the "main level," driven at a height of 312 ft. above the Shotover River. When the present company took over the property the old levels had mostly collapsed, and, the ground overhead having been well worked, they decided to tap the reefs at a greater depth by driving what is called the "machine level," at a height of 35 ft. above the Shotover River. This drive is also just on a level with the roof of the battery-house, so that very little handling of ore will be required. The vertical height between the machine level and the old company's main level is 277 ft. At the point where the company decided to start the machine level they took advantage of a drive in 184 ft. connecting with a rise to the surface, through which the old

company conveyed their ore to the battery. This level was cleaned out and retimbered, and up to date has been extended 426 ft., making the total length 610 ft. Besides driving this distance the company have prospected the reef formation on which they are driving, and have done cross-cutting to the extent of 70 ft., rising 90 ft., and a short intermediate level 45 ft. This makes their total length of dead-work done equal to 631 ft. during their term of occupation. The machine level is timbered throughout, the dimensions in the clear being 6 ft. 6 in. in height; width at top, 3 ft.; width at bottom, 4 ft. 6 in. Machinery, water-rights, &c.: The company have a twelve-head battery of 5 cwt. stamps, there being three mortar-boxes with four heads in each. The gold-saving appliances consist of silvered copper plates, and blanket strakes with a berdan for grinding the blanketings. The motive-power used is a Pelton wheel driven by a column of water of 250 ft. vertical height. The water is obtained from two creeks known as Sandhills and Ballarat Creeks, in which a first right of ten heads is held. The water is brought from the creeks to the company's pressure-tank by races two miles in length. From the Penstock, which is situated on the opposite side of the Shotover River to the mine and battery, the water is conveyed in piping having a diameter at the tank of 22 in., gradually reducing to 9 in. at the battery-house. The pipes are suspended where they cross the river by six 1½ in. steel-wire ropes. The total length of piping is close on 500 ft.

Achilles Mine, Bullendale (Area, 134 acres; owner, Achilles Gold-mine, Limited; general manager, N. C. Morcom; mine-manager, James Edwards).—A change has been effected in the management of this mine. Mr. F. Evans, who has had the conduct of operations for the past thirty years, has now severed his connection with the company. The present manager reports that during the year the mine has only been worked for a few months, and a few trial crushings been made, which yielded 96 oz. 19 dwt. 6 gr. gold. The incline shaft has been sunk to a depth of 556 ft., and the present low level opened at 550 ft. Operations in the mine during the year have chiefly consisted of development work, shaft-sinking, stoping, and driving levels on the reefs. There are two lodes worked on in the mine, arsenical pyrites being associated with the quartz, the country adjacent being mica-schist.

Cromwell District.

Cromwell Proprietary Mine (Area, 189 acres 1 rood 30 perches; owner, Cromwell Proprietary Gold-mining Company, Limited; mine-manager, John Allan Dobson).—This mine is worked from two shafts, the old shaft and the pumping-shaft; the older winding-shaft being 260 ft., and the pumping-shaft 530 ft., in depth. There are five levels—two adits and three from shafts—viz., the 320 ft., 430 ft., and 520 ft. levels. There are seven reefs opened in the mine, varying from 6 in. to 3 ft. in width. The quartz from the surface to 320 ft. level is a brownish oxidized free-milling ore; below that level it changes to a bluish-white, harder in character, and associated with pyrites. The country rock is mica-schist, and the walls are usually well defined. Development works have been carried on, comprising winzes, uprises, and stoping, mostly on the Cromwell or main lode. A shaft now down 86 ft. is being sunk 1,200 ft. distant from present workings to prospect reefs in the eastern part of the mine. The water is raised by an 8 in. pump, two plungers and a draw-lift being required to raise the water to the surface. Motor for pump, a Pelton wheel, giving 20-horse power. The winding machinery consists of a turbine, giving 15-horse power; a steam-engine, 16-horse power. Total value estimated at £3,500. The battery is driven by water-power, and consists of twenty stamps and four berdans; estimated value, £2,200. The quartz crushed amounted to 3,108 tons, yielding 3,451 oz. 8 dwt., of the value of £13,057 15s. 11d. The number of men employed during the year was twenty-seven, the majority being tributers.

Carrick Range District.

Carrick Range Quartz-reefs, Bannockburn.—Mr. Hayes, Inspector of Mines, reports as follows:—

"Messrs. Lawrence Brothers are working the Day-dawn Mine, which includes the old Caledonia Mine, this latter being at an elevation of 130 ft. higher than the former. The reef is nearly vertical, and averages 18 in. in width. Three persons are employed. Messrs. Lawrence estimate that they have seven or eight years' stone to work at their present rate of output. The gold obtained is said to be ½ oz. to the ton, and the quartz gets more refractory as it gets deeper, being associated with antimony and arsenical pyrites. The battery is near the low-level adit, and consists of four heads of stamps (800 lb.), and one berdan driven by a hurdy-gurdy wheel receiving its water at a pressure due to a head of 250 ft. 84 oz. of gold was obtained for the year. Water is obtained from the Carrick Race (which supplies part of the Bannockburn diggings), and is conveyed to the battery by 7 in. pipes, 450 ft. in length. At the Star Mine and battery (belonging to Mr. James Lawrence) three persons are employed, surface stone only being got at present. This is worth about 15 dwt. of gold to the ton. The battery has ten heads of stamps, and is driven by a hurdy-gurdy water-wheel. Water is obtained from Carrick Race, and is conveyed through 900 ft. of 7 in. pipes for a vertical distance of 210 ft. The 450 tons of quartz crushed yielded 107 oz. On the opposite side of the ridge from the Star Claim a prospecting tunnel is being driven by Mr. T. Holliday, who has a claim of 54 acres. The tunnel is in about 300 ft., but the reef has not yet been cut."

Prospecting has also been carried on in the locality of the Young Australia Mine.

Old Man Range District.

Excelsior Mine (Area, 20 acres; owners, F. W. and R. W. Gray; mine-manager, Francis W. Gray).—This mine is situated on the Obelisk or Old Man Range, about five or six miles from Bald Hill Flat. The workings have hitherto been from shafts of no great depth, a hand-windlass being used for hauling the material; operations in this way being continued along the reef until the shafts became too deep for the method of working. An adit was driven in one portion of the mine with a

view of prospecting the reef at a depth of 130 ft. below previous workings, but, as this drive was not of convenient size to fulfil the purpose for which it was intended, it was decided to abandon it in the meantime, and to cut the reef in a more convenient place. An adit for this purpose has been driven, and is now in 202 ft., and it is expected the reef will be reached in about 220 ft. This will admit of the reef being worked at deeper levels under the old workings, and, as gold is left in the floor, the future prospects appear to be favourable. The quartz is of a friable nature, easily mined and crushed. No explosives are required in breaking on the lodes, although the adjoining country is of a hard nature. The workings have all to be closely timbered, and this forms the chief item of expense. The stone is crushed by a small three-head battery, running from 95 to 120 drops per minute, with about a 6½ in. drop, and crushes from 2½ tons to 3 tons each eight-hour shift worked. A Pelton wheel of about 3-horse power is sufficient to drive the battery. The gold is free, and easily amalgamated, most of it being saved in the mortar-box and on the top plate. The quantity of stone crushed was 292 tons, for a yield of 303 oz. 1 dwt. 18 gr. of retorted gold, valued at £3 18s. 4d. per ounce, or a total value of £1,187 1s. 10d. The mine is about 3,000 ft. above sea-level, and in the winter months work is carried on with difficulty. Timber is brought by bullock-team from Heriot Railway-station, and is obtained from a bush at a distance of fifty to seventy miles. The battery is now being shifted to a more convenient site to save handling of stone. An average of five men have been employed during the year.

Lawrence District.

Gabriel's Gully Prospecting Association.—A report from the Inspector of Mines says,—

"Since my last visit the prospecting works have very considerably advanced at the low-level tunnel, but the reefs have not been picked up beyond the cross-cut. A drive has been commenced to prospect the solid country through the main (Blue Spur) fault. At about 28 yards beyond the fault a small quartz leader was cut. This is being followed up, and the main drive is also being continued. The latter shows patches of quartz. Mr. E. Johns is in charge of the works, three men being employed. Tunnels, &c., all in first-class order."

Burnt Creek Mine (Area, 27 acres; owners, Burnt Creek Gold-mining Company; mine-manager, Arnold Sturm).—This claim is situated at Table Hill. Three lines of reef have been prospected, varying in width from 2 ft. to 6 ft. The quartz presents a white glassy appearance, and is very poor. 1,297 tons was crushed at a battery of ten stamps which is on the ground, the yield of gold being 95 oz. The battery is driven by water-power. The whole plant, including race and dam, is valued at £1,600. Six men were employed during 1898, but very little work has been done during the present year.

Milton District.

Canada Reefs (Area, 50 acres; owners, Messrs. Ritchie, Andrews, and Lawson; manager, W. G. Mouat).—This mine is worked from two shafts at the respective depths of 70 ft. and 60 ft. Four levels have been opened and a great amount of development work carried out during the year. The battery consists of ten heads of stamps of 8 cwt. each, driven by a 12-horse-power Pelton wheel. The quantity of quartz crushed for the year was 838 tons, which yielded 103 oz. 8 dwt. 2 gr. of gold, valued at £389 12s. 11d., extracted by amalgam. Eight men and two boys were employed. Mr. W. G. Mouat, who has the mine on tribute, gives the following full description of the work done for the year:—

"The claim is held by me on tribute, and so far the work has consisted chiefly of erecting gear, putting down tram-lines, and opening up. No. 1 inclined tram-line is 1,200 ft. in length, and descends to battery. The head of the tram-line is at an elevation of 450 ft. from battery; it is self-acting. The trucks are of 15 cwt. capacity, and are capable of lowering 100 tons per day if necessary. No. 2 line is from No. 1 shaft to head of No. 1 line, a distance of about 300 ft. The lowering gear consists of a surging-drum 2½ ft. in diameter working on a 3 in. shaft, attached to which is a Crown wheel, also 2½ ft. in diameter, geared by intermediate shaft 2½ in., with pinion 1 ft. in diameter, and brake-wheel 16 in. worked by a 6 ft. lever. There is also a safety-brake attached to the surging-drum to be used in case of accident. This brake grips both drum and rope. The rope is ⅝ in. flexible crue-steel wire, running on hardwood rollers 40 ft. apart. The trucks are fitted with self-acting discharging gear. Within 30 ft. of the lowering gear a hopper (No. 1) is erected, under which the trucks run for filling. There are three distinct lines of lode, known as Ocean View, Canada, and Lawson's, all of which run parallel with each other, east and west, at a distance of about 300 ft. apart. No. 1 shaft is sunk in Ocean View line, about 300 ft. from lowering gear, to a depth of 70 ft. From 5 ft. well-hole of shaft a level is driven west 30 ft. and east 70 ft., the lode varying from 2 ft. to 3 ft. A portion of the stone is being stoped out. The stone from this shaft, which was sunk for prospecting purposes, is hauled by windlass. The ore is conveyed to No. 1 hopper by tram-line. No. 2 shaft is sunk on the same line of reef, about 1,000 ft. east of No. 1 shaft, to a depth of 60 ft., and a level is driven east 60 ft. and west 10 ft., and the stone above partly stoped out. The stone pinches from each end of the drives, and varies from 12 in. to 4 ft. The ore has been hauled by windlass, and conveyed to No. 1 hopper by dray, at a cost of about 1s. 3d. per ton. No. 3 shaft is sunk on the Canada line of reef, opposite No. 2 shaft, to a depth of 60 ft., and a level driven west about 30 ft., the lode varying from east 1 ft. to west 8 ft. Stoping has been commenced. Poppet-heads are erected over the collar of shaft, and the buckets pulled by whip. The stone is emptied into the hopper at shaft, and is conveyed by drays to hopper No. 1. Lawson's reef is being prospected."

Waipori District.

O.P.Q. Gold-mines, Waipori (Mine-manager, C. Rillstone).—Mr. John Hayes, Inspector of of Mines, who has recently visited the district, gives the following account of this mine and its workings:—

"Since my last visit work appears to have been pushed forward with a good deal of energy. The main shaft, 12 ft. 6 in. by 4 ft. has been sunk to a depth of 220 ft., a new Robey Undertype

mining-engine with winding and pumping gear set to work, head-gear (poppet-heads) erected and fitted with safety-cages and detaching-hooks. The pump is 9 in. diameter, with 5 ft. stroke, both lift and force. At present the lifting set only is in use in connection with the sinking, and a cage is in use for lowering the men to a platform at 200 ft. and raising them to the surface. The *débris* from the sinkers is raised in a bucket in a separate compartment. Some new plant is on the ground ready for use as soon as required. It is proposed to cut the reef at 300 ft. As stated in my last report, two tunnels were being driven on the line of reef. These have been continued, and are now in 940 ft. and 1,120 ft. respectively. From this latter tunnel a cross-cut (east) is being driven to the new shaft, and will form an adit for water. This cross-cut passes through an old shaft which has been cleaned out for ventilation. Owing to the fact that the first mentioned (and shorter) tunnel starts from the surface at a considerable distance further up the gully than the other one, it is really leading by about 800 ft., the vertical distance between the two tunnels giving the lower and longer one about 80 ft. of backs. The line of reef is approximately north and south, and very patchy so far as seen. From the upper tunnel a cross-cut has been driven west in the foot-wall for 87 ft., and from the lower tunnel a cross-cut was similarly driven for 121 ft. without meeting with any parallel reef. Some 400 tons of quartz had been taken out of these tunnels, and, I am informed, showed a yield of 14 dwt. per ton. The battery-site is being prepared, and a good portion of the machinery is on the ground. The sinking of the main shaft is also being continued, and at this date is 250 ft. deep. The low-level adit-tunnel, previously named, is now connected by a cross-cut to the shaft at a depth of about 70 ft. from the surface. The pump delivers its water to this level. Both adit-tunnels have been continued on the line of reef, and have passed through old workings into a fair thickness of stone. The battery plant is not yet erected, but portions of this work are in progress."

Rough Ridge.

Great Eastern Mine (Area, 3 acres; owners, T. and H. Perry; mine-manager, T. H. Perry).—This mine is opened up by two shafts at a depth of 235 ft. and 275 ft. The only work done during the year was surface-prospecting, and about 65 tons of quartz was taken out, but has not yet been crushed. The mine has been worked intermittently for the past twenty-eight years with varying success, yielding from 7 dwt. to 3 oz. per ton. The last workings at the lowest level—275 ft.—gave a return of £3,080 from 600 tons of quartz, the reef averaging about 18 in. in width.

The present owners purchased this property in 1891, but they have not been able to open up the mine for want of a proper pumping plant, consequently work has been chiefly confined to taking out surface-blocks, which will shortly be crushed. The battery consists of five heads of stamps, 7 cwt. each, driven by an Eclipse double turbine.

Barewood District.

Barewood Reefs.—Operations have been stopped by the Anglo-Continental Syndicate and the London and New Zealand Exploration Companies jointly, and the plant dismantled prior to its sale. A considerable amount of work has been done, and money spent, without finding anything sufficiently good to warrant further development. Three shafts were sunk parallel to the line of reefs, and a tunnel driven from the Taieri River Gorge. The latter was, approximately, 300 ft. in when stopped. No. 1 shaft was sunk some 200 ft., and a cross-drive driven to cut the reef, but, after being continued to beyond the perpendicular line of reef at surface, failed to meet with any quartz. This cross-cut intersected well-defined walls filled in between with angular fragments of country rock and mullock. This track was driven on in a southerly direction for nearly a chain, where an extra quantity of water was tapped with which the two pumps were unable to cope, although up to this time one pump could effectually deal with the water. When it was found that the water was too much for the pumps the work was stopped. No. 2 shaft was sunk nearly 200 ft., and a cross-cut driven in a similar manner to that at No. 1 shaft, without finding any reef. Two walls, with mullock-filling, were cut through at some 40 ft. from the shaft, and a drive put in northwards for, say, ¾ chain without finding any quartz. Both in the shaft and cross-cut the country rock was very hard, and the water less in quantity than in either of the other shafts. No. 3 (or Scott's Gully) shaft passed through 7 ft. of reef at a depth of 150 ft. The shaft was continued to over 200 ft., and at the 200 ft. level the reef was cut a few yards to the east of the shaft, where there is a large body of stone. To the north the reef decreases in width, and was only some 8 in. wide at the face when operations ceased. A large quantity of water was met with at the 200 ft. level. 53 tons of quartz was crushed from time to time, and yielded 10 oz. of gold.

Macrae's Flat and Nenthorn District.

The Bonanza Mine, formerly owned by Phelan Brothers, has been taken over by Beale and Peterson, who have carried on some development work, and reorganized the plant, &c.

Mount Highlay Syndicate.—The owners of this mine, which is situated between Macrae's and Hyde, have crushed a large tonnage of mixed mullock and quartz, 1,880 tons, which yielded 368 oz. 7 dwt. 2 gr. of gold.

Lyders and party still continue to carry on operations at their mine. The work, however, is carried on in an intermittent manner, and the year's operations have not been of great extent. The quantity of quartz crushed was 360 tons, which yielded 62 oz. 7 dwt. 8 gr.

Surprise Mine (Area, 16 acres; owner, Mills and Sons; manager, H. N. Mills, sen.).—This mine has been abandoned, and the late owners are removing the battery to Macrae's Flat, to work freehold land.

Golden Point Mine, Macrae's (Area, 32 acres; owner, George Donaldson; mine-manager, William Donaldson).—The proprietor of the mine reports that the workings are situated on a hill-side; the surface is of a broken character, and the lode very much disturbed, the reef, lying

in irregular masses, having almost the same inclination as the hill. The workings carried on are within a short distance of the surface. The reef is of varying width, and consists of friable stone. The surrounding country rock is of schist, with a soft casing to the lode. The greater portion of the material between the walls consists of quartz, in which irregular bunches and fragments of scheelite are of common occurrence. This latter is selected, when possible, by hand, but a large portion is subsequently recovered by concentration. The quartz, being of an auriferous character, is first crushed, and the gold saved by means of amalgamating tables. The residue is passed over Frue vanners, where the scheelite, which is of greater specific gravity than the quartz, is readily separated. During the year 600 tons were crushed, but no cleaning up with respect to the gold saved has yet taken place; 40 tons of scheelite were, however, recovered, assaying 67 per cent. tungstic acid—value, £65 per ton, £2,600.

The machinery at the battery consists of ten head of stamps, 7 cwt. each, capable of a speed of seventy blows per minute; one 5 ft. Huntingdon mill; one Giant rock-breaker, 8 in. by 10 in., of a capacity of 6 to 8 tons per hour; one 6 ft. Frue vanner, capable of treating 12 tons a day. Water-power is used for driving the machinery when available, but a Weber oil-engine drives the plant when water is scarce and the supply short. The reef crops out along the line for several miles, and contains gold-bearing quartz and scheelite. The average number of men employed was seven wages-men.

Parker's Reef (Area, 200 ft.; owner and manager, Arthur Parker).—This mine, which is owned by Mr. Arthur Parker, and situated at Blackman's Gully, in the Hindon district, is held as a claim containing 200 ft. on the line of reef. A small vein has been opened near the surface, and about 40 tons of quartz taken out yielded gold to the value of £50. A small battery of four stamps, each stamp weighing 4 cwt., is on the ground, and is driven by an eight-horse-power oil-engine. This mine is not worked continuously, having been idle during three months last winter.

Cunningham's Mine (Area, 16 acres; owner, Cunningham Brothers and George Ross).—Two reefs have been cut in prospecting tunnels, and the owners, confident of their favourable nature, have erected a battery of eight stamps, to be driven by water-power, and which will be capable of a speed of eighty strokes a minute. The owners are at present engaged in cutting a water-race, and it will be two or three months before operations in the mine and battery are commenced. A trial crushing of 30 tons of quartz yielded 30 oz., valued at at £117 15s.

Preservation Inlet.

Morning Star Mine (Area, 77 acres 3 roods 15 perches; owners, Morning Star Gold-mining Company; mine-manager, E. P. Keam).—This mine is situated at Long Beach, and is entered by four levels from the side of a mountain-range. The lowest level is known as No. 2, and connects to the outside by a cross-cut tunnel, from which it has been driven on the line of reef for 499 ft. No. 1 level is 86 ft. above No. 2, and is driven 591 ft. No. 1A level on reef is 138 ft. above No. 1, and 718 ft. in. No. 1B level is 156 ft. above No. 1A, and 192 ft. in. Below No. 2 level a winze has been sunk to a depth of 170 ft., so that the reef has been proved to a vertical depth of 550 ft. below No. 1B level. At the lowest point where the quartz has been cut—viz., at the bottom of the winze—the lode is 6 ft. in width, and assays 4 dwt. to the ton. No. 2 level is said to have never yielded good payable stone. Good stone made at 18 ft. to 20 ft. below No. 1 level, and was as much as 2 ft. 6 in. in width. Between No. 1 and No. 1A the best gold has been won, the reef averaging 20 in. in width. Above No. 1A the stone gets thinner, and at the top of the highest rise is only 4 in. in width. A little lower down it was thinner still. No. 1B was driven some distance without getting any quartz, and when struck the stone cut out again after running about 15 ft. It was from 12 in. to 14 in. wide, and is said to have assayed 9 oz. to the ton. The whole of the four levels are standing at present without stone at their respective faces. It is most desirable that at least one level should be pressed forward to prove the ground ahead. From the present position of the faces, No. 1A level would perhaps be the best to go on with. Unless something of this sort is done, the returns must fall off very materially, as the ground now open will be stoped out in the course of a few months. Taken as a whole, the reef appears very patchy, the stone getting thicker and poorer as it gets deeper, and *vice versâ*. In working, all the stone is shot down passes to No. 2 level, and is conveyed by a self-acting incline to the battery. An aerial tramway has recently been constructed to convey mining timber, &c., from the wharf to the working. The battery consists of ten heads of stamps, four berdans for grinding and treating the blanketings, and ten smaller berdans for tailings, all driven by a Robey undertype semi-portable engine with a pair of 8 in. cylinders, having a stroke of 12 in.; boiler pressure, 55 lb. The quantity of quartz crushed for the year was 3,733 tons, which yielded 2,060 oz. 4 dwt. of gold. The total number of men employed was fifty-three.

Golden Site Extended Mine (Area, 134 acres 2 roods; owner, Golden Site Extended Gold-mining Company, Limited; mine-manager, William Wylie).—Mr. Wylie, mine-manager, gives the following account of the mine:—

"This mine is worked from a shaft the depth of which is 210 ft., the greatest depth of workings being 200 ft. below the surface. Two levels are opened up. The lower, or 200 ft., level was driven a part of the way in stone, which so far has not proved payable. The intermediate level has been driven for a part of its length underneath a block of stone the enclosing walls of which are in some places 20 ft. apart. The stone thus occurs in wedge-shaped ribs, which usually make in the foot-wall and run over towards the hanging-wall. The foot-wall is well defined wherever quartz is met with, and it carries a few inches of casing or pug. The foot-wall is composed of a black slaty rock, the hanging-wall rock being of a much lighter colour. During the year the levels have been driven a considerable distance. Sundry cross-cuts have been put in, together with rises, as a means of ventilation, and at the same time to prospect the reefs. The motive-power is water. There is a Pelton capable of working up to 20-horse power to drive the stamp-mill, also a Pelton capable of working up to 10-horse power to drive winding gear and pump. The battery consists of ten stamps of 6 cwt. each; average drop, 7½ in. blows, and eighty-six drops per minute; and two 4 ft. berdans.

Value of plant, £900. The average quantity of quartz crushed is 15 tons in twenty-four hours. When crushing, all the stamps are usually kept at work. The various crushings put through have been more in the way of trial crushings. The value of the gold is £3 17s. 10½d. per ounce. The average number of hands employed is eighteen. At present the mine is only in the prospecting stage."

Sunrise Mine.—The Sunrise Company is now driving tunnels on property adjoining that of the Morning Star Company. No. 1 tunnel has been driven 70 ft., and has cut a reef about 6 ft. wide in two divisions of 3 ft. each, with a 2 ft. horse of mullock between. No. 2 tunnel is now 210 ft. in., and it is expected that the reef will be cut at 260 ft. or thereabouts. The long drive tunnel is nearest the Morning Star Mine. Twelve men are employed.

RETURNS FROM QUARTZ-MINES IN THE OTAGO AND SOUTHLAND DISTRICTS FOR THE YEAR ENDING 31ST MARCH, 1899.

Name of Company.	Quartz crushed.	Yield of gold.	Approximate Value.
	Tons.	Oz. dwt. gr.	
Achilles Goldfields (Limited)	591	96 19 6	
Glenrock Consolidated (Limited)	4,845	2,498 15 0	
Glenrock tailings by cyanide	42	193 0 0	
Westralia and New Zealand Gold-explorers (Limited) ...	458	161 13 0	
Morning Star Gold-mining Company	3,733	2,060 4 0	
Morning Star tailings by amalgamation	...	93 9 0	
Golden Site Extended Gold-mining Company	1,107	301 12 5	
Alpha Quartz-mine	338	53 8 0	
Cromwell Goldfields (Limited)	2,841½	2,844 3 12	
Lawrence Brothers	79	84 1 0	
James Lawrence	450	107 0 0	
Golden Gate Gold-mining Company	75	55 0 0	
F. W. Gray	304½	373 11 15	
R. T. Symes	148	93 0 0	
Beal and Peterson	195	194 0 0	£38,493
W. G. Donaldson	550	18 13 0	
H. N. Mills and Sons*	...	...	
F. H. Perry	Nil	...	
H. F. Knight	Nil	...	
J. Rodgers and Party*	...	...	
Mount Highlay Syndicate	1,880	378 11 18	
A. Parker	47	8 7 0	
Burnt Creek Quartz-mine	782	83 10 0	
Barewood Quartz-mine	53	10 0 0	
Taieri Quartz-mine	360	62 7 8	
Canada Reefs	685	98 15 0	
Totals	19,564	9,870 0 16	

* Returns not to hand: will not materially affect the total.

REMARKS ON OTAGO AND SOUTHLAND QUARTZ-MINING.

There has been a great falling-off in the gold returns compared with those of the previous year, and there is very little indication of an increase for next year.

The Achilles Mine at Bullendale, which has been one of the most regular gold-producers in the past, may, however, be expected to again largely contribute to the yield of gold from quartz.

In the other fields no very extensive mining work is carried on other than working out the most readily accessible parts of the reefs and veins that have been already opened.

The development work at the O.P.Q. Mine at Waipori may, however, result in that district again adding to the production of gold from quartz. It may therefore be expected that next year's yield from this mine will show an increase.

COMPARATIVE STATEMENT SHOWING APPROXIMATE VALUE OF GOLD OBTAINED FROM QUARTZ-WORKINGS THROUGHOUT THE COLONY for the Years ending the 31st March, 1898 and 1899 respectively.

Name of District.	1898.	1899.	Increase.	Decrease.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
North Island—				
Auckland District	405,745 13 3	575,642 2 8	169,896 9 5	...
Middle Island—				
Nelson and Westland Districts	27,030 15 0	109,019 2 10	81,988 7 10	...
Otago and Southland Districts	67,900 0 0	38,493 0 0	...	29,407 0 0
Totals	500,676 8 3	723,154 5 6	222,477 17 3	...

ALLUVIAL AND CEMENT MINING.

The various methods adopted for working gravel-deposits, and recovering the free gold which they contain, are distinguished by the term "alluvial mining." These methods may be classed—First, mining for the older gravels now superimposed by later deposits; second, washing those older gravels and later gravel-deposits by hydraulic sluicing and elevating; third, operating on the older gravel-beds that are found in the bottoms of rivers and streams, or alluvial flats containing water, by means of dredging; and, fourth, sluicing and washing sands and gravels on river- and sea-beaches.

Alluvial mining is confined to the South Island, and carried on in Marlborough, Nelson, Westland, Otago, and Southland.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices, and registered on or before the 31st March, 1899, in the Books of the Mining Registrars.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
		Havelock.				
	A. R. P.					
30/6/94	4 2 11	Wakamarina ..	..	Wakamarina	The Gorge ..	Wakamarina Gorge Gold-mining Co. (Ltd.).
30/6/96	30 0 0	" ..	..	"	Quayle's Terrace	H. F. Thompson.
1/2/98	30 0 0	" ..	..	"	All Nations ..	All Nations Hydraulic Sluicing Co.
25/2/98	28 0 0	" ..	..	"	New Mentor ..	Thomas Todd.
25/2/98	30 0 0	" ..	..	"	New Midas ..	G. M. Mathieson.
25/3/98	30 0 0	" ..	..	"	Yukon	David Girdwood.
30/10/96	11 0 0	Wakamarina River	..	"	Golden Point ..	G. P. Hilton and C. L. Diamanti.
30/10/96	10 0 20	Ditto ..	..	"	Quayle's Terrace	Harry F. Thompson.
30/10/96	13 0 0	" ..	..	"	Wakamarina Dredging Co.	Henry D. McKenzie.
24/2/98	12 1 0	" ..	..	"	Crœsus ..	Q. J. Scott.
24/2/98	13 2 0	" ..	..	"	Trafalgar ..	William E. Clouston.
24/2/98	0 2 0	" ..	..	"	Hamilton ..	Alfred Rogers.
		Collingwood.				
1/1/86	10 0 0	Richmond Hill	VIII.	Aorere ..	Richmond ..	Parapara Hydraulic Sluicing and Mining Co.
7/6/88	7 1 9	"	"	" ..	..	Ditto.
1/1/92	9 0 0	Glen Gyle ..	IV.	" ..	..	"
9/7/92	27 1 0	Parapara ..	"	" ..	..	"
7/2/94	19 3 5	" ..	VIII.	" ..	..	"
18/6/97	9 3 9	Quartz Ranges	X.	" ..	..	Collingwood Goldfields (Ltd.).
9/6/94	83 0 0	Parapara ..	I.	" ..	..	Parapara Hydraulic Sluicing and Mining Co.
7/4/96	100 0 0	Quartz Ranges	XIV.	" ..	..	Collingwood Goldfields (Ltd.).
7/4/96	85 3 5	"	X.	" ..	..	"
7/4/96	68 0 31	"	VIII.	" ..	..	"
7/4/96	48 2 21	"	XIV.	" ..	..	"
7/4/96	46 3 29	"	X.	" ..	..	"
4/5/96	48 3 30	Victoria Creek	IV.	" ..	..	"
1/2/97	50 0 0	"	III.	" ..	..	Richard Ellis.
6/6/98	35 0 0	..	XI.	" ..	..	Mary H. Trent and others.
		Motueka.				
16/3/97	30 0 0	Balloon Hill ..	V.	Mount Arthur	Tableland Hydraulic Sluicing Co.	C. Lewis and H. P. Washbourne.
		Westport.				
28/8/93	8 3 0	Addison's ..	II.	Waitakere ..	..	Peter Halligan and party.
21/5/94	29 3 27	Bradshaw Terrace	"	Steeples ..	Catherine Gold-mining Co.	Charles Lind and party.
18/4/95	7 3 9	Addison's ..	"	Waitakere ..	Try Again Gold-mining Co.	John Brady and party.
13/5/95	4 2 10	" ..	"	" ..	Venture	Venture Gold-mining Co. (Ltd.).
11/3/95	66 2 0	" ..	V.	" ..	Shamrock Lead ..	Shamrock Lead Gold-mining Co. (Ltd.).
22/5/96	17 3 24	Steeples ..	IV.	Steeples ..	South Spit Co. ..	E. Gillon and party.
22/12/96	22 0 8	Addison's ..	II.	Waitakere ..	Garryowen Gold-mining Co.	M. Carmody and party.
10/2/97	14 1 0	Bradshaw Terrace	"	Steeples ..	Bradshaw's Cement Co.	J. Smith and G. A. Smith.
29/5/97	32 1 0	Addison's ..	"	Waitakere ..	Neill and Party ..	James Morgan and party.
20/7/97	97 1 6	" ..	I.	" ..	Rose Blanche ..	Virgin Flat Gold-mining Co. (Ltd.).
3/11/97	99 3 26	" ..	IV.	Steeples ..	Enterprise ..	Margaret Sullivan.
7/12/97	72 2 0	Old Diggings ..	VIII.	Ohika ..	Old Diggings Gold-mining Co.	S. Chapman and J. Colvin.
18/1/98	10 3 31	Addison's ..	II.	Waitakere ..	Torrance and Party	Hugh Torrance.
18/12/97	33 0 15	Karamea ..	XV.	Oparara ..	Scarlett and Party	D. Scarlett, jun.
7/12/97	30 3 21	Bradshaw Terrace	I.	Steeples ..	Black Lead Gold-mining Co.	J. M. Dennehy.
1/3/98	100 0 0	Karamea ..	X.	Oparara ..	Oparara Gold-mining Co.	Cornelius Dean.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices—*continued.*

Date of License.	Area.			Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
	A.	R.	P.					
				Westport—continued.				
17/5/98	13	0	37	Bradshaw Terrace	II.	Steeples ..	Maid of Erin Gold-mining Co.	J. Duggan and party.
5/7/98	92	2	16	Ditto ..	IV.	"	Cynosure ..	Edward George Braddon.
5/7/98	41	1	0	Addison's ..	II.	Waitakere ..	..	Venture Gold-mining Co. (Ltd.).
20/9/98	95	0	11	Karamea ..	XV.	Oparara ..	..	Alexander Stitt.
15/11/98	20	0	0	Addison's ..	I.	Waitakere ..	..	Henry Warne.
15/11/98	99	3	35	" ..	"	" ..	Virgin Flat Gold-mining Co.	Virgin Flat Gold-mining Co. (Ltd.).
1/11/98	99	3	38	" ..	"	" ..	Grace Darling Gold-mining Co.	Ditto.
1/11/98	41	2	37	" ..	II.	" ..	Mellihan and Party	W. Mellihan and party.
7/3/99	20	0	0	Caroline Terrace	I.	Ohika ..	..	Henry William Lloyd.
				Charleston.				
21/11/89	5	0	34	..	VI.	Waitakere ..	Morning Star ..	P. Dwyer, M. Connolly, J. Gregory, and H. Horner.
1/12/90	6	0	0	..	"	" ..	Big Bonanza ..	P. Hanigan.
17/8/93	8	2	37	..	"	" ..	..	Edward McClatchie.
23/11/94	10	3	39	..	"	" ..	..	Thomas Shine.
12/6/95	5	3	0	..	I.	Brighton ..	..	M. and T. O'Brien.
20/5/95	1	0	31	..	IV.	Waitakere ..	..	S. Turner and W. Calvert.
6/7/96	8	1	13	..	VI.	" ..	..	Thomas Morris and J. Lyther.
9/8/88	8	0	0	Croninville ..	IV.	" ..	Great Extended ..	M. and J. O'Donnell.
21/10/95	68	0	17	Brown's Terrace	"	" ..	Brown's Terrace ..	William Wilson.
17/2/96	99	2	0	Four-mile ..	VI.	" ..	Aurora	Kastan and Charubin (Germany).
5/2/97	58	2	10	" ..	IX.	" ..	Four-mile Gold-mining Co.	"
5/2/97	99	1	20	" ..	"	" ..	Empress Gold-mining Co.	"
14/5/97	26	1	0	Nine-mile Beach	III.	" ..	Totara Gold-mining Co.	John M. Powell.
17/7/97	50	0	0	Deadman's Creek	IX.	Brighton ..	Deadman's Creek	George A. Hart.
29/10/97	50	0	32	Fool's Terrace ..	IV.	Waitakere ..	Lucinda ..	A. M. Bourke.
28/10/97	38	1	18	Brown's Terrace	"	" ..	Lucy	"
				Lyell.				
12/3/94	100	0	0	Matakitaki ..	VII.	Matakitaki ..	Mammoth Hydraulic Sluicing Co.	Thomas George Macarthy.
19/8/97	39	2	34	Maruia ..	XV.	Burnett ..	Hector	Hector Bates Walker.
19/8/97	29	3	27	" ..	"	" ..	Record	George Walker.
1/9/97	98	3	0	" ..	"	" ..	Ophir	G. Von Belle and F. J. Walmsley.
14/3/92	5	0	0	White Point ..	"	Lyell ..	..	J. Fennell and R. Perkins.
18/11/97	5	3	33	Three-channel Flat	VI.	Inangahua ..	Jubilee	Matteo Della Vedova.
20/1/98	10	0	0	Dee Creek ..	"	" ..	Dee Creek ..	Dee Creek Gold-sluicing Co.
20/1/98	3	0	28	Maruia ..	XV.	Burnett ..	Drover	George Walker.
				Reefton.				
3/8/96	29	2	21	Boatman's ..	VI.	Waitahu ..	A1 Sluicing Co. ..	James Cornwall.
21/9/96	12	0	0	" ..	"	Reefton ..	Flowers Creek ..	Tong Shay.
				Ahaura.				
10/9/92	45	0	0	Nelson Creek ..	VIII.	Mawheranui	New Bendigo ..	John Straker.
24/4/93	8	0	0	Try Again ..	VII.	"	Donnellan & Sons	Patrick, John, Peter, and William Donnellan.
30/3/94	49	2	23	Bell Hill ..	I.	Kopara ..	Bell Hill ..	Bell Hill G.M. and S. Co. (Ltd.).
11/11/95	30	0	0	Blackball ..	III.	Mawheranui	Republic ..	Thomas Jones and others.
11/11/95	28	3	3	Nelson Creek ..	VIII.	"	Nelson Creek ..	John Straker.
27/7/96	42	3	30	Orwell Creek ..	II.	Ahaura ..	Perseverance ..	G. Erickson and H. W. Young.
28/9/96	10	0	3	Nelson Creek ..	VIII.	Mawheranui	Larkin and Party	Richard Larkin and four others.
26/4/97	30	0	0	German Gully	"	"	German Gully ..	D. Flannery, W. L. Moore, and H. U. Mackenzie.
26/4/97	49	3	19	Blackball ..	III.	"	Montgomerie Terrace	Thomas Jones.
24/1/98	5	3	28	Ahaura River ..	I.	Ahaura ..	Arthur's Lease ..	A. Brooks and A. Dunn.
25/4/98	100	0	0	Paparoa ..	XIII.	Waiwhero ..	Zealandia ..	Fred. J. Johnston.
23/5/98	100	0	0	" ..	XIV.	"	Metropolitan ..	W. E. Lutz.
27/6/98	100	0	0	" ..	X.	"	Hopeful ..	Charles McArthur.
27/6/98	98	0	0	" ..	"	"	Dearing Wonder	William Berry and two others.
23/5/98	100	0	0	" ..	XIII.	"	Homeward Bound	Thomas W. Tymons.
25/7/98	30	0	0	Grey River ..	III.	Mawheranui	Grey River ..	J. T. Kinsella and two others.
28/6/98	100	0	0	Paparoa ..	X.	Waiwhero ..	Christchurch ..	Gardiner Wilson.
24/10/98	9	0	0	Ahaura River ..	I.	Ahaura ..	Ahaura ..	A. Dunn and H. Finlay.
28/11/98	15	0	24	Paparoa ..	XIV.	Waiwhero ..	Golden Point ..	James W. Thompson.
28/11/98	100	0	0	" ..	"	" ..	Golden Fleece ..	William Lutz.
28/11/98	100	0	0	" ..	"	" ..	Enterprise ..	Arthur Mickel.
27/2/99	55	2	12	Nelson Creek ..	VIII.	Mawheranui	Enterprise Dredging	William Rundle.
28/11/98	97	1	24	Paparoa ..	XIV.	Waiwhero ..	Napoleon ..	Charles Alger.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices—*continued*.

Date of License.	Area.			Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
	A.	R.	P.					
				Greymouth.				
21/8/88	13	2	22	..	XVI.	Greymouth ..	..	Druce and party.
29/9/90	10	0	3	..	XIV., XV. III., IV.	" .. Waimea ..	..	John Byrne.
13/10/88	2	0	0	..	..	Hohonu ..	..	Claus H. Linz.
21/12/96	49	0	6	..	XII.	Greymouth ..	..	John Druce.
7/12/96	35	2	11	..	III.	Waimea ..	..	H. J. Wickes.
1/6/97	100	0	0	Barrytown ..	IX.	Waiwhero ..	Barrytown Flat ..	Barrytown Flat Gold-mining Co. (Ltd.).
1/6/97	92	2	12	" ..	"	" ..	" ..	Ditto.
10/7/97	37	3	18	Paroa ..	III.	Waimea ..	Golconda ..	J. D. Gilles.
1/6/97	50	0	0	Fourteen-mile North Beach	I.	Te Miko ..	Pactolus Gold-mining Co.	Peter Wilson and William Campbell.
3/8/97	100	0	0	Barrytown Flat	"	Waiwhero ..	Inverness Gold-mining Co.	Alexander MacDougall.
29/12/97	100	0	0	Barrytown ..	"	" ..	Barrytown Flat Co.	James Charles Duncan.
23/2/98	100	0	0	Stillwater ..	X.	Arnold ..	Record Find Co.	Alfred Yeadon.
17/2/92	16	1	0	..	IV.	Hohonu ..	..	Low Hoyd and party.
28/6/94	10	0	0	..	"	Waimea ..	..	John Byrne.
16/3/96	7	2	7	..	V.	Waiwhero ..	..	Davies and Egden.
23/4/96	20	2	0	..	IV.	Waimea ..	..	John Walsh.
9/7/96	15	0	25	..	"	" ..	..	E. A. Wickes.
12/11/96	7	3	6	..	I.	Hohonu ..	..	C. H. Linz.
28/1/97	20	0	0	..	V.	Cobden ..	..	Gifford and Will.
14/4/97	25	0	0	Barrytown ..	I.	Waiwhero ..	Lawson's Creek Hydraulic Sluicing Co.	Evan Henry Lewis.
26/5/97	30	0	0	Paparoa Range	V.	" ..	Kahnui Extended	Cornelius R. Skelly.
				Kumara.				
19/1/89	10	0	0	Shamrock Lead	..	..	Long Tunnel ..	Kumara Long Tunnel Gold-mining Co. (Ltd.).
19/1/89	50	0	0	"	..	..	" ..	Ditto.
14/6/97	32	1	2	Larrikin's ..	..	..	Moynihan's ..	J. McGrath and T. Moynihan.
30/5/98	41	0	9	Shamrock Lead	..	..	" ..	
4/10/98	50	0	0	Mouth Greenstone Creek	..	..	Brodie's ..	John Brodie. "
4/10/98	96	0	17	Paddy's Gully ..	..	..	Herries' ..	Stewart Robert Harris.
10/1/99	82	2	0	Greenstone Creek (Westbrook)	..	..	Gillies' ..	James Douglas Gillies.
4/4/87	10	0	0	Mignonette Flat	..	..	Conoghan's ..	J. Conoghan, M. Madden, J. Light, N. Rochford, N. Rochford, jun.
17/2/93	9	0	0	Cape Terrace ..	..	..	Cape Terrace ..	Elizabeth Burr, Alexander Nesbit, Alexander Waters.
15/12/93	10	0	0	Dunedin Flat ..	..	..	Dunedin Flat ..	Henry Benger, David McConnon, George R. Rudkin.
8/5/95	8	0	0	Nardoo Flat ..	..	..	Nardoo Flat ..	Jane Bowden, Thomas J. Jones, Thomas Cundy, Thomas Marks.
14/4/97	16	0	0	Shamrock Lead	..	..	Cullen's ..	J. Cullen, W. Wells, W. T. Lamason, P. Franzine.
28/7/97	30	0	0	Maori Point (Greenstone)	..	..	O'Grady's ..	J. O'Grady, M. Ryan.
29/6/98	10	2	9	Education Reserve (Kumara)	..	..	Carlson's ..	Carl Peter Carlson.
29/6/98	5	3	3	Ditto ..	..	..	" ..	"
29/11/98	23	0	0	Kapitea Creek	..	..	Wylde's ..	James Wylde.
				Stafford.				
23/5/90	8	0	0	..	XV.	Waimea ..	Callaghan's ..	J. Dolph and party.
1/2/97	30	0	0	..	V.	Otira ..	Taipo Sluicing Co.	H. P. Hill.
2/9/97	7	1	39	..	XV.	Waimea ..	Goldsborough ..	J. McWhirter and party.
1/12/85	28	0	0	..	XIV.	" ..	Wheel of Fortune	G. F. Batchelor.
28/8/89	4	0	0	..	"	" ..	Stafford ..	Benjamin Lyons.
1/12/98	70	0	0	..	"	" ..	Wheel of Fortune Gold-mining Co.	Wheel of Fortune Gold-mining Co.
				Hokitika.				
25/1/87	15	0	0	Kanieri Forks ..	..	Kanieri ..	..	C. Davey, J. Grimmond, J. McKay, and W. G. Forbes.
1/7/83	60	0	0	Humphrey's ..	III.	" ..	..	Humphrey's Hydraulic Sluicing Co. (Ltd.).
10/8/93	11	0	37	Arahura Flat ..	II.	" ..	..	Augustus Boys.
29/3/94	16	2	38	Kanieri Forks ..	VI.	" ..	..	C. Davey, J. Grimmond, and M. J. T. Forbes.
21/9/95	100	0	0	Humphrey's ..	..	" ..	..	Consolidated Goldfields of New Zealand (Ltd.).
21/9/95	100	0	0	" ..	III.	" ..	..	Ditto.
21/9/95	100	0	0	" ..	"	" ..	..	"
28/9/95	100	0	0	" ..	II.	" ..	..	"
8/6/96	100	0	0	Mount Harman	..	Davey ..	..	Wilberforce Gold-mining Co. (Ltd.).

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices—*continued.*

Date of License.	Area.			Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
	A.	R.	P.					
				Hokitika—continued.				
22/3/95	50	0	0	Waiho ..	XI.	Waiho ..	..	Waiho Hydraulic Sluicing and Water-race Co. (Ltd.).
8/7/97	9	0	0	Shallow Lead..	I.	Kanieri ..	..	G. Noble, C. Crawford, and J. Stenhouse.
8/7/97	20	0	0	Lake Mahinapua	XI.	Mahinapua..	..	John Howat.
8/1/98	100	0	0	Seddon's Terrace	V., IX.	Kanieri ..	..	Joseph Grimmond.
29/1/98	75	0	0	Gillespie's ..	IX.	Gillespie's ..	..	Philip James Perry.
9/6/98	30	0	0	Gentle Annie Terrace	X.	Kanieri ..	..	C. J. E. Linnemann.
				Ross.				
1/3/83	60	0	0	Donoghue's ..	I.	Totara ..	Prince of Wales..	Charles Davey.
1/3/84	25	0	0	Ross ..	II.	" ..	Mont d'Or ..	Mont d'Or Gold-mining Co.
1/5/84	43	0	3	" ..	"	" ..	Ross United ..	Ross United Gold-mining Co.
2/10/89	10	0	0	" ..	"	" ..	Mont d'Or ..	Mont d'Or Gold-mining Co.
2/10/89	21	1	32	" ..	"	" ..	" ..	"
14/2/91	7	0	0	" ..	"	" ..	" ..	"
3/12/94	6	0	0	Redman's ..	I.	" ..	Chamberlain's ..	Robert Gow Chamberlain.
23/12/96	100	0	0	Ross ..	II.	" ..	Mont d'Or ..	Mont d'Or Gold-mining Co.
				Okarito.				
1/3/97	100	0	0	Waiho ..	XI.	Waiho ..	Waiho Hydraulic Sluicing and Water-race Co. (Ltd.).	Waiho Hydraulic Sluicing and Water-race Co. (Ltd.).

MARLBOROUGH DISTRICT.

Mahakipawa.

Work has been carried on in the King Solomon Claim with a view of striking the run of gold that was being worked when the claim was flooded out some years ago. So far the company has met with very little success. The position of the place where the run of gold was left in the flooded part of the mine has not been reached; from 200 ft. to 300 ft. have yet to be driven. Eight men were employed.

A small number of miners still continue to obtain a little gold by fossicking and working in the upper parts of the stream and its branches.

Wakamarina.

The company which for several years past has been engaged in working the Wakamarina Gorge was at last successful in bottoming the most rock-bound portion of its claim. The quantity of gold obtained was only about 50 oz., for which upwards of 128,000 cubic yards of gravel was raised and washed. This claim is now taken up by another party, who intend to try and get at the bottom near the mouth of the gorge.

Ground-sluicing is carried on in different parts of the creek and terraces, furnishing employment to a number of miners. Some of the claims are also worked by hand, and the washdirt afterwards sluiced.

Advantage is taken of the time when the river is low, and small quantities of gold are obtained from the rocky bars by a method known as "blind-stabbing."

Wairau.

A few miners still continue to obtain small parcels of gold by sluicing in the Onamalutu, Armchair, and other creeks on the north of the Wairau River.

NELSON DISTRICT.

Takaka District.

The mining industry at present in this locality is in a very low state. At the Bubu there are five parties working, who do not average small wages, on account of the scarcity of water for sluicing. Patterson and party are bringing up a drainage-race to work ground which is supposed to be rich, and expect to have it finished about the end of May. Whelham and mate are sluicing on Whelham's freehold property, and are well remunerated when they have a good supply of water. J. Rose is also sluicing in the winter months, but has to get protection during summer. Cate and son are fossicking, but are doing very little. There are four old men also fossicking on the Bubu. At Anatoki, Jackson and party are bringing in a head-race about a mile long to work a terrace along the Anatoki River. They are very sanguine as to the result, as they have well prospected the terrace before going to the expense of the race. If this claim proves payable, very likely other parties will take up the terraces along the river. In former years several persons have worked the bed of the river during the summer months, and now three parties are working there, who, when the river is low, make fair wages. Stewart and Bamford have taken up a claim at the head of the Anatoki, on a beach left by the river taking another course, and their prospects appear

favourable, though the size of the boulders hampers operations. James Smith is working at the head of the Waingaro, and is reported to be making good wages. The group of claims adjoining Jacobsen's, at Anahau Race, has been abandoned.

There have been several samples of the ore sent to different places for analysis, but all proved that gold in payable quantity did not exist there. The great drawback to the mining industry in this district is the want of water-races to convey the water to work the higher levels. It is generally believed that if water could be brought on to the terraces the ground would pay.

Parapara Hydraulic Sluicing and Mining Company, Limited, Parapara (Area, 150 acres; mine-manager, W. Peters).—This company holds a water right of one hundred heads from the Parapara River, and has two miles and a half of race, 4 ft. by 3 ft. 6 in., in addition to two miles of steel piping varying in diameter from 2 ft. 6 in. to 1 ft. 6 in., giving a pressure of 200 lb. per inch. The wash, which is worked by hydraulic sluicing and elevating, is very hard and cement-like. During the year 800,125 yards of material were operated on, taking an area of about 4 acres. The gold is of good quality, being valued at £3 18s. per ounce. Twenty men were employed. The company obtained 355 oz., valued at £1,370, for the past year's work.

Excelsior Claim, Rocky River (Area, 30 acres; manager, A. Trent).—About half an acre of ground only has been worked on during the year, for a yield of 8 oz. of gold. There is two miles of race, with an average of nine heads of water, with a pressure of 150 ft. Five men are employed.

Reddan's Claim, Victoria Creek, Kaituna (Area, 5 acres).—This claim has only been worked for a short period during the year, yielding some 12 oz. of gold, valued at £40.

Lash and Son's Claim, Appos Creek (Area, 2 acres).—Three to four men have been engaged here. The claim is worked by hydraulic sluicing, and the returns are considered payable.

Benson's Claim, McArtney's Hill (Area, 2 acres).—This cement claim is worked by sluicing, a water-race two miles in length, with 700 ft. of 8 in. steel pipes, gives a pressure of 200 ft. Two men were employed for a yield of 80 oz. of gold, valued at £3 13s. 6d. per ounce.

Hawkins's Claim, Lightband's Gully (Area, 2 acres).—A water-race four miles and a half in length, with 1,800 ft. of steel piping, 6 in. diameter, gives a pressure of 50 lb. The results not having proved payable, the owners intend removing the plant about a quarter of a mile from the present scene of operations, and have applied for a 5-acre claim. An acre of ground was worked during the year for a return of 77 oz. of gold, valued at £3 15s. 6d per ounce.

Collingwood District.

Collingwood Goldfields (Limited), Quartz Ranges (Area, 230 acres; manager, F. G. Mace).—This claim, which will, it is anticipated, be shortly in working-order, has some four miles and a half of races, with a capacity of fifty-two Government heads of water, and 3,000 ft. of piping varying in diameter from 13 in. to 30 in., with a pressure of 300 ft. The cost of the races and plant is about £20,000, and seventy men are employed. A most comprehensive account of the preliminary works appeared in my report of last year. The manager, Mr. Mace, gives the following information:—

"The company have been in operation for nearly three years. The work of bringing in water from the Boulder River is on a large scale. The flume, which is nearly four miles long, is 4 ft. wide by 3 ft. 3 in. All sills and under-work are of matai timber, bottom and sides of rimu 1½ in. thick. Several bridges of considerable size occur along the line of race, one nearly 90 ft. high and 200 ft. long; also several tunnels. The quantity of timber used in construction of the flume is approximately 700,000 ft. The company own their own sawmill plant. The total cost of timber delivered at commencement of race will not exceed 4s. 6d. or 5s. per 100 superficial feet, including haulage up an incline of four miles and a half in length (by tramway, 2 ft. 6 in. gauge). This is exclusive of cost of mill and part cost of tramway, which is chargeable to timber account. Benching for flume was started twelve months ago, and is now pretty well completed. In addition to the main flume several miles of race are now cut and ready for work to carry water to different parts of the claim. It is proposed to open out in several places, and ultimately to employ eight Giant nozzles. The fall for tailings is ample. The company are constructing a dam, at an altitude of 3,000 ft., to impound the waters of the Boulder Lake, which, when completed, will gave a storage capacity covering 150 acres 16 ft. in depth, or approximately 104,000,000 cubic feet of water. The natural facilities for working the property are excellent—a never-failing water-supply, abundance of timber, and washdirt moderately fine and friable.

"The following is a description of the improved Giant nozzle: The arrangement of the horizontal joint in the improved Giant nozzle does away with the objectionable king-bolt used in many nozzles, and distributes the friction evenly on the whole joint. The joint consists of an accurately turned groove in casting A, into which is fitted a turned steel ring in two segments; these work freely in groove. Over the half-rings is fitted a solid steel ring, which is fastened to the two half-rings by ten stud-bolts. This then forms the flange to couple with casting B. A leather washer is inserted between the joints of the castings, which is brought up 3 in. on the casting A and trimmed the casting, which also should be turned smooth. This then forms a perfect hydraulic joint. The rifle in the director is in one piece as shown, and completely breaks the centrifugal motion of the water, and gives a solid, direct discharge. The ball-and-socket joint is of the usual pattern."

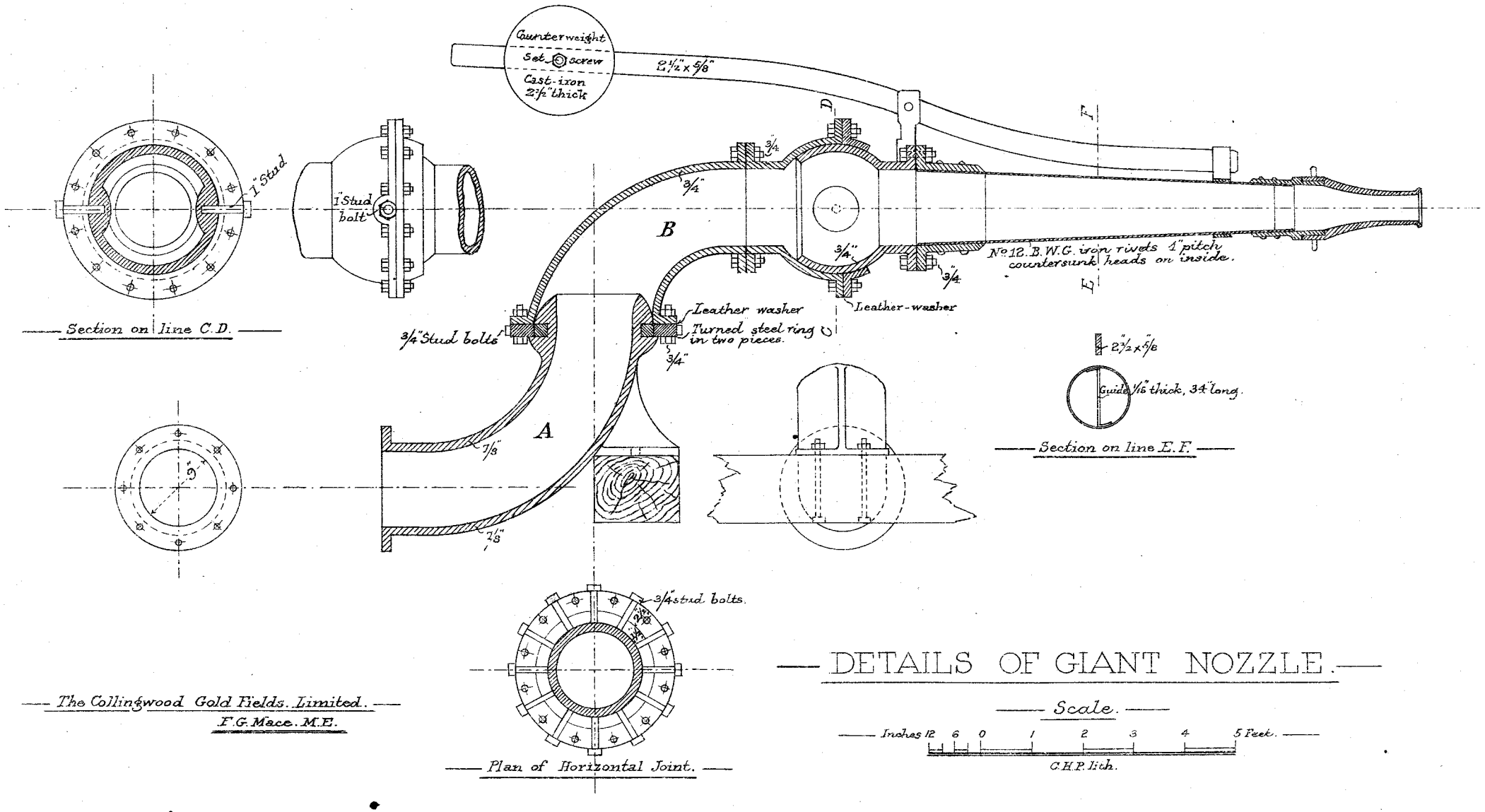
WEST COAST.

Karamea.

Several parties still continue to prospect along the banks of the river. A hydraulic-sluicing plant and water-race are in course of construction to operate on some of the terraces. The plant, which is owned by Mr. McKerrow, has not yet been completed.

Mokihinui.

No operations are in progress on the river or its branches, but on the beaches and sand-hills extending from the Mokihinui to the Orawaiti River, near Westport, about a hundred miners are located. The returns from this class of mining are every year becoming more precarious and uncertain.



Section on line C.D.

Section on line E.F.

Plan of Horizontal Joint.

DETAILS OF GIANT NOZZLE.

The Collingwood Gold Fields. Limited.

F.G. Mace. M.E.

Scale.

Inches 12 6 0 1 2 3 4 5 Feet.

C.H.P. lith.

Waimangaroa River.—Along the banks of this stream ten parties make fair wages by driving small tunnels into the banks and washing the gold-bearing drift in the stream by the use of long-toms.

Fairdown Claim (Area, 100 acres; owners, the General Exploration Company, Limited; mine-manager, Wilfred Cottrell).—This claim is situated at Christmas Terrace, about seven miles from Westport. The nature of gravel deposits and depth of stripping are as follows: Raised marine terraces, 15 ft. to 30 ft. of sand and shingle deposits, with varying proportions of magnetic and titanic sands, gem sand, and fine hornblendic *débris*. The beach deposits are covered by overburden, varying in depth from 20 ft. to 60 ft., of subangular coal-grit, sand, and boulders. The ground is worked by hydraulicking, the larger boulders being hoisted out of the face by a steam-crane. 120,000 yards of gravel (180,000 tons) was operated on during the year. There are two miles of race to the reservoir at Lake Rochfort, of a capacity of eighty heads; head-race to drain, one mile, fifty heads capacity. The total pressure used for hydraulicking is 380 ft. When there is a reasonable warrant for the expenditure the Wareatea water will be brought in, complete surveys and estimates for the work having already been prepared. Seven men are employed.

Orawaiti River.

Mackle and Party's Claim (Area, 6 acres).—This claim is situated at Caledonia Gully. The operations consist of sluicing and raising the *débris* by means of an elevating tramway worked by a water-balance. The face operated on is part of a bed of tailings that was deposited in the Caledonia Gully from the upper terraces, the result of earlier washings, which have filled the gully to a depth of 50 ft.

Jamieson and party of two men are at work in an adjoining gully. They have driven two tunnels, 1,300 ft. and 700 ft. The washdirt, which is taken out by hand, is sluiced by water brought in from Ballarat Creek.

Bradshaw Terrace.

Several claims are being worked, the wash consisting of black sand, sometimes interspersed with clean water-worn stones and boulders.

A small crushing-mill is also at work reducing cement.

Addison's Flat.

Halligan and Party's Claim.—This party of six men continue sluicing operations on the east side of the Charleston Road.

Shamrock Claim.—Since the extension of the sand-tunnel and the removal of the elevating plant to the north face were completed sluicing operations have been carried on by two shifts, with profitable results. Eleven men were employed.

Venture Claim.—This claim is on a cement lead, a battery of ten stamps, driven by water-power, being used. The layer of cement is from 8 ft. to 10 ft. in thickness, and is conveyed to the battery by a tramway about 60 chains in length. The cement is broken and sent to the mill by contract labour. Seven men were employed.

Golden Sand Claim.—The face of cement which was previously worked was found to contain too many stones and boulders for profitable treatment by the battery. A new face has now been opened at the south end of the claim, and from this better results are being obtained. It is intended to remove by sluicing the vegetation and soil on the surface, as the fibrous material from the roots was detrimental to the discharge of the crushed sand through the gratings.

Bendigo Claim (Area, 80 acres; owners, the General Exploration Company, Limited; mine-manager, James Meehan).—During five months an acre of ground was operated on, and 28,000 yards, or 37,000 tons, of gravel treated. There are ten miles of races delivering fifty-five sluice-heads of water. The pressure for ground-sluicing is 200 ft., and 175 ft. pressure is used for the Pelton to work the winding gear. The work of opening out is completed, and the face now being advanced is expected soon to be in payable ground. Eight men are employed.

Virgin Flat Claim (Area, 99 acres 3 roods 35 perches; owners, Virgin Flat Gold-mining Company).—A considerable amount of prospecting was done by sinking a number of shafts in order to ascertain the value of the wash, the average depth of the shafts being about 15 ft. from the surface to the blue bottom. The wash, which consists of fine gravel, is to be all sluiced away, as there is gold distributed through the whole mass from top to bottom. In order to deal with this extensive deposit a water-race is being constructed. The water is taken from three of the branches of the Totara River, and conveyed through tunnels into a storage-dam—area, 30 acres, and about 25 ft. in depth at the deepest part. The water is carried in an open ditch from the dam to the penstock at the head of the pipe-line. The pipes are to be a mile and a half in length to convey the water to the claim. A tunnel tail-race 60 chains in length, 5 ft. in height, 4 ft. 6 in. wide at the bottom, 4 ft. wide on top, all closely timbered, is approaching completion. At the end of this tail-race a set of tables 300 ft. by 16 ft., partly covered with baize and partly copper plate, is also in course of construction. The total capacity of the race will be seventy sluice-heads. The whole of the work in progress is in an advanced stage, and it is expected that all will be completed in four months; but, as the pipes have to be made on the ground, further time may elapse before sluicing operations can be commenced. The necessary buildings, consisting of an office, men's huts, store-room, carpenter and blacksmith's shops, and also a large shed for use in making the iron pipes, have been erected. The whole of the iron for the pipes and siphons is shortly expected from England. Eighty-two men were employed.

Croninville.

O'Donnell's Claim (Area, 8 acres; owners, James and Michael O'Donnell).—This claim is worked from an open face having 12 ft. of wash. About 20 ft. of stripping has first to be sluiced away. About an acre was operated on during the year, which yielded 50 oz. gold, valued at £200. Three men were employed.

Brown's Terrace Special Claim (Area, 68 acres; owner, the General Exploration Company, Limited; mine-manager, W. Cottrell).—This claim is situated some two miles north of Charleston. The ground is under preliminary examination and survey, and a large number of prospecting-shafts have been put down. Three men are employed on this work. It is proposed to bring in water either from the Nile or Totara River. There is a very large quantity of material to be operated on when the water-supply is completed, and an ample fall for tailings.

Persevere Claim (Area, 10 acres, 3 roods 39 perches; owner, Thomas Shine).—This claim is worked from an open face, and has a tunnel tail-race about 40 chains in length. The face is 30 ft. high, with 10 ft. of wash. About half an acre of ground was worked during the year, yielding 100 oz., valued at £400. Value of plant, £1,000. Four men were employed.

Charleston.

Powell's Elevating Claim (Area, 27 acres).—This claim is situated near the beach. The material dealt with is sand, with occasional small stones. After being elevated, the sand passes over a series of eight copper tables, 6 ft. by 6 ft., with a continuation of eight baize-covered tables, also 6 ft. by 6 ft. The water-race is eight miles in length, with 60 chains of iron pipes, having a pressure of 200 ft. from the seven heads of water used. The discharge is through a tail-race 5 chains long, leading into the sea. Eight men were employed.

The Argyle Water-race is now let at a yearly rental, and under this system gives general satisfaction.

Lucy Special Claim (Area, 33 acres; owner, Fox River Prospecting Association; mine-manager, A. M. Bourke).—The principal work done in this claim was of a prospecting nature. The cement is from 10 ft. to 20 ft. in thickness, with 10 ft. to 12 ft. of wash underneath. A tail-race tunnel 1,000 ft. in length was put in to drain the area. Three men were employed. Active operations in clearing the ground for development are now being carried out under the general supervision of Mr. A. M. Bourke on Fools' Terrace. At least thirty prospecting-shafts from 5 ft. to 15 ft. in depth have been sunk for the purpose of testing the value of the wash.

Brilliant Claim (Area, 3 acres 3 roods; owner, Bernard Shepherd).—This ground is operated on by ground-sluicing, and is a deposit of tailings from former claims. There is, however, still a sufficient quantity of gold in the material to pay for its being reworked. There is also another bottom with about 5 ft. of sand and wash underlying the old workings, and the material on this bottom is dealt with at the same time. About 40 oz., valued at £158, was obtained for the year. Value of plant, £180. One man employed.

Enterprise Claim (Area, 9 acres; owners, Norris and Tyther).—This cement claim is worked from an open face connected with a tramway 200 yards in length to the battery. The battery consists of four stamps, 250 lb. each, and valued at £100, and is driven by an overshot water-wheel which is 30 ft. in diameter and 2 ft. 6 in. breast. The cement is about 4 ft. in thickness with the same depth of stripping. Crushing has only been carried on for about half of the year, which resulted in producing gold to the value of £400. Four shareholders work the claim.

Tailing Claim (Area, extended; owner, Edward McClatchie).—This claim is worked by ground-sluicing, and 2 acres operated on during the year produced gold to the value of £79, the ground being poor. Two men were employed.

Morning Star Claim (Area, 6 acres; owners, Dwyer and Connolly).—This is a cement claim with 6 ft. of gold-bearing material and 6 ft. of stripping. The only work done during the year was the constructing of a tail-race for the purpose of stripping and falling the cement by hydraulic nozzle. Three men were employed.

Lucinda Special Claim (Area, 52 acres; owner, Fox River Prospecting Association; mine-manager, A. M. Bourke).—This claim is a free sluicing area, originally beach deposit, and is an extension of the back lead of Addison's and Croninville. A water-race is to be brought in from the Nile River to work the claim. Three men were employed.

Considerable numbers of parties still continue to earn fair wages by beach-combing—that is, gathering up the black sand thrown up and concentrated on the beach after a storm. The gold, which is of a fine character, is deposited with the heavier sand by the operation of the waves. The sand, after being collected, is washed by being sluiced over quicksilver tables, for which purpose water is conveyed in flumes from the small creeks that flow toward the ocean.

Buller River District.

A considerable number of miners are still engaged on various terraces and leads along the banks of the Buller River. Opposite Berlin's several parties are employed. Prospecting-work has also been carried on by McGregor and party on the opposite side of the river to Della Vedova's house. The Deep Creek Sluicing Company have let their claim on tribute. A number of parties are sluicing near Ryan's land at Fenian Creek. A few Chinamen are also working on the point of a spur at the junction of the Lyell and Buller Rivers. Several parties of Chinamen and a few Europeans are working at the Big Flat, four miles above Lyell. Several parties are also working on the terraces at Fern Flat, near which place dredging is carried on in the Buller River. A few Chinamen are working at the Murchison.

Matakitaki.

About forty miners are engaged between Murchison and a point about twelve miles up the stream.

Maruia.

A number of miners still continue to find employment in ground-sluicing along the banks and terraces. Messrs. J. and G. Walker have also been engaged in bringing in a water-race a distance of four miles for the purpose of working the Jubilee Claim of 40 acres by hydraulic sluicing.

Hector Sluicing Claim.—This company hold an area of 39 acres 2 roods, and employ ten men. The washdirt is about 70 ft. in depth, with coarse boulders, and the water-supply depends much on the season. Plush tables have been erected to save the fine gold, with satisfactory results.

Mitchell, Phillips, and party are also bringing in a water-race from Stockyard Creek, in order to work their claim of 25 acres by hydraulic sluicing. This claim is situated on the opposite side of the stream to the Hector.

A few parties are also finding employment by ground-sluicing at the Mangles.

Inangahua District.

Some Europeans have been prospecting. A number of Chinese are working ground at Coal Creek, besides a number being engaged in sluicing at Winding Creek.

Boatman's Creek.

Rodgers and party have put a cutting through a point and diverted the creek. They expect about three years' work in the ground from which the water has been diverted.

Merrijigs.

The A1 Company are still engaged in ground-sluicing their claim on the Snowy Creek; their race has a capacity of twelve sluice-heads.

There are nine miners sluicing at Big River Creek.

Grey River District.

Antoni's Creek.—Twenty-four Europeans and thirty Chinese are engaged in alluvial mining. The washdirt is from 3 ft. to 9 ft. thick.

Blackwater Creek.—There is a considerable area of alluvial ground worked in this district. Long-toms are chiefly used in washing the gold-bearing gravels. In some cases the surface is sluiced off the washdirt, while other parties work the ground by driving, and very satisfactory results are in many instances obtained. On this creek there are a hundred and twenty Europeans and eighty Chinese at work.

Junction and Noble's Creeks.—A few Europeans and Chinese work along the banks of these creeks by ground-sluicing and alluvial mining.

A considerable number of miners are employed in ground-sluicing at Brandy Jack's Creek and its branches—the Teviot, Half-ounce, Duffers, and Granville Creeks.

Orwell Creek.—This place continues about the same. The old Napoleon Gold-mining Company worked their ground down the flat until driven out by water. The ground is now worked by other claimholders. Graham and party (eight men) have taken up 20 acres in Taylor's Gully. The ground is 70 ft. in depth, and the party have erected machinery for pumping and lifting purposes. This district suffers from the want of water.

Ahaura District.

A number of parties are engaged in hydraulic and ground sluicing between the Ahaura Bridge and the Gorge.

Dunn and party own two claims on the north bank of the Ahaura River, with a total area of 14 acres 3 roods 28 perches. The claims, which are worked by hydraulic sluicing, produced 300 oz. of gold for the year, valued at £1,170. The height of the gravel face operated on is from 12 ft. to 80 ft. The water-race is four miles in length, with 1,500 ft. of pipes, and gives a pressure of 80 ft. The value of water-race and plant is £1,800. Four men were employed.

Hargreaves and party are also hydraulic-sluicing about one mile and a half above Dunn's. Their face is about 60 ft. in height, and the tailings are discharged direct into the creek.

About a dozen small parties of one and two men each are ground-sluicing near the Junction, and about a mile up the Nancy Creek. Other parties are engaged at the foot of the terraces on this creek.

Callaghan's Creek.

German Gully Claim (Area, 30 acres).—This claim belongs to a Sydney syndicate. A tunnel which was driven 29 chains will have to be extended a further 26 chains before the drainage of the claim can be effected. Boring operations have been carried on, to test the depth and value of the wash, under the direction of Mr. Bowman, C.E., who has reported to the owners as to the best methods of future working.

Several parties are ground-sluicing in the gully further up than the German Gully Claim.

Nelson Creek.

In this old mining district employment for ninety miners is found. Some prospecting has also been done by aid of Government subsidy.

Shellback and Baxter's Creeks are worked by forty Chinese.

Moonlight Creek and its tributaries give employment to sixty miners.

A few parties are also employed at Slaty Creek.

Healey's Gully.

Republic Sluicing Company (Area, 30 acres; owners, Thomas Jones and others; mine-manager, John Hay).—This claim is operated on by hydraulic sluicing, and 450 oz. of gold was obtained for the year, valued at £1,777 10s. The water-race is two miles in length, with a capacity of thirty-five heads, with 700 ft. of 22 in. and 1,000 ft. of 15 in. pipes. The water-race and plant is valued at £4,000. Sluicing has been very intermittent since Christmas, as the weather has been

very dry during that time. The company have under consideration the construction of a dam, which would have been made before now had they been in a position to have undertaken the work. This has become an urgent requirement, as there has been lately several more claims taken up, and under present conditions the company will not be able to supply all the parties with the water they have applied for. The private parties are doing better now, as the ground improves going into the hill, and from present appearances they will continue to do well. In the Republic Claim the company have lately been putting down iron rails at intervals in the tail-race. This has effected a marked improvement in the saving of gold. It breaks up the stuff much better than is done on a straight run of ordinary blocks. Eleven men were employed.

Roaring Meg Sluicing Claim (Area, 50 acres; owner, G. Perotti).—Very little work has been done during the year. The derrick and machinery that were to have been used for the removal of the large boulders have not yet been erected, and the plant is still lying at the roadside about four miles distant from the claim. Sluicing operations have consequently been limited. It is intended that all boulders 10 tons and under will be removed by the derrick, and those of larger size will be broken up by explosives, so that they can be made of fit size to be removed. Until the derrick is fitted up it cannot be expected that much progress can be made.

Grey River Claim (Area, 30 acres; owners, John T. Kinsella, Joseph Shrives, and Joseph Stenhouse; mine-manager, Joseph Shrives).—This claim is situated two miles east of Blackball Township, and is worked by hydraulic sluicing. About 60,000 yards of material was operated on during the year, giving a return of 150 oz. 10 dwt. 17 gr. of gold, valued at £594 12s. There are three miles of water-races, with a capacity of fifteen heads, and 8 chains of 13 in. pipes. The value of water-races and plant is £1,500. Four men were employed. This claim was only worked for about eight months.

No Town District.

Several miners are still employed in this district. Prospecting-shafts were sunk in a line across the gully by a party, who were subsidised under the prospecting regulations.

Several claims are worked from drives put into Red Jack's Terrace, the gravel being brought out and sluiced at No Town or Twelve-mile Creek.

Bell Hill Claim (Area, 49 acres 2 roods 23 perches; owner, Bell Hill Gold-mining Company, Limited; mine-manager, Thomas Stafford).—This claim is situated at Deep Creek, a tributary of the Arnold River, and is worked by ground-sluicing. The face of gravel varies from 100 ft. to 150 ft. About 59,300 yards of gravel was operated on, which yielded 155 oz., valued at £610. There are two miles of water-races, with a capacity of twenty-five heads, with 700 ft. of 18 in. and 15 in. pipes. The plant is valued at £7,740. This claim was short of water for ten weeks. Ten men were employed.

Sulky Gully is situated on the north of the right bank of the Grey River, about two miles behind Taylorville. Wills and King completed a race to bring in water to work the ground in this locality by hydraulic sluicing. A subsidy was granted for the construction of this race, the owners agreeing to sell one-third of the water at Government rates. Several parties of Chinese are also working in this locality.

Wills's claim and other ground are giving profitable returns.

Between Cobden and Point Elizabeth a few prospectors are engaged on the beaches.

To the northward of Point Elizabeth some prospecting has been done at the Ten-mile.

Fourteen-mile Beach.

The Pactolus (Area, 100 acres; owner, the Pactolus Sluicing Company; mine-manager, George Morris).—This ground is worked by ground-sluicing. Only a small experimental washing was made during the year, and gold obtained to the value of £4 17s. 9d. There is one race a quarter of a mile in length carrying eight heads, and another of two miles, which will carry ten heads, is under construction. There is also 14 chains of 11 in. pipes. The value of the water-races and plant is £2,500. From ten to twenty men were employed.

Seventeen-mile Beach.

Barrytown Flat No. 1 Claim (Area, 192 acres; mine-manager, William White; owners, the Barrytown Flat No. 1 Gold-mining Company).—This claim is worked by hydraulic elevators under a pressure of 600 ft. For the eight months worked, 193,600 cubic yards of material was operated on, giving a return of 714 oz., valued at £2,803. The water-race consists of 1 mile 33 chains of fluming with 50 chains of 15 in. pipes. The value of the water-race and plant is £12,000. Twelve men were employed.

Special Claim No. 63 (Area, 100 acres; owner, the Barrytown Flat No. 2 Gold-mining Company; mine-manager, George Reeves).—The owners propose to work this claim, which is composed of beach-gravels to a depth of 25 ft., by elevating. When the works are completed there will be 4 miles 66 chains of water-races with 120 chains of piping, and the pressure of water will be 600 ft. The value of the whole work when completed will be about £20,000.

Canal Creek.

Waiwhero Claim (Area, 300 acres; owner, the Waiwhero Sluicing Company; mine-manager, Thomas G. Davis).—The claim is worked by ground-sluicing. The washdirt varies from 12 ft. to 30 ft. in thickness, and the stripping 5 ft. to 25 ft. About an acre was operated on during the year, giving a yield of 213 oz. 6 dwt. 21 gr., valued at £853 18s. There are three small water-races completed—the first a mile and three-quarters in length, with a capacity of five heads; the next three-quarters of a mile, with fifteen heads; and the third three-quarters of a mile in length, with forty heads. There is also a five-mile race under construction which will have a capacity of thirty heads. The estimated value of water-races and plant is £9,000. The present water available is

from three small creeks, supplying from five to fifteen heads, conveyed by branch race into the main race from Canoe Creek. About forty men were employed.

A considerable number of miners continue to find profitable employment on the beaches between Barrytown and Brighton, and also on White Horse Terrace to the north of Brighton. Work is also being done in the creeks and on the terraces, where ground-sluicing is carried on. On some of the terraces cement occurs similar to the cemented sand in the Charleston district.

Greymouth District.

Between Greymouth and Hokitika small parties of miners are engaged on suitable parts of the beach in beach-combing and ground-sluicing. At Saltwater River several parties of Chinese and some Europeans, up as far as the Township of Marsden, are employed ground-sluicing, chiefly on the old worked ground. Since the proclamation of Saltwater River more attention is being directed to the ground towards the mouth of the stream, and a small rush took place on Crown land. A few miners continue to find employment in ground-sluicing in the Dunganville and Maori Creek district.

At Mosquito Flat about fifty miners are employed in alluvial mining. Ground-sluicing, long-tom, and cradle are used for washing whenever found suitable.

Greenstone.

The Galtimore Hydraulic Sluicing Claim, situated about two miles above Maori Point, is worked on the face of a high terrace. The wash is intermixed with large boulders, which are very difficult to handle. The owners have therefore constructed a tail-race, lined with strong logs, and having a fall varying from 1 in 6 to 1 in 3. With a small head of water at their command they are enabled to send away by the tail-race boulders as much as 3 tons in weight. The gold is chiefly of a coarse description, but even in that case some gold must be washed down, the tail-race having such a steep gradient.

Several parties of Chinese are working between Maori Point and Greenstone.

Hydraulic sluicing was carried on by the Greenstone Company during wet weather and when water was available, but latterly the claim was sold to a Christchurch syndicate, and since the sale very little work has been done.

Prospecting was carried on in the Blackwater district, and a small rush took place on an alluvial terrace. About twenty persons are finding employment in claims they have taken up.

No work is being carried on at Fuchsia Creek.

At Westbrook four parties of Europeans and four parties of Chinese are working ground-sluicing claims.

Deep tail-races are cut through the "blue reef," and in order to carry the sluiced material across the road, the boxes are erected on high trestles.

Johnson's Terrace.

Anderson and party and Baucke and party are working claims on this terrace, but are frequently idle on account of scarcity of water.

Cape Terrace.

Lohmann's Claim (Area, 4 acres; owner, T. T. Lohmann).—This claim is worked by hydraulic sluicing. The gravel deposit is from 45 ft. to 80 ft. in depth. There are two water-races—the head-race one mile and a half in length, and another one mile, together carrying ten heads during wet weather. In connection with these races there are two lengths of 100 ft. each of 11 in. and 15 in. pipes. Two dams are used for storing the water from the head-race, which hold sufficient water to carry on operations for a week in the dry weather when there is very little water in the race. About twenty heads are used when sluicing is carried on. Four men are employed.

A number of dredging claims have been marked out on the Greenstone Creek, on the Teremakau River, near the junction of the Greenstone, and in the vicinity of Cape Terrace. Several shafts have been sunk in the creek, and the bottom reached at about 25 ft. A centrifugal pump was used while sinking, and the whole of the wash was passed through a sluice-box. This was an excellent method of ascertaining the value of all the material taken out in sinking. The prospects obtained from the shaft were so encouraging that a local company have subscribed sufficient capital to put a dredge on Greenstone Creek, at a place located by Mr. Gardiner Wilson, who had charge of the sinking operations.

Kumara.

This goldfield, which was opened in 1876, still affords profitable employment to a considerable number of miners. Although the most productive portions have been worked out, the field is not yet exhausted, and the extensive deposits of auriferous wash already worked, from Larrikin's on the southward to the neighbourhood of the Teremakau Bridge and the Town of Kumara, will doubtless in time be traced further seaward. Throughout the field the principal gold deposits are found in wash extending from near the surface to a depth of about 35 ft., and in the vast accumulations of granite- and quartz-gravels intermixed with fragmentary portions of rock borne from the mountains. This moraine deposit does not in itself contain any great proportion of the gold recovered, but is partly intermingled with the more ancient auriferous gravels. In some parts, such as the hills near Dillmanstown, where these deposits have been removed, the faces sometimes exceed 200 ft. in height above the bottom on which the gold-bearing gravels rest. The back leads, as far as traced, show that the bottom on which the auriferous strata rests has a general inclination in the direction of the ocean. Hydraulic sluicing with a large water-supply is now, and has been, the method adopted in dealing with these large quantities of gravels. The locality of the chief leads is on the extensive terrace running along the south or left bank of the Teremakau River, and extending from

thence to the Kapitea Hill. The terrace has a general elevation above the river of 200 ft., and, in order to afford sufficient fall to convey the gravel from the leads into the river, tunnels, used as channels for that purpose, have been constructed. These channels or tunnels are commenced at a considerable height above river-level, and have a gradient of from 4½ in. to 6 in. in 12 ft.; this fall being sufficient to run off the gravels and boulders when a requisite flow of water is available. From these channels tail-races are driven towards the claims to be worked, the tail-races having a much steeper gradient than the channels. When a tail-race reaches the most advantageous point in the ground a shaft is sunk from the surface to meet the tail-race tunnel, the upper end of the tail-race being usually from 20 ft. to 30 ft. deeper than the bottom on which the wash-gravel lies. On communication from the surface to the tail-race being effected, the water is laid on, and the whole of the gravel surrounding the shaft washed down until the bottom on which the lead-gravels lies is reached, the gold being saved as the mass passes along the tail-race into the channel. When a tail-race is commenced it is made with an easy angle from the channel, so that the current may not be impeded by the material flowing from the tail-race to the channel. As soon as the required space is made around the shaft the larger stones and boulders are stacked on the bottom, sluice-boxes are introduced, into which the gravel is washed from the faces, and in these boxes the greater part of the gold is retained. As the claim gets worked it presents the appearance of a large paddock or excavation about 30 ft. or more in depth, on the bottom of which immense piles of boulders are stacked, with lines of sluice-boxes leading to the various parts of the face, at which the hydraulic nozzles are at work undermining the gravel and washing it into the boxes. The larger stones are stacked, and only those that are manageable permitted to pass through the boxes, down the shaft, and into the tail-race, to be discharged into the main channel.

In order to work a claim to advantage there are several faces which are operated on alternately, the man at the nozzle being employed at one face, whilst the rest of the party are stacking boulders from the other faces. The sluice-boxes are paved with blocks of wood set on end. These blocks, which are sometimes cut from round logs, were formerly used from 12 in. to 18 in. in depth, so that on the one end becoming worn and uneven the block could be turned, and again present an even surface. The method now most commonly in use is to cut the blocks, 7 in. or less in depth, from squared logs, so that when the surface becomes too much worn the blocks are removed and replaced with fresh ones. The tail-races and channels are for their whole length laid with boxes, the bottoms of which are paved with blocks, the boxes varying from 22 in. to 32 in. in width. A footway is generally left by the side of the boxes, for persons employed in looking after the races, and in repairing, cleaning up, or renewing the blocks.

The channels are maintained by trustees, who are entitled to the whole of the gold saved in them; while the gold recovered in the tail-races leading into the channels belongs to the owners of the claims who use these tail-races.

The water for sluicing is obtained from the Government water-race, and is supplied to the claimholders at the rate of 7½d. for each sluice-head per hour, the sluice-head being 60 cubic feet of water per minute. Flush-water is supplied free for the purpose of keeping the boxes in the channels clear. This is measured out in proportion to the whole quantity that may at one time be used by all those sluicing their tailings into the channel.

The channels that have been constructed up to the present are—Nos. 1 and 3, length 77½ chains; No. 2, 35 chains; No. 4, 42½ chains; and No. 5, 55 chains in length. There are also other channels, owned by and under the control of private parties, such as McGrath and Moynihan's, situated between Nos. 2 and 3 channels, but having its discharge at a height above the entrance to those channels. Carlsson's channels, one situated between Nos. 2 and 3, the other running parallel with No. 5 channel, have also a higher discharge, which permits of the *débris* being deposited on top of the tailings already accumulated from the other channels. Another channel, to command some ground near Larrikin's, is being constructed by McGrath and Moynihan. There are also several shorter channels held by private owners. No. 1 channel did good service in the past, but is now worked in conjunction with No. 3, both being used as one channel. No. 5 is only just completed, and some time must elapse before the claims are connected with it. These five channels have been constructed at various periods, largely with the aid of subsidies from the Government.

The water supplied to the claims and channels is from the main race and branches, but chiefly from the Kapitea Hill branch. This race runs along the hill in an open ditch, from which water-mains lead to the Nos. 3 and 4 channels and the groups of claims that use them. Open ditches convey flush-water to each channel, and this leaves the whole of the water in the mains to supply the nozzles in the claim-workings. All the ground-sluicing is carried on similarly to what has been described.

The immense quantities of gravel and boulders that have been discharged into the Teremakau River for a period of upwards of twenty years have filled up the bed as well as the beaches of the river, and difficulty is now experienced in getting rid of the *débris* from present operations. The No. 5 channel commands those parts of the lead at the back of and towards the town, but, in order to work a further extension of the lead seawards, other channels must be opened to discharge into the river further down; and on the success of the claims at No. 5 being assured, a No. 6 channel and others will doubtless be taken in hand. The cost of these channels has been very great; the opening of others will also be expensive; and, as new channels cannot be constructed with a fall such as the others have, a much greater quantity of water will be required for flushing purposes. The supply from the Kumara Water-race, which is being augmented by the Wainihinihi extension, as well as by the conservation of the rainfall at Kapitea, will be sufficient for carrying on more extensive operations in ground-sluicing; but, should it become impracticable for the outfall channels to be used for that purpose, the gravels are not sufficiently gold-bearing to be profitably dealt with by hydraulic elevating. With the exception of those parts of the leads which were first worked out by mining,

the yield of gold per cubic yard has been so small that ground-sluicing with an ample supply of water was the only means of dealing with the gravels and extracting enough gold to pay for working.

Another feature in connection with the field is that, in addition to the leads of gold lying near the surface, it has been shown that there exist deeper leads, the result of older beach concentration, and it is probable that some of these may be profitably worked by mining from tunnels. Several parties are employed in drives put in from the face of the terrace, those drives being made with just enough fall for drainage, and the leads of wash are worked in the ordinary way of alluvial mining. A low-level prospecting tunnel, 7 chains to the southward of No. 3 channel, has also been driven to test the deeper ground, and the presence of a lead of gold-bearing wash has been demonstrated. The owners have been subsidised by Government in doing this work, and further assistance is promised for more extensive operations towards ascertaining the value of what has already been found, and also in continuing the prospecting-tunnel towards Kapitea Hill, where the "blue reef," or marine bottom, rises nearer the surface.

A hopeful anticipation of proving the nature of deposits under the Kumara terraces, and of finding deeper leads of gold, is shared by nearly all who have been mining on the field; and efforts continue to be directed to that end, but prospecting-works of this kind can only be from drainage-tunnels. The vast quantities of water with which the whole of the ground is charged must preclude shaft-sinking until drainage is effected.

The gradual exhaustion of the leads of payable gold-bearing wash amenable to hydraulic sluicing will permit of some of the water from the race being applied to other purposes, and it is evident that considerable time must elapse before the gold in this district is exhausted.

The accompanying map of Kumara Goldfield furnishes full information about the channels and other matters.

PARTIES NOW AT WORK.

No.	Name of Party.	Number of Men employed in each Claim.	Fall to 12 ft. in Tail-race.	Width of Boxes in Tail-race.	Number of Sluice-heads used in Sluicing.	Auriferous Wash sluiced away per Hour.	Race from which Water is supplied.
	No. 2 channel—		In.	In.		Cub. yd.	
1	Dillon and party	4	6	26	10	60	Kumara Race.
2	Williams and party	3	4	32	10	40	"
	No. 3 channel—						
1	Light and party	5	6	22	10	60	"
2	Neame and party	3	5	22	10	50	"
3	O'Connell and party	5	8	22	8	64	"
4	Harris and party	5	7	22	8	56	"
5	Neville and party	4	8	22	8	64	"
6	Coninghan and party	5	6½	22	10	65	"
	No. 4 main tail-race—						
1	Cullen and party	6	7	24	10	98	"
2	Long Tunnel Company	7	6¾	26	22	148	Private race.
3	Quinn and party	5	8	24	14	112	"
	Private races—						
1	Lee and party	10	8	24	12	96	Kumara Race.
2	Shrives and party	5	12	30	10	120	"
3	Carlsson and party	4	10	30	12	120	"
4	Shroder and party	4	9	26	10	90	"
5	Bowden and party	4	8	24	10	80	"
6	Marshall and party	4	8	24	10	96	"
7	Moynihan and party	8	8	24	22	176	Private race.
8	Arnerich and party	4	8	24	15	120	"
9	Pascoe and party	6	7	26	12	84	Kumara Race.
10	Carlsson and party	4	8	22	12	96	"
	Preparing to sluice into private race—						
1	McGrath and party	10	5	...	20	...	Private race.

	Parties.	Men.
No. 2 channel	2	7
No. 3 channel	6	27
No. 4 main tail-race	3	18
Private tail-race...	10	53
Total	21	105
Supplied from Kumara Race	17	81
Supplied from private races	4	24
Total	21	105

Long Tunnel Claim (Area, 60 acres; owners, Kumara Long Tunnel Gold-mining Company, Limited; manager, Theodore Hahn).—This claim sluices into No. 4 channel, the water being chiefly obtained from the company's own race; and, when necessary, this supply is supplemented from the Government water-race. About 142,800 yards of gravel was operated on during the year, which produced for the owners 238 oz. 3 dwt. 12 gr. of gold, valued at £928 13s. 9d.; this amount only being 40 per cent. of value received, the tributers receiving 60 per cent., out of which they paid all working-expenses and maintenance. The water-race is two miles in length (with a capacity of thirty heads), and connected with it is a quarter of a mile of 11 in. and 10 chains of 13 in. pipes. The value of water-race and plant is £4,000.

The length of boxes is 3,000 ft., with a 6 in. grade. Seven men were employed.

Neam and Netherway sluice into No. 3 channel, and obtained gold to the value of £583 16s.

Arnerich and party, who have a private tail-race, got 141 oz. 7 dwt. 15 gr. of gold, valued at £550, which gave employment to four men.

O'Connell and party, who own a private tail-race, sluiced about half an acre, and received a return of 295 oz., value £1,135 7s. 6d. Five men were employed.

Bowden and party, of Nardoo Flat, obtained 155 oz. of gold, valued at £614 10s., and employed four men.

Ryan and Party's Claim (Area, 60,000 ft.; owner, D. Ryan).—The principal work on this claim for this year was the putting-in of a drive some 400 ft., and getting the claim into working-order. The value of the plant is £30. Three men were employed. As the drive put in by Mr. Ryan is for the purpose of prospecting some of the deep leads, a subsidy has been granted for extending it another 200 ft.

Warren and Party (Area, 2 acres; owner, William Warren).—This claim is worked from a drive, the length of which is 200 ft. The washdirt is 8 ft. in thickness, and 720 cubic yards was treated, for a yield of 45 oz. of gold, valued at £175 10s. Two men were employed. This claim is on one of the deep leads near Ryan's tunnel.

Channel Terrace Prospecting Claim (Area, 2 acres; owners, H. Holst and W. Reid).—This claim is worked by a drive, which is in 200 ft. About 1,320 cubic yards of material was operated on, yielding 50 oz., valued at £195. Value of plant, £20. Two men were employed. This is one of the deep-lead claims in the vicinity of Webster's and Ryan's.

Light and Party's Claim (Area, 3 acres; owners, Light and party).—The gold obtained was 250 oz., valued at £975. The length of pipes is 480 ft. (13 in.), and valued at £150. Five men were employed.

Roberts and Party (Area, 3 acres; owners, Roberts and party).—There are 2½ chains of 18 in. pipes, and the total pressure used is 70 ft. Three men were employed.

Harris and Party's Claim (Owners, George and party).—The original area of this claim (4 acres) has, with the exception of half an acre, been worked out. From half an acre operated on during the year 162 oz. of gold was obtained, valued at £631 16s. There are 9 chains of 13 in. pipes, which, together with plant, is valued at £200. Four men were employed.

Cullen and Party's Claim (Area, 12 acres; owners, Cullen and party).—The water-race is half a mile in length, with a capacity of seven heads, with 19 chains of 15 in. pipes and 11 chains of 13 in. pipes, the value of which is £350. Six men were employed.

Marshall and Party's Claim, Nardoo Flat.—The area of this claim (6 acres) is all but worked out, there only being one-eighth of an acre left to operate on. The quantity of gold obtained for the year was 120 oz., valued at £468. The water-race is 10 chains long, with a capacity of ten heads, and the length of pipes 17 chains of 15 in., valued at £250. Four men were employed.

Carlsson's Claim, Mignonette Flat (Area, 20 acres; owner, C. P. Carlsson).—This claim yielded 125 oz. of gold, valued at £487 10s. The length of water-race is 1,568 ft., twelve Government heads, with 1,208 ft. of piping and 360 ft. fluming, valued at £400. The claim is shut down at present, it not being sufficiently payable to pay the full price charged for Government water, and it would require an outlay of about £600 to drive a new tail-race.

Carlsson's Extended Claim, Dunedin Flat (Area, 3 acres; owner, C. P. Carlsson).—About an acre was operated on during the year, yielding 320 oz., valued at £1,248. The water-race is 950 ft. in length, ten Government heads, with 156 ft. of 22 in. and 540 ft. of 15 in. pipes. The value of pipes and nozzles is £150. Six men were employed.

Shroder and Party's Claim (Owner, George Shroder).—There is only 1 out of 6 acres in this claim to be worked, 1¼ acres being worked during the year, from which 158 oz., valued at £616 4s., was obtained. There is 18 chains of 18 in. pipes. The plant is valued at £250. Four men were employed.

Throughout the district about the same number of men have been employed as was the case during the last year. The yield of gold was considerably lessened on account of the stoppage for some months of all work in No. 4 channel. It appears that the trustees who manage this channel had let the work of maintenance on contract, and the contractor had paid more attention to the boxes running freely than watching that the sides and roof of the tunnel were properly supported, and that the timbers were in good condition. Consequently gravel from the sides and roof was allowed to fall into the tunnel, but, as this was swept away along with the tailings, very little attention was directed to the places from which the gravel fell. A continuation of this falling of gravel must have left large vacancies about the timbers, and the roof had caved to a considerable height; a bed of pug lying above the gravel must also have been undermined, with the result that an immense mass of this pug or soft clay fell down, completely obstructing the channel and breaking down and damaging the timbers. The trustees applied to the Government for assistance in clearing and repairing the channel, and this was granted to the extent of £134. A period of some months, however, elapsed after the breakage before sluicing was again commenced through this tunnel.

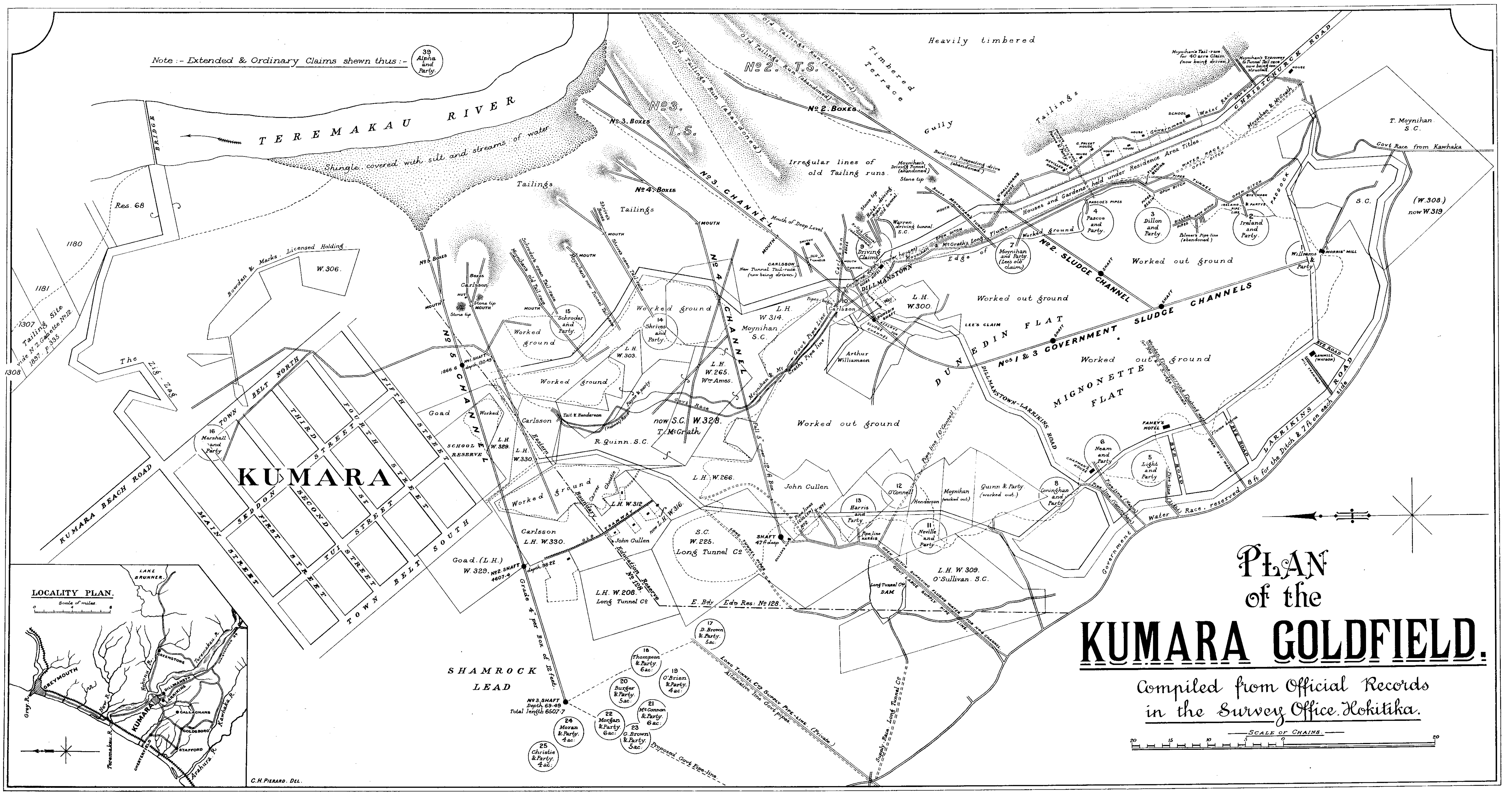


Photo-Lithographed at the Head Office, Department of Lands and Survey, Wellington, N.Z. July 1899.

Taipo River District.

Sluicing operations have been carried on by several parties, and also by the Taipo Sluicing Company at Seven-mile. The returns, as far as can be ascertained, are unimportant.

The road up to the Seven-mile is being improved and widened by the Westland County Council, with the aid of grants and subsidies from the Government.

Some prospecting is also carried on in the direction of Browning's Pass.

Waimea District.

A few parties still continue to carry on sluicing operations at Callaghan's and Italian Gully, but much more work should be done in the district considering the good supply of water from Callaghan's branch race.

The most promising part for future gold-production is the ground commanded by the Waimea main tail-race. The tail-race, which is managed by trustees, and has been subsidised by Government to the extent of £1,020 on a proportion of five-eighths to three-eighths, is nearly completed, and the extension of a branch race from the Waimea Water-race is in a forward state. Consequently, as soon as a storage reservoir is completed, water will be available for use in sluicing through the main tail-race.

On the church property, mining work has been carried on successfully for several years, but operations were expensive through the parties having to bale the water.

On the completion of the main tail-race, and of the branch races to the several claims, the greater portion of the surrounding land will probably be drained, and some parts of the lead may then be worked from shafts.

It is, however, to the hydraulic-sluicing operations that will be undertaken by the owners of the claims that we must look for increased gold-production and the future prosperity of the district.

A few parties are using water from the Waimea Race in sluicing on the terraces lying towards Fox's and in the direction of Stafford.

Kelly's Terrace Drainage-tunnel.—This tunnel, which is being driven from Flowery Creek in a line in the same direction as the main road, has now reached a distance of 3,600 ft. from the entrance, the distance driven during the year being 1,000 ft.

The work is carried on by three trustees, who find three-eighths of the cost, the remaining five-eighths being subsidised by the Government, and contracts are let for different sections as the work proceeds. As this tunnel is carried on with as little fall as possible, the difficulty of trucking the material for a long distance has been obviated, by the construction of two shafts, through which the gravel is hauled to the surface. The last shaft sunk was about 60 ft. in depth, and was constructed so that the material could be hoisted by a water-balance; the tank filled with water passing down one division while the cage with the loaded truck was raised up the other compartment. There is still a further distance of 2,400 ft. to which the tunnel must be extended before the ground at Kelly's Terrace can be drained. The cost of this tunnel has already amounted to £1,076 7s. 9d., the proportion paid by the Government being £875 11s. 1d.

The Wheel of Fortune Claim was formerly worked by Messrs. Batchelor and Noble by means of a water-wheel elevator, but operations were not profitable, and work was given up some years ago. The claim is now under the management of Mr. Betram. The work carried out during the year was the conserving of water, constructing large dams, and extending the water-race for a distance of two miles and three-quarters. As there is some difference between the vendors and the new company, the manager will not give information about further operations until this is settled.

Hokitika District.

Craig's Freehold and the University Reserve are being worked by alluvial miners, twelve in Craig's and nine in the University Reserve.

Several parties are also prospecting on the old Alma lead.

At Lake Mahinapua the Shanghai Claim, owned by Mackintosh and party, is worked on the elevating principle. A Priestman's Grip, driven by a steam-engine, is used to raise the stripping and deposit it clear of the work, as well as to raise the washdirt to the sluice-boxes.

A few parties are engaged about South Terrace, and Douglas and party have driven a tunnel 600 ft. in length. Several claims are also worked on the North Terrace. Cundy and party, Monday and party, O'Brien and party, Leece and party, and McCormick and party are all engaged on ground-sluicing.

At Seddon's Terrace and Back Creek a considerable number of miners are employed, three parties hydraulic-sluicing and the others ground-sluicing. The chief supply of water is derived from Handley's Race, now the property of the Rimu Miners' Association, but there are other catchwater races from which water for sluicing purposes is obtained after a rainfall. Two sections of land, the property of Mr. P. O'Neill, were resumed for mining purposes. The land, being directly convenient to the terrace, and lying between it and the Hokitika River, was in the way of sluicing operations.

Kanieri District.

Main and party are driving a tunnel, which is now 1,200 ft. in length, to drain a lead where the ground is wet, and which was deserted at the time of the Kumara rush. It is expected that if the ground can be unwatered by this tunnel profitable employment will be found for a considerable number of miners in again working the shallow lead.

Holmes and party are also driving a tunnel, which is 544 ft. in length, to drain Tucker Flat, where it is expected payable ground will be found when the water is drawn off.

Kanieri Forks.

The Kanieri Lake Water-race Company continue to profitably work their ground by hydraulic sluicing. They also supply water to three other parties engaged in ground-sluicing.

A considerable amount has been expended in prospecting throughout this district, but no discovery of any importance was made.

Hou-Hou District.

Slocum and party and James and party are ground-sluicing near the face of the terrace.

Noble and Stenhouse are driving a tunnel from New Chum Gully to drain the leads in the Hou-Hou Flat, formerly worked by the alluvial miners at a time when the ground was full of water. The tunnel is now in 2,000 ft., and some distance further must yet be driven before the deep wet ground is reached. This tunnel has been subsidised by the Government.

Blue Spur.

Boys's claim still continues to be profitably worked by the owner, who employs some six to eight men.

Harcourt and party, who put in a drive for the purpose of draining Blue Spur Creek, were unsuccessful, as the drive which was in the blue bottom could not be kept open except at great expense. They are now putting an open drain up the side of the creek, but will take three or four months yet before they can commence sluicing operations.

Dwyer's tunnel, which has been driven from the Arahura face of the terrace, is now advanced to 4,085 ft., and is getting well up towards the locality of the leads. This tunnel has been subsidised by the Government on condition that it be used as a drainage-tunnel for all the claims in the locality.

There are several parties driving on the terrace alongside the railway, between the Arahura and the Teremakau. McGovern and party were subsidised by Government to drive a tunnel with a view of prospecting for the Lamplough lead.

Ross District.

Humphrey's Claim (Area, 600 acres; owner, Humphrey's Hydraulic Sluicing Company, Limited; mine-manager, William Greenbank).—This claim is situated in Humphrey's Gully. The nature of the gravel deposits is "Old Man" gravel, 100 ft. to 300 ft. deep, and it is operated on by ground-sluicing. The area of ground worked during the year was 1 acre, and the estimated amount of gravel operated on during the year 100,000 cubic yards. The quantity of gold obtained was 419 oz. 18 dwt. 3 gr., valued at £1,638. The length of the water-races is eleven miles, having a capacity of seventy heads. The total length of pipes is 2,000 ft., and their dimensions 22 in., 15 in., 13 in., and 11 in. The gold-saving appliances in use are 4,500 ft. long, 3 ft. wide, with a grade of 8 in. in 12 ft., paved with stones and wooden blocks. The total pressure used for ground-sluicing was 160 ft. Forty men were employed on the claim and in the construction of water-races and pipes. During the year only a small amount of sluicing has been done, and this by tributers, the reason being that many parts of the race were in such a bad state of repair that the company decided to suspend sluicing operations and give attention to the race. The long flume up at Milltown has been dismantled, and is now being replaced by a siphon, 36 in. diameter. The total length of pipes for the siphon is 4,142 ft. A number of contracts for ditching have been let, some of which are complete and others nearing completion, besides several tunnels being retimbered, and some tunnels being abandoned in favour of ditches. Tenders for the Doughtown bank will soon be called, also for No. 2 siphon, 725 ft. in length. When these last two items are complete the race will be in good order from Black's tunnel inlet to the dam at Milltown. A new survey from Mount Brown to the Arahura River is now engaging attention. The value of water-race it is impossible to compute at present, as so many parts above the dam are valueless until they are renewed, being in a sad state of decay. The expenditure on the race and property since March, 1898, has amounted to £6,343 8s. 6d.

Several parties of miners find profitable employment on the Totara River by ground-sluicing.

A party who have taken up a dredging claim are about to have a dredge constructed to work the river-bed.

Donnelly's Creek.

Several parties find employment ground-sluicing and working out the leads in the terraces. A drainage-tunnel is in course of construction from a point below the bridge on the Hokitika Road, which is to be driven a distance of 1,500 ft. The tunnel is being substantially timbered, and when completed will be of sufficient depth below the surface to drain a large extent of the creek-bed, which hitherto it has been impossible to work on account of the water. This drainage-tunnel is being subsidised by Government, which gives five-eighths of the cost, the balance being found by the Totara Miners' Association.

Mount Greenland.

Gagliardi and Sons, who have been for some considerable time prospecting for quartz, were unsuccessful in that respect. Towards the latter end of the year they discovered a lead of gold in a gravel deposit lying at an elevation of about 3,000 ft. above sea-level. A small rush has taken place, and the prospects obtained are of a favourable character. Two parties have cleaned up for payable yields, but as water is scarce at this high elevation, operations must be limited on that account. Water for washing can only be obtained during the spring and autumn months.

A few small parties are working in Jones's Creek.

Ross United (Area, 44 acres; owners, Ross United Gold-mining Company, Limited; mine-manager, Joseph Grimmond).—This claim is operated on by ground-sluicing and elevating, and

1 rood 20 perches, or 39,825 cubic yards, was worked out during the year, yielding 247 oz. 17 dwt. 15 gr., valued at £959 13s. There is 11 miles of water-races in connection with this claim, with 40 chains of 15 in. and 20 chains of 11 in. piping. Value of water-races and plant, £15,000. Twelve men were employed.

Ross Flat.

In view of the future development of the deep alluvial leads on Ross Flat, the old workings, on which a depth of 390 ft. had been attained, but which are now under water, the Government, on the 28th October, 1898, obtained from Mr. C. Napier Bell, M.Inst.C.E., the following report dealing with the subject of the drainage of deep levels:—

"Acting on your instructions, I proceeded to Ross and inspected the locality. I also rode over the creeks and up to the Mikonui Gorge to look at all the places from which the necessary water-supply for draining the deep levels and working the mines is intended to be taken and applied, and I also read over all previous correspondence and reports. As you are probably aware, the original mining undertaken at Ross was in sluicing the high gravel terraces. This work indicated that the leads of gold found at various heights above ground dipped underground at steep inclinations, and they were followed down as far as the appliances for drainage would allow. Then a Christchurch company, called the Ross Extended, sank a shaft on the flats, but were unsuccessful; and, the site and plant being purchased by Cassius, the sinking was continued to a depth 300 ft. from the surface. Here some rich deposits were worked, but, the pumping-power being insufficient, Cassius's claim was drowned out by tapping the water accumulated in the abandoned workings of other companies. Stimulated by the known richness of Cassius's claim, the Ross United Company endeavoured to get down to the same or a greater depth, and succeeded in sinking a shaft to a greater depth, and found fairly rich deposits at a depth of 390 ft. from the surface. But their pumping plant did not work satisfactorily, and the Ross United shaft was drowned out by tapping the standing water of Cassius's abandoned workings. This occurred in 1887, and since then all workings of the deep levels have been suspended.

"As to the value or extent of these deep-level deposits, nothing is known with any more certainty than the evidence acquired by Cassius's working and six weeks' working of the Ross United Company. Many reports have been written about the value of the workings by your officers and those of the Ross United Company, and they assume that the deep deposits are both rich and extensive. It is said to be impracticable to test the deposits by boring; so that the knowledge of the depth, extent, or direction of the deep deposits remains uncertain.

"The Ross United Company has purchased or acquired all the most important of the water-rights over creeks that can be brought to the workings, and have made several races to bring in all available water, and altogether they have spent about £70,000 in a great variety of plant necessary to the working of both their surface and deep workings. The surface workings are not now profitable, and the company seeks to reopen the deep levels so long drowned out.

"The quantity of water to be pumped to keep the deep levels dry cannot be ascertained with certainty. It is asserted that when Cassius and the Drainage Company were pumping together they kept their workings dry by removing 708 gallons a minute. The late T. J. Waters, C.E., assumed that with deeper and more extended underground workings much more water would find its way to the workings, and he took 1,900 gallons a minute as the quantity that would have to be pumped, assumed from a certain percentage of the rainfall that would get down below. The company has driven an adit which, coming up from the sea-beach at a sufficient grade, intercepts surface drainage at about 90 ft. below the surface at the shaft, and it was intended to extend this adit in a contour round the foot of the rising terrace, so as to cut off all the surface water it could catch from higher ground and old workings, and at present its does intercept a large quantity of water.

"Although after long pumping the saturated soil under the flats will be drained, and in ordinary circumstances one would expect the quantity to be pumped to diminish, yet I can see no other way of getting an idea of what water will have to be removed than that of Mr. Waters—viz., taking a percentage of the known rainfall, giving 1,900 gallons per minute. The company's manager, Mr. Joseph Grimmond, proposes to erect a catch-tank at 100 ft. below the adit. This is assumed to catch 500 gallons, which has to be lifted 100 ft., and the remaining 1,400 gallons pumped from the bottom has to be lifted 300 ft., all discharged at the level of the adit, which is 90 ft. below the surface. The theoretical power required to lift the water is 143-horse power, which, adding 66 per cent. for efficiency of the machinery, gives 238-horse power required to keep the deep workings dry. There is also power required for winding up the earth to be treated on the surface. I take this at 42-horse power effective. As there is no question of using steam, the above work must be done by water-power.

"The investigations of Messrs. Waters and Wylie having shown that from the existing water-races there was not enough power to be had from the water-supply, the latter recommended that the supply should be taken from the Mikonui Tunnel and Race. This supply would be about 200 ft. higher than the company's water-supply at present in use; it would consequently give the same power with less water. Mr. Wylie states that he measured the supply of water that could be obtained in the driest weather in the Mikonui Race at 5·3 cubic feet a second. The height of this supply above the discharge of the water into the adit is 580 ft., and, deducting 5 ft. for pipe-friction, there is 5·3 cubic feet a second into 575 ft. head, which gives 345 theoretical horse-power, and, taking 66 per cent. of this for efficiency of the machinery, leaves 228 effective horse-power to do the work of pumping. It was shown above that the horse-power required to raise the water was about 238, so that in the driest weather the water-supply would be no more than enough. Dry weather is not very frequent here, and Mr. Wylie states that for nine months in the year the various creeks would

yield 8 cubic feet a second. As he says in his report of the 12th March, 1888, that he measured the water that would flow in the high Mikonui Race, and found it to be 6 cubic feet a second, I think his statement may be relied on, that 5·3 heads would be the supply in driest weather, and 8 cubic feet a second for the greater part of the year.

"To provide water for winding up the washdirt there are two alternatives, either of which leaves a deficiency in the driest weather of water to wash and sluice the washdirt or wind it up from below. In the first alternative water from the right-hand branch, which at present is brought across Donnelly's Creek in a 15 in. pipe and delivered into the No. 1 race, would give 2 cubic feet, and water picked up between the Mikonui intake and that of No. 1 race is said to yield 1 cubic foot, or 3 cubic feet altogether, and the height of No. 1 race above the proposed site of the winding-engine would be 170 ft., the effective horse-power of which would be about 38-horse power—barely enough for the power required, which, as above mentioned, is stated to be 42-horse power. But this leaves no water for washing in dry weather. The second alternative is to take the excess of water yielded in ordinary weather at the high Mikonui Race. This was stated above to be 8 cubic feet, and the quantity required for pumping to be 5·3 heads or cubic feet a second. The excess is, therefore, 2·8 cubic feet, and the head is 400 ft., because in this case the winding-engine could be placed at the top of the tip where washing is to be done, or 175 ft. higher than the position mentioned in alternative No. 1. Taking only 2 cubic feet of the 2·8 supposed to be available, with a head of 400 ft., would give a theoretical power of 86-horse power, and 66 per cent. of this would be the effective power for work, equal to 56-horse power, the power required being, as above, 42-horse power. This leaves the water of the right-hand branch, stated above to be about 3 cubic feet, with a height of 170 ft., and running in No. 1 race, to be used for washing the dirt. But this second alternative leaves no water for winding in dry weather.

"Messrs. Waters's, Wylie's, Grimmond's, and my investigations all point to the conclusion that the water-supply is barely enough in the dry weather for all the operations, and, although there is ample for pumping, work, if dependent on water only for power, might be stopped for a short time perhaps every year. Mr. Grimmond thinks, and, I believe, with reason, that in very dry weather the underground water would diminish in proportion as the supply for power purposes did, and thus the water-power available might always be sufficient.

"I will not attempt to express any opinions on the style of water-engines that should be used, except to state that the engines used, and now standing in the shaft, never gave satisfaction, although Messrs. Waters and Wylie were of opinion that they could be so altered as to be serviceable, recommending at the same time that much longer water-cylinders should be provided. But I think, if new engines are to be designed, some form of common Cornish pit-pumps, driven by turbines or Pelton wheels, if such could be adapted to the position, would be much more reliable and easier managed.

"If this property is to be worked on a payable scale, it will be necessary to comply with the mining regulations and sink another shaft. I agree with Mr. Grimmond that it would be best to put the pumps in the present shaft and pump it dry, and then the second shaft can be easily sunk, as the ground would be nearly free of water. As Cassius's shaft and workings are standing full of water, if this is not pumped out the water must be relied on to percolate slowly into the pumped-out shafts, with the liability of an outburst suddenly into the pumping-shaft. There was reason to believe, when the Ross Company were working at the bottom of their shaft, that water was pouring into it from Cassius's workings. If so, these workings might be drained by pumping in the Ross Company's shaft until Cassius's workings were dry; but, if the water refused to pass through, and stood in Cassius's workings, there would always be a risk in working the shaft, and means would have to be taken to free Cassius's workings of water.

"From the above investigations it is quite evident that the water-supply available from Donnelly's Creek and its tributaries is just about enough to keep Ross Flat drained to the deep levels, and enable the Ross United Company to carry on all their necessary operations; but there is no water to spare for any other parties to join in working other parts of the flat, which I understand is one of the objects the Government had in view when proposing to assist the Ross United Company by a subsidy. It is shown that it will most likely be necessary to provide for extending the working seaward of the shaft, and for this purpose: that power should be provided to sink the shaft 100 ft. deeper than is contemplated in this report. But unless the water met with underground proves to be much less than the 1,900 gallons a minute herein assumed, then there is not power enough to be got out of water derived from Donnelly's Creek and its tributaries. Some time ago Mr. Grimmond proposed that water should be taken from the Mikonui River at a place called "the Gorge," and brought in a race to the site of the old overshot-wheel of the Koh-i-noor Company at Black's Creek, there to be employed in driving a turbine or Pelton wheel, which should generate electric power, to be conveyed by wire to the Ross Company's shaft, and there used to drive the pumping machinery. The Mikonui River is said to carry in ordinary weather about 300 cubic feet a second, and when I saw it at the Gorge it appeared to me that it was running about that quantity. Persons long resident in the locality estimate that in the driest weather it carries never less than 100 cubic feet.

"A water-race, called the Prince of Wales, was surveyed from the Prince of Wales Claim, near Ross, up to the gorge of the Mikonui at an inclination of 8 ft. per mile. This race is constructed as far as 17 chains beyond Italian Gully, but is not used by the Prince of Wales Company any further than Black's Creek. At Black's Creek the height of this race above the available discharge at the old overshot-wheel is said to be 62 ft., but, as I could find no levels, this height requires to be verified. If 55 cubic feet a second were taken out of the river at the Gorge by completing the Prince of Wales Race or constructing a new race to there, this water, with a fall of 60 ft., will give a

theoretical power of 371-horse power, or, taking 66 per cent. of it, the effective power would be 245-horse power. The fall of the race as surveyed was 1 in 633, which gave 60 ft. head where the water was to be used. But if the fall were made 1 in 1,500 the head would be 73 ft., which would give an effective horse-power of 300 with the same quantity of water.

"We have seen above that the effective power required to pump the assumed quantity of water is 238-horse power, so that it appears that 55 cubic feet of water from the Mikonui Gorge would provide ample power for pumping out the deep levels of Ross Flat. The advantages of this project are that all the power-water would be discharged at Black's Creek; therefore the adit at Ross Flat would not require to be enlarged. Also, the whole of the water system already in use from Donnelly's Creek and its tributaries, amounting to 6 cubic feet a second in dry and about 10 in ordinary weather, with a head of 313 ft. above the level of discharge into the adit, running in No. 1 race, together with 3 cubic feet from the right-hand branch at Donnelly's Creek, with a head of 200 ft. above adit, running in No. 2 race, would be available for winding and washing by the Ross United Company, together with any other parties that might take up other claims on the Ross Flat. This last-mentioned project, therefore, seems to be the one which best suits the purpose intended by the Government in assisting by subsidy to reopen these workings.

"The estimates given herewith are made by inspection only, without any plans, and before anything certain is possible plans and sections of the race, with abundance of cross-sections, should be made, and the quantity of water in the Mikonui River should be at least approximately gauged; also, plans should be drawn of all the machinery proposed to be used; and only when all this is done will there be any certainty about the feasibility or cost of the project. The cost of surveys and plans of machinery might amount to £600. The plans of machinery to show how the water-power is to be converted into electric power of 240-horse power, and conveyed three miles and a quarter to work pumps lifting 1,900 gallons a minute 300 ft. high, must be carefully worked out by a thoroughly competent person, otherwise there will result a disastrous failure.

"Another subject requiring careful consideration is that the depth at present proposed to go down is 300 ft. below adit-level, and at this depth all country inland from the shaft can be worked, as the deep deposits rise upwards towards inland; but seawards over the Ross Flat the deposits dip downward, and therefore seaward of the shaft cannot be worked below the level of the shaft-bottom, as there would be no means of removing the water. No one knows how the deposits dip seaward of the shaft; they are supposed to dip slightly, but I do not believe that is proved to be a certainty. The project contemplated in this report is to pump from 300 ft. below adit-level, and the power required to do this work is assumed above at about 238-horse power. If the deposits are found to extend far out seaward of the shaft, and if they dip in that direction steeply, then, in order to be able to work the deposits in that direction, it will be necessary either to sink the shaft 100 ft. deeper (400 ft. below adit-level), or another shaft must be sunk further out on the flat. The person who designs the machinery and the race must bear all that in mind, so that a method may be found to accomplish the project of commanding the largest possible area of the deep deposits. For instance, he may be able to use some of the water in the high Mikonui Race from Donnelly's Creek to assist the electric power brought from Mikonui River Gorge, and so add sufficient power to pump water from the depth of 400 ft. below adit-level, or by pumps placed in an extra shaft, or he may state the quantity of water he would require to be brought out of the Mikonui River to accomplish this object. Designs of the machinery must be furnished, with precise data, either assumed or ascertained, of every particular which he is required to take into consideration, so that nothing shall be overlooked which makes for a successful result of the whole design.

"It would be best if all the information requisite to make a trustworthy design and accurate estimate be procured before raising the money to undertake the work; otherwise, if the money raised should turn out insufficient, there will again be disappointment and distrust of the whole scheme.

"If some party other than the Ross Company should take up this scheme of working the deep levels of the flats, they must make sure of acquiring all the water-rights, races, dams, and other fixed plant, otherwise they would have to buy the same to avoid great and useless extra expense.

"N.B.—This report is accompanied by approximate estimates of using all the power required from water-power of Donnelly's Creek and tributaries; also of the cost of getting the requisite power out of the Mikonui River at the Gorge. This last is incomplete, as I could not find out the cost of dynamos, motors, wires, and all appurtenances, but which may be approximately ascertained by your officers, and the estimates completed.

"Donnelly's Creek, through Mikonui Extended.

	£		£
New race, 40 chains, at 9s. per foot, including connecting-tunnels, &c. ...	1,200	Branch adit, main shaft to pumps ...	396
Head-works, Donnelly's Creek ...	600	Pelton wheel winding gear	600
Increasing size of adit	2,000	Drainage, contour, heading	1,000
Repairs to present races	1,500	New shaft	2,800
Extending No. 2 race to new shaft ...	800	Pit-head gear	790
Reservoir in Donnelly's Creek ...	5,200	Tunnels to open mine	1,000
Alterations and additions to mains ...	3,200		27,976
Pelton wheels, gearing, and pit-pumps ...	3,560	Contingencies, 15 per cent.	4,196
Erection of same	1,780		£32,172
Erection of winding gear	1,050		
Cages, poppet-ropes, mine-trucks ...	500		

"Race to bring Water from Mikonui Gorge.

	£
Tunnel through clay, 4 ft. 6 in. by 6 ft. 6 in., 50 chains at 14s. per foot ...	2,375
Race, 4 ft. bottom width, 157 chains, at £22 per chain	3,454
Tunnel through rock, 15 chains, at £66 per chain	1,188
Pipe, 30 in., to turbine, 26 chains, at £33 per chain	858
Engine-house, foundations, pits ...	500
Fences, dwellings, &c.	250
Turbine, one (erected); dynamo, one ...	650
Lines of copper, insulators, poles, 265 chains, plant at motor end, transformers, switches	5,600
New shaft, 400 ft., at £7 per foot ...	2,800
Pit-head gear	790
Repairing adit, 50 chains, at 5s. 6d. per foot	908
Driving drainage contour adit ...	1,000
New pumps of Cornish pit-pump construction, with rising main, 60 tons, at £45 per ton	2,670
Fixing in place and erection, 50 per cent.	1,335
Gearing for driving pumps from motors	800
Branch adit pumps to main shaft, 660 ft., at 12s.	396
Erection of winding gear	1,050
Pelton wheels for winding	600
Cages, ropes, mine-trucks, &c. ...	500
Tunnels to open mine, 1,000 ft., at £1 ...	1,000
Repairs to present races	1,500
	30,224
Contingencies, 15 per cent.	4,533
	£34,757

"Includes one dynamo, one motor, and one turbine."

In pursuance of recommendations made by Mr. Napier Bell, Mr. Perham, A.M.Inst.C.E., was instructed to make an exhaustive examination of the Mikonui Stream, and obtain reliable data upon which a scheme for utilising the water-power could be based. The following is the general tenor of a preliminary report furnished by Mr. Perham, the complete report and plans not being yet finished:—

Continuing on the lines of Mr. C. Napier Bell's report on this important subject, Mr. Perham, by instruction, made an exhaustive examination and surveys of the localities of the upper and lower Mikonui River gorges, and collected the necessary data, in conjunction with Mr. Ernest J. Fenn, A.I.E.E., electrical engineer, from Auckland, for a full and concise report on pumping a portion of the flat, hitherto worked by the late Mr. Cassius and the Ross United Gold-mining Company. It is proposed to pump by electrical transmission of power by water drawn from the Mikonui River and tributaries. The river has been accurately gauged in the lower gorge below the main tributaries, and computed to carry after three weeks' dry weather, which is exceptional for the West Coast, 393 cubic feet (or Government sluice-heads) per second, the mean of the highest flood-indication and the former being 1,702 cubic feet per second. It is proposed to adopt a suitable site for the power-house and tail-race on the ana-branch of the right bank of the Mikonui River near Italian's Gully, and to that point bring in a race, mainly in tunnels (on account of the broken and insecure nature of the sidlings), two miles and a half in length, from the bottom of the lower gorge, carrying 110 heads, with a net available fall of 55 ft., to drive a turbine generating 476-horse power, transmitted to an electric motor running about 250 revolutions. From this generating-station to the mine at Ross the power will be transmitted by polyphase alternate currents under a pressure of 3,000 volts. The estimated volume of water to be pumped is 2,000 gallons per minute—viz., 500 gallons from the adit-level (100 ft.), 1,000 gallons from the 300 ft. level, and 500 gallons from the 400 ft. level. Sufficient power can be obtained from the existing races running from the branches of Donnelly's Creek and tributaries for winding and washing. The power is to be transmitted by an overhead cable, on insulators and poles, of hard-drawn bare copper, about three miles and a half in length, nearly following the Okarito–Ross Road. The total cost of this scheme, including construction of race, electrical plant for transmission, &c., together with equipment of mine, is computed jointly by Messrs. Perham and Fenn at £50,155. Another scheme has been worked out to draw the water from the head of the lower gorge, with the generating plant on the spot, having a cable seven miles in length across the Greenland Range into Ross. This has, after careful consideration, been rejected, mainly on account of the expense of transit up the lower gorge (the only route), the extreme length of cable, and the inaccessibility of the generating-site, besides the total cost being £373 above the lower scheme adopted. The information obtained may, however, be of use in the future for additional power if the proposed present pumping is proved to be profitable.

Mr. Ernest J. Fenn, A.I.E.E., has, at the request of the Hon. the Minister of Mines, furnished the following report:—

"Sir,—In accordance with your instructions I have visited Ross and ascertained the necessary particulars for estimating the power required to be generated from the Mikonui and transmitted to Ross for the purpose of draining the deep levels of the Ross United Company's claim and the adjoining ground, and for furnishing an estimate of the cost of same. I have also read the reports of the late Mr. T. J. Waters, C.E., and Mr. Napier Bell, C.E. Mr. Waters estimates the amount of water to be pumped to be 1,900 gallons per minute, 500 gallons of this being caught at the 100 ft. level, and the remaining 1,400 gallons from the 300 ft. level. This is concurred with by Mr. Bell.

"Since Mr. Bell's report was given, Mr. J. Grimmond, the company's present general manager, informs me that provision must be made for pumping from 400 ft. instead of 300 ft. below the adit. This will, of course, necessitate an increase of power above Mr. Bell's estimate. Mr. Grimmond states that the greater portion of the water can be caught at the 300 ft. level. It is, however, advisable that provision for pumping a large proportion from the 400 ft. level should be made. In the following estimate, therefore, with the approval of Mr. Grimmond, I have assumed that the water to be pumped is as follows: 500 gallons from 100 ft., 1,000 gallons from 300 ft., and 500 gallons from 400 ft. This gives a margin of 100 gallons per minute over Mr. Waters's estimate.

"A catch-tank is to be provided at the 100 ft. level and at the 300 ft. level. The most suitable form of pump would be a double Cornish pump with two vertical rods; at the 100 ft. level there would be fixed two plunger-pumps, the diameter of each plunger being 10 in.; for pumping from the 300 ft. level, two plunger-pumps having plungers each 16 in. in diameter.

"The mine being now flooded, two 16 in. draw-lifts capable of pumping 100 ft. to the plunger-lift will also be necessary, the plunger-lifts being moved in 100 ft. stages until the mine is dry on the 300 ft. level. When the extension of the shaft at the 400 ft. level is commenced, the 16 in. plunger-lifts can be permanently fixed at the 300 ft. level, pumping direct from the catch-tank at that level to the adit. The pumping below can be carried on with two 10 in. draw-lifts, which would deliver water to the tank at the 300 ft. level. The above pumps would have a stroke of 9 ft., and would make ten strokes per minute. The columns required would be as follows: One, 10 in. in diameter, from the 100 ft. level to the adit; one, 16 in. in diameter, from the 300 ft. level to the adit; and one, 10 in. in diameter, from the 400 ft. level to the 300 ft. An air-vessel would be fixed at the 100 ft. level and at the 300 ft. level.

"The power for the pumps would be furnished by an electro-motor running at the rate of (about) 250 revolutions per minute, furnished with a pulley 5 ft. in diameter, driven with cotton ropes on to a pulley 16 ft. in diameter fitted on to an intermediate shaft. This shaft would drive counter-shaft by a pinion 2 ft. 3 in. diameter by 18 in. face, gearing into a spur-wheel 16 ft. in diameter, the crank-shaft transmitting power to the pump-rods in the usual way by a connecting-rod and two angle-bobs of 15 ft. radius. The theoretical power to pump the water against gravity will be 5,500,000 foot-pounds per minute. Allowing for the extra head due to friction in the column, slip of pump, friction of pump-rods and gearing, power to be given out by the motor-pulley will require to be double this amount—viz., 11,000,000 foot-pounds per minute—*i.e.*, 333-horse power—this power to be transmitted from the Mikonui River.

"Mr. J. Grimmond, Mr. T. Perham, and myself have pegged out a suitable site for the generating plant. This site is three miles and a quarter, measured along the pole-lines, from the Ross United Company's shaft. An efficiency of transmission of 70 per cent. could be guaranteed, with first-class electrical plant, including the losses in the dynamo, line, and motor. The turbine for driving the dynamo must therefore be capable of developing $333 \times \frac{100}{70} = 476$-horse power. Many makers of turbines state that they can guarantee an efficiency of 80 per cent. This, however, is too high for everyday work, and it is not safe to estimate an efficiency of more than 70 per cent. for the turbines.

"When I was at Ross Mr. T. Perham was engaged on the survey of the proposed water-race, but at the time of my leaving had not quite finished the levels. Since then he has telegraphed to me that the total difference of level between the head-race and the tail-race is 86 ft. 6 in.; loss of head in race, &c., 26 ft., leaving 60 ft. 6in. available. As it is very important that there should be no stoppage at flood-time, nor even any serious diminution of the power given out by turbine, sufficient water should be brought in to enable the turbine to give at its full power when the water at the tail-race is considerably above its normal level. The following calculation is therefore based on the assumption that a net fall of 55 ft. is available. The amount of water necessary to drive the turbine when giving out 476-horse power will therefore be $\frac{476 \times 550}{55} \times \frac{100}{70} = 110$ cubic feet per second (approximate). The water-race must therefore be capable of carrying 110 Government sluice-heads.

"The power will be transmitted from the generating-house to the mine by polyphase alternating currents, under a pressure of 3,000 volts.

"The cost of pumping plant will be £7,390; electrical plant, £9,265—£16,655: contingencies and supervision, at 10 per cent., £1,665 10s.: total, £18,320 10s.

"The pumping plant includes the following: Engine-house at mine; excavation and foundations for machinery and pit-head gear; poppet-legs; main shaft, with 16 ft. grooved pulley; pinion, 2 ft. 3 in. diameter, 18 in. face; crank-shaft with spur-wheel, 16 ft. diameter, 18 in. face; connecting-rod, angle-bobs, pump-rods; two 10 in. by 9 ft. stroke plunger-lifts; two 16 in. by 9 ft. stroke plunger-lifts; two 16 in. by 9 ft. stroke draw-lifts; two 10 in. by 9 ft. stroke draw-lifts; 300 ft. of 16 in. columns, with extra necessary columns for draw-lifts; 200 ft. of 10 in. columns for draw-lifts from the 400 ft. level (the 10 in. column from the 100 ft. level to adit is not included, as the company have already a column in position which will fulfil the purpose); air-vessels; bearings; holding-down bolts; driving-ropes; erection of pump in position. (This estimate does not include any repairs to shaft.)

"The electrical plant will consist of—one turbine capable of giving 476-horse power, in casing, with governor direct, coupled to one polyphase dynamo and exciter; overhead line of hard-drawn bare copper, with insulators and poles; one polyphase motor capable of developing 350-horse power; switch-board and working appliances for generating-house; switch-board and starting gear at motor-house; foundation and erection; one galvanised-iron building for generating-house; six spare coils for motor; spare armature for exciter; six spare coils for alternator; telephone-line between generator-house and mine.

"The two estimates above therefore comprise everything in connection with the pumping machinery with the exception of water-race and tail-race, the cost of which you probably have received by this time from Mr. Perham. The remaining figures for the complete equipment of the mine can be obtained from Mr. Bell's report.

"Whilst I was at Ross Mr. Perham asked me to look at the upper reaches of the Mikonui, as it had been pointed out to him that a much greater fall per mile could be obtained higher up. My investigation confirms this; but, as the distance along the pole-line would be increased to seven miles against the present scheme, the extra cost of electrical plant, together with the extra cartage for machinery to the generating-site on the upper reaches, would be approximately £2,700, the

extra loss in transmission being 5 per cent. There would also be an extra annual cost of working, owing to the inaccessibility of the upper generating-site, and I therefore do not recommend that this should be chosen, unless it can be shown that a saving of at least £4,000 can be effected in the water-race."

With a view of granting aid to prospecting the deep levels of Ross Flat, the Government has reserved an area of 100 acres, being a portion of the ground formerly occupied by the Ross United Company. This area, which is situated on Ross Flat, will be handed over to any company that can satisfy the Government of their ability to raise sufficient capital to drain the flat to a depth of 400 ft. below the adit. In pursuance of this matter, the foregoing reports from Messrs. Napier Bell, Perham, and Fenn, who were specially requested to point out some practicable method of the adaptation of the water-power obtainable in the district, furnish data sufficient to indicate to any such company how the deep-level drainage can be effected. The description of the plant, which, with some modifications, will be capable, in my opinion, of doing the work required, and the estimated cost will indicate to any company or companies what the initial cost of the undertaking would be. In the event of satisfaction being given, the Government will be prepared to subsidise the undertaking in accordance with regulations under "The Mining Act, 1898."

Mont d'Or Claim (Area, 163 acres; owner, Mont d'Or Gold-mining and Water-race Company, Limited; mine-manager, Charles Davey).—This claim, which consists of auriferous gravels, is operated on by ground-sluicing, with a pressure of 180 ft. There are sixteen miles of water-races, carrying from fourteen to sixteen heads, with a length of 4,020 ft. of 15 in. and 800 ft. of 22 in. pipes. Value of water-races and plant, £13,294. The tail-races cover a distance of about three-quarters of a mile, with a grade of 1 ft. in 12 ft. The quantity of gold obtained for the year was 1,532 oz. 7 dwt. 6 gr., valued at £6,009 6s. Twenty-three men were employed.

Never Despair Claim (Area, 1 acre; owner, J. P. Muir).—About 30 oz. of gold was obtained by ground-sluicing. There is a water-race a mile and a quarter in length, carrying five sluice-heads, with a pressure of 70 ft. At this claim the fine gravel only is washed away, the larger stones being stacked on the ground.

Blue Jacket Extended (Area, 2 acres; owners, Jeremiah O'Neil and party).—This claim is worked by a drainage-tunnel, with a water-balance and incline, and for the past thirty years was worked from one deep level to another. Only 600 cubic yards of washdirt was operated on during the year, giving a yield of 30½ oz. of gold, valued at £119. Three men were employed during the year.

Scott and party are receiving Government subsidy for driving a tunnel to drain a lead known as the Terrace lead, near Clear Creek.

Prince of Wales Claim (Area, 37 acres; owner, Charles Davey and others).—This claim, which is let on tribute, is worked by trucking and elevating, the face of auriferous gravel being about 30 ft. in height. The elevators are worked at a pressure of 60 ft. The water-race is three miles in length, carrying eight heads, with about 230 ft. of 15 in. pipes, valued at £1,600. From the 1st October to the 22nd December 85 oz. 11 dwt. 13 gr. of gold was obtained, valued at £333 15s. This claim has been recently purchased from the Ross United Company, and is held by seven shareholders who are contemplating erecting a new haulage plant and intend developing this ground by sinking to deeper levels. The claim is at present worked by a party of eleven tributers.

Prospecting operations are being carried on at the Mikonui River, near the South Road, and a subsidy has been granted to a party for driving a tunnel from near the water's edge to drain an area of ground lying between the main road and the terrace behind.

A number of "beachcombers" and others employed in ground-sluicing find employment on the beaches near the mouth of the Mikonui River.

Mr. C. Holley is prospecting in the old Captain Russell Claim, near the road to the southward of the Mikonui River. He has been engaged cutting a water-race and making a dam and tail-race for the last fifteen months, and expects to be ready to make a start washing in a few weeks. Mr. Holley's father has got the adjoining claim, and both men work in partnership.

Okarito and Jackson's Bay.

The splendid returns from one of the beaches of the Callery above the gorge last winter resulted in many of the accessible beaches on that river being pegged off, and held again until the river is again low enough to be worked. Previous to last winter the auriferous beaches on this river were neglected. In view of discovering the source of this gold, several parties during the summer have been prospecting the ranges up to the terminal face of the Spencer Glacier, but so far nothing of importance has been discovered.

The Waiho Hydraulic Sluicing Claim, situated on the Waiho terraces, has an area of 100 acres. The original owners, a party of miners, being unable to bring in a sufficient supply of water to work the claim, placed the property under option to Mr. Perry, who afterwards disposed of it to a British syndicate who handed over the management to that gentleman. Mr. Perry first decided to construct a water-race from the Totara River, one mile and three-quarters in length, and having a capacity of thirty heads. To carry out this, estimates of costs were prepared, and on tenders being called Mr. Robert Wylde's was accepted. At the inlet end 20 chains of tunnel, capable of carrying a hundred heads, is driven through very hard country rock, at a cost per foot varying from £1 1s. to £3, and 15 chains of ditching done at a cost of £8 per chain. The pipes used to convey the water from the tunnel to the nozzles are 110 chains in length and 30 in. diameter, the water-pressure at the end being 220 ft. The cost of the whole work was £7,500. Sluicing operations will shortly be commenced, as the water-races have been completed.

Another claim of 100 acres has been acquired by Mr. Perry on behalf of a syndicate, for which it is intended to bring in water for sluicing on the success of the Waiho company being assured.

Several parties of miners are employed about the shores of Lake Mapourika and on the beaches above the Forks.

A considerable population are engaged "beachcombing" and sluicing on the sea-beaches both to the northward and southward of Okarito.

At twelve miles south of Okarito, at the Waikupakupa River, a claim has been taken up for dredging.

An English company has also taken up a claim at Gillespie's Beach.

Otago and Southland.

Abstract of Licenses for Special Claims and Licensed Holdings issued from the Wardens' Offices, and registered on or before the 31st March, 1899, in the Books of the Mining Registrar.

Date.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
			Naseby.			
	A. R. P.					
31/8/92	10 0 24	St. Bathan's ..	I.	St. Bathan's	..	Thomas Hughes and J. Morgan.
5/5/93	29 2 32	" ..	VII.	"	..	United M and E Water-race Co. (Reg.).
21/7/94	100 0 0	" ..	I.	"	..	John Ewing.
23/2/95	24 0 0	" ..	II.	"	..	United M and E Water-race Co. (Reg.).
30/11/96	39 0 30	" ..	I.	"	..	John Ewing.
15/12/96	50 0 0	Serpentine ..	XIII.	Long Valley	Laffey and Party ..	John Laffey.
15/12/96	47 3 10	" ..	"	"	"	Patrick Laffey.
25/3/97	63 0 0	Enterprise Gully, Naseby	XVIII.	Naseby ..	(Alluvial and dredging)	Enterprise Gully Dredging Co. (Ltd.).
10/9/97	43 0 0	St. Bathan's ..	III.	St. Bathan's	..	William McConnochie and J. Kennedy, jun.
10/9/97	95 2 0	" ..	I.	"	..	John Ewing.
21/1/98	75 3 34	" ..	IV.	Blackstone	..	John Ewing.
6/8/88	15 0 0	Hamilton South	I.	Rock and Pillar	..	John Hambley and others.
9/9/90	8 0 0	Naseby ..	"	Naseby ..	..	Enterprise Water-race Co. (Reg.).
11/7/90	16 0 20	St. Bathan's ..	"	St. Bathan's	..	Bank of New South Wales.
5/5/93	7 2 37	" ..	"	"	I.X.L.	Harry Excell and another.
1/1/92	10 0 0	" ..	II.	"	..	St. Bathan's Water-race Co. (Reg.).
20/9/93	5 2 13	" ..	III.	"	..	M. Hunt, H. Mee, and Bank of New South Wales.
6/2/95	16 2 17	" ..	VII.	"	St. Bathan's Water-race Co.	St. Bathan's Water-race Co. (Ltd.).
12/2/95	18 2 26	Naseby ..	Pt. I.	Mount Buster	Mount Buster Mining Co.	Mount Buster Mining Co.
6/3/96	6 0 0	St. Bathan's ..	IV.	Blackstone ..	..	Robert Jones.
13/10/96	19 2 28	" ..	II.	St. Bathan's	..	John Ewing.
29/9/96	4 2 19	Naseby ..	I.	Town of Naseby	Inder Brothers Hydraulic Co.	R. S. F. Inder and F. W. Inder.
29/9/96	8 0 0	" ..	II.	Naseby ..	Enterprise Water-race Co.	Enterprise Water-race Co. (Ltd.).
27/10/96	29 2 21	Taieri River, Hyde	III.	Rock and Pillar	Capburn Mining Co.	Taieri Gold-sluicing Co. (Ltd.).
27/10/96	29 2 12	Ditto ..	"	"	Capburn Sluicing Co.	"
6/11/96	17 3 0	St. Bathan's ..	II.	St. Bathan's	..	Scandinavian Water-race Co. (Reg.).
25/3/97	3 3 28	Naseby ..	I., VIII.	Town of Naseby	..	Charles Hore.
25/3/97	11 2 20	" ..	I.	Naseby ..	..	William Guffie and Julia Guffie.
7/9/97	21 0 0	" ..	XVIII., I.	" ..	..	Richard L. Francis.
10/9/97	4 1 18	St. Bathan's ..	I.	St. Bathan's	..	William Gay and James Fordham.
21/1/98	28 3 0	" ..	III.	"	..	James Hesson and others.
14/12/97	13 0 7	Naseby ..	I.	Naseby ..	..	John W. Reed.
3/5/98	10 0 0	" ..	VIII., I.	Town of Naseby	..	Shung Won Tong.
12/5/98	61 2 21	Kyeburn ..	V., VI.	Kyeburn ..	..	Moses Brown and John Brown.
13/9/98	13 2 0	Spec Gully, Naseby	II.	Naseby ..	..	Si Young.
27/9/98	14 3 0	Naseby ..	"	" ..	..	John Hore.
14/3/99	10 0 0	Kyeburn Diggings	..	..	..	Moses Brown and John Brown.
			Dunedin.			
14/8/96	40 0 0	Lee Stream ..	VII.	Deep Stream	..	Deep Stream Hydraulic Sluicing Co.
			"	Lee Stream..		
14/8/96	40 0 0	Sutton ..	X.	Sutton	..	"
13/1/97	40 0 0	" ..	XII.	"	..	"
			VII.	Lee Stream		
13/1/97	38 0 0	" ..	XII.	Sutton ..	..	"
			VII.	Lee Stream		
29/4/97	25 3 17	Nenthorn ..	XI., XII., VII.	Nenthorn ..	..	Caledonian Gold-mining Co.
3/7/96	12 3 4	Mount Hyde ..	IV.	Mount Hyde	..	Richard Sheppard.
3/7/96	16 2 0	" ..	V.	"	..	Harrison and Lyders.
7/8/96	16 2 0	" ..	"	"	..	"
8/1/97	13 2 12	Sutton ..	X.	Sutton ..	..	Deep Stream Amalgamated Hydraulic Sluicing Co.
7/5/97	3 3 17	Lee Stream ..	VII.	Lee Stream..	..	Deep Stream Hydraulic Sluicing Co.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens Offices—*continued.*

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
			Queenstown.			
	A. R. P.					
13/8/88	47 2 18	..	XI.	Skipper's Cr'k	..	W. L. and J. E. Davis.
31/12/88	5 0 0	..	X.	"	..	James Edward Davis.
19/6/89	9 3 34	..	IV.	Wakatipu ..	..	G. G. Woodhouse and W. Houston.
19/6/90	3 0 0	..	VII.	Skipper's Cr'k	..	T. Monck and N. McInnis.
13/6/93	7 2 31	..	XI.	"	..	Elizabeth Stevenson.
10/4/94	6 3 32	..	"	"	..	John Stephen Collins.
15/5/94	4 2 22	..	"	Shotover ..	..	Egbert Sainsburn.
14/1/96	17 0 20	..	XIX.	" ..	..	Lawrence and James Lynch.
2/3/97	14 0 0	..	XI.	Skipper's Cr'k	..	Alfred Smith.
2/3/97	9 1 10	..	"	"	..	B. Rogers and R. Trippe.
2/3/97	20 0 0	..	VII., XI.	"	..	James Stenhouse.
13/4/97	12 0 0	..	"	"	..	Eliza Gemmell and C. Schmeidt.
7/6/97	9 3 0	..	XI.	Shotover ..	..	J. Jephsen, M. Trainor, and W. Pearson.
17/2/98	9 3 12	..	"	" ..	..	John Stephen Collins.
5/4/98	16 0 23	..	XIX.	" ..	..	Joseph Walde.
12/5/90	6 0 0	..	I.	Mid Wakatipu	..	Shu Ming and A. McCallaghan.
23/9/90	62 0 24	..	XI.	Skipper's Cr'k	..	Skipper's Sluicing Co. (Ltd.).
9/6/94	54 2 24	..	XIII. VII.	Glenorchy Mid. Wakatipu	..	Moonlight Sluicing Co. (Ltd.).
10/9/94	73 2 0	..	III., IV.	Skipper's Cr'k	..	E. B. Rylen, T. Brown, and J. Mitchell.
7/6/97	26 0 0	..	XI.	Shotover ..	..	Samuel Rogers.
7/6/97	59 0 18	..	XIII.	Poluoru ..	..	John Mitchell.
12/7/97	52 1 30	..	XI.	Skipper's Cr'k	..	Robert Johnson.
25/5/98	75 0 0	..	II., III.	"	..	Achilles Goldfields.
22/2/99	12 2 30	..	..	Glenorchy ..	Moonlight No. 2 ..	Moonlight No. 2 Sluicing Co.
22/2/99	73 2 0	..	..	" ..	" ..	"
13/3/99	1 0 0	..	XI.	Skipper's Cr'k	..	Skipper's Sluicing Co. (Ltd.).
20/2/99	1 0 0	..	XIX.	Shotover ..	..	John Greig.
			Arrowtown.			
14/9/96	10 0 0	..	XIV.	Shotover ..	..	W. H. Anderson, J. Anderson, W. Hannah.
18/8/98	13 0 16	..	XVIII.	" ..	..	William and John Jenkins.
10/12/89	6 2 14	..	XIV.	" ..	..	Arrow Falls Gold-mining Co. (Ltd.).
5/6/97	24 1 20	..	I.	Cardrona ..	..	Patrick Talty.
22/4/98	39 1 18	..	XVIII.	Shotover ..	..	Arrow Flat Hydraulic Gold-mining Co.
			Cromwell.			
15/10/97	40 0 0	..	V.	Cromwell ..	..	John Werner and party.
9/7/97	30 0 0	Fatboy's ..	X.	Cardrona ..	..	F. G. Naumdun.
			Alexandra.			
19/3/94	12 0 0	Tucker's Hill ..	VI.	Cairnhill ..	Tucker Hill Sluicing Co.	J. Rivers and another.
13/2/97	63 0 0	Obelisk Creek..	I.	" ..	Last Chance Co. ..	James Hesson and others.
1/3/97	17 0 0	" ..	"	" ..	Carroll and Party ..	P. Carroll and another.
22/3/97	37 0 0	" ..	"	" ..	John Ewing ..	John Ewing.
8/2/98	6 0 0	" ..	"	" ..	George Wilkinson ..	George Wilkinson.
			Black's.			
1/7/92	25 0 0	Matakanui ..	VII.	Lauder ..	Matakanui Co. ..	William Greenbank and others.
4/3/96	22 0 0	" ..	"	" ..	" ..	"
1/1/92	15 0 0	" ..	"	" ..	Simes and Morgan..	John Simes.
21/2/93	82 0 0	" ..	"	" ..	Ewing and McConnochie	J. Ewing and another.
10/12/95	31 0 0	" ..	"	" ..	Sugar-pot Co. ..	Stephen Read and others.
6/2/95	25 0 0	" ..	"	" ..	Undaunted Co. ..	Undaunted Gold-mining Co. (Ltd.).
6/5/96	20 0 0	" ..	"	" ..	" ..	Ditto.
			Roxburgh.			
21/11/92	88 0 0	Roxburgh East	I.	Teviot ..	Roxburgh Amalgamated Co.	Roxburgh Amalgamated Mining and Sluicing Co. (Ltd.).
2/6/93	30 0 0	Hercules Flat	VII.	" ..	John Ewing ..	John Ewing.
22/7/93	5 0 0	Coal Creek Flat	II.	" ..	Manuel Brothers ..	M. E. Manuel.
29/8/93	62 0 0	Hercules Flat	VII.	" ..	John Ewing ..	John Ewing.
21/11/93	19 0 0	Commissioner's Flat	I.	" ..	Haughton and Party	Joseph Haughton and others.
24/1/96	21 0 0	Horseshoe Bend	XII.	Benger ..	Jenson Brothers ..	J. Jenson and another.
12/3/97	92 0 0	Miller's Flat ..	IX.	" ..	James Rattray ..	James Rattray.
7/6/97	29 0 0	Roxburgh East	I.	Teviot ..	Loudon and Party..	Thomas Loudon and others.
7/6/97	51 0 0	Dismal Swamp	X.	Long Valley	Enterprise Hydraulic Co.	Enterprise Hydraulic Sluicing Co. (Ltd.)
7/6/97	29 0 0	Miller's Flat ..	IX.	Benger ..	Charles W. Rattray	Charles W. Rattray.
7/6/97	23 0 0	Upper Waikaia	II.	Whitecomb	Upper Waikaia Sluicing Co.	James Elliott.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices—*continued.*

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
					Roxburgh—continued.			
18/6/97	12	0	0	Miller's Flat ..	III., VIII.	Benger ..	P. Laffey ..	P. Laffey.
8/9/97	100	0	0	" ..	VIII.	" ..	Laffey and Party ..	Patrick Laffey and others.
19/6/97	69	0	0	Upper Waikaia	V.	Whitecomb	Upper Waikaia Sluicing Co.	P. Riordon.
23/2/98	41	0	0	Molyneux River,	I.	Teviot ..	Pitchers and Party	Henry Youngman.
23/2/98	40	0	0	Miller's Flat ..	II.	Benger ..	Andrew B. Imrie ..	Andrew B. Imrie.
27/6/98	11	0	0	Pleasant Valley	V.	Teviot ..	Pleasant Valley Gold-mining Co.	Pleasant Valley Gold-mining Co.
27/6/98	65	0	0	Moa Flat ..	VIII.	Benger ..	Kate McIntyre ..	Kate McIntyre.
3/10/98	28	0	0	Campbell's ..	V., VIII.	Whitecomb	Parker and Party ..	David H. Parker.
					Lawrence.			
7/6/97	22	1	15	German Creek	VI.	Tuapeka ..	German Flat Hydraulic Slucing Co.	German Flat Hydraulic Sluicing Co.
19/7/97	70	2	15	..	V., VII.	Waitahuna E., Table Hill ..	Sailor's Gully	Sailor's Gully Gold-mining Co. (Ltd.).
4/3/98	46	1	19	Munro's Gully	XVIII., XIX.	Tuapeka East	Tuapeka Sluicing Co. (Ltd.).	E. Mills and E. Browne.
17/2/98	31	1	32	Waipori ..	VI.	Waipori ..	..	Lewis Pearsall and A. Munro.
4/3/98	73	1	34	Weatherstone's	X.	Tuapeka East	Golden Rise Mining Party	W. F. Smyth and party.
17/2/98	68	3	7	Waipori ..	V.	Waipori ..	Pedlow and Party ..	William Pedlow.
10/9/94	66	3	0	..	XVIII.	Tuapeka East	Blue Spur and Gabriel's Gully	Blue Spur and Gabriel's Gully Consolidated Gold Co. (Ltd.).
27/11/94	26	0	30	..	X.	Waitahuna E.	..	Charles Thomson and party.
28/1/96	84	1	0	..	XIV.	Waipori ..	Bakery Flat ..	Bakery Flat Sluicing Co. (Ltd.).
28/7/96	47	0	32	..	IV., I.	Beaumont ..	Beaumont Local Co-operative	Beaumont Local Co-operative Gold-mining Co. (Ltd.).
10/8/96	99	1	0	..	XI.	Tuapeka East	Golden Key ..	Golden Key Gold-mining Co.
15/2/97	34	2	0	..	V., VIII.	Waipori ..	Golden Block ..	Charles Leijon and party.
15/2/97	20	2	15	..	I.	Waitahuna W.	Tuapeka Mouth Sluicing Claim	George Reid.
27/7/97	18	2	11	Waipori ..	XIV.	Tuapeka East	Dead Lead Co. ..	William J. Farrell.
21/10/87	10	1	36	..	V.	Waitahuna ..	Ferris and Party ..	Joseph Ferris and party.
10/9/94	18	0	27	..	XIV.	Tuapeka East	Local Industry ..	Local Industry Gold-mining Co. (Ltd.).
14/1/95	16	3	26	..	XVIII.	"	Perseverance Co. ..	John Kitto and party.
26/11/95	8	3	16	..	XV.	Crookston ..	Undaunted Gold-mining Co.	John Edie and J. Kirkpatrick.
13/4/96	19	2	17	..	V.	Table Hill ..	..	David McGill.
25/3/96	11	0	21	..	X.	Waitahuna E.	Quilter and Party..	Thomas and Thomas Francis Quilter.
13/7/96	8	2	28	..	VI.	Waipori ..	Parker's Deep Lead	James Parker.
18/3/98	53	3	29	Waipori ..	XIV.	Tuapeka East	Caudwell and Party	W. E. Caudwell and W. E. S. Knight.
4/7/98	29	2	38	" ..	"	"	Slater and Party ..	Joseph Slater.
4/7/98	90	2	37	" ..	X., XIX.	"	Crescent Gold-mining Co.	William Forrest Smyth.
15/8/98	91	1	0	Post Office Creek	XII., VI.	Maungatua .., Waipori ..	..	Post Office Creek Gold-mining Co. (Ltd.).
28/9/98	17	0	33	Gabriel's Gully	XIX.	Tuapeka East	..	Local Industry Gold-mining Co. (Ltd.).
8/11/98	18	1	24	Horseshoe Bend	VII.	Beaumont ..	Undaunted Gold-mining Co.	John Edie and John Kirkpatrick.
23/11/98	20	3	9	Blue Spur ..	XVIII.	Tuapeka East	Perseverance Gold-mining Co.	John Kitto and party.
23/11/98	12	2	14	Horseshoe Bend	VII.	Beaumont ..	Undaunted Gold-mining Co.	John Edie and John Kirkpatrick.
15/12/98	34	0	0	"	XV.	Crookston ..	Ditto	"
10/1/99	34	2	0	Waitahuna ..	VI.	Tuapeka East	Sutherland and Party	Alexander Sutherland and party.
26/1/99	87	2	5	Waipori ..	XI., IV.	Tuapeka East, Waipori ..	Eaton and Party..	Walter T. Eaton and party.
6/3/99	16	0	0	" ..	XV.	Tuapeka East	Golden Point ..	Charles Todd.
6/3/99	12	0	0	Waitahuna ..	IV.	"	..	John Sutherland and William Sutherland.
22/3/99	5	0	0	Waitahuna Gully	..	..	Quilter and Party ..	Thomas Quilter and party.
					Waikaia.			
15/6/96	70	1	0	..	I.	Nokomai ..	Lion Gold-mining Co.	Lion Gold-mining Co.
24/8/96	30	0	0	..	V.	Wendon ..	Break-'em-All ..	Winding Creek Gold-mining Co. (Ltd.).
14/9/96	26	2	0	..	II.	" ..	Landslip Claim ..	Albert McIvor.
16/10/96	53	1	24	..	VI.	Waikaia ..	Nugget Gold-mining Co.	D. Ferguson and party.
16/10/96	98	1	0	..	V.	Nokomai ..	Golden Terrace Hydraulic Co.	R. T. Stewart (trustee).
15/4/97	27	0	24	..	"	Wendon ..	Break-'em-All ..	Winding Creek Gold-mining Co. (Ltd.).
20/10/97	25	0	20	..	VI.	Waikaia ..	Nugget Gold-mining Co.	D. Ferguson and party.
3/2/98	39	3	20	..	XIV.	Chatton ..	..	John Marr.
3/2/98	27	1	2	..	"	" ..	..	William Little.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices—*continued.*

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
			Waikaia—continued.			
	A. R. P.					
3/2/98	9 0 34	..	V.	Wendon ..	Break-'em-All ..	Winding Creek Gold-mining Co. (Ltd.).
6/3/94	34 0 0	..	IV., VII.	Nokomai ..	Nokomai Hydraulic Sluicing Claim	Sew Hoy.
6/3/94	61 2 0	..	VII.	" ..	Ditto	Kum Poy.
26/6/97	28 3 0	..	II.	Wendon ..	Landslip Hydraulic Sluicing Claim	J. White and A. McIvor.
3/2/98	9 0 34	Wendon ..	V.	" ..	Break-'em-All ..	Winding Creek Gold-mining Co. (Ltd.).
30/5/99	84 1 31	..	I., III.	Waikaia ..	Argyle Hydraulic Sluicing Co.	R. T. Stewart (trustee).
2/8/98	26 1 1	Waikaia ..	VI.	" ..	Piano Flat Hydraulic Sluicing and Gold-mining Co.	G. L. Roope.
20/9/98	99 0 0	Nokomai ..	I.	Nokomai ..	..	W. Pearsey.
4/10/98	6 1 25	Waikaia ..	V.	Wendon ..	Break-'em-All ..	Winding Creek Gold-mining Co. (Ltd.).
31/1/99	13 2 0	..	VII., VIII.	Whitecomb..	Piano Flat Hydraulic Sluicing and Gold-mining Co.	Piano Flat Hydraulic Sluicing and Gold-mining Co.
			Riverton.			
27/3/95	20 0 0	Round Hill ..	VII.	Longwood ..	..	Ourawera Gold-mining Co. (Ltd.).
16/7/95	6 1 12	" ..	"	" ..	..	Round Hill Mining Co. (Ltd.).
2/11/95	40 0 0	" ..	"	" ..	..	"
23/3/97	53 3 0	Waiau ..	I.	" ..	Waiau Beach Co. ..	Waiau Beach Hydraulic Elevating Co.
13/4/97	8 3 31	" ..	IX.	" ..	The Camp ..	Hugh Erskine and John H. Tresseder.
20/9/98	4 2 0	" ..	XV.	" ..	Waiau Beach Extended Gold-mining Co.	Richard Allen.
15/10/98	25 0 0	Round Hill ..	VII.	" ..	T. O'Brien Gold-mining Co.	Thomas O'Brien.
15/10/98	19 1 9	" ..	"	" ..	Smith Gold-mining Co.	Leonard W. Petchell.
9/3/99	19 0 10	" ..	"	" ..	Pactolus Gold-mining Co.	John White.
7/2/99	100 0 0	" ..	X.	" ..	Oraki	William Gunn.

Livingston.

A considerable number of miners are engaged in hydraulic sluicing and in working out alluvial washdirt from tunnels. The principal source of the water-supply is from Maerewhenua Creek, a water-race which is owned and managed by Mr. Christian.

Maerewhenua.

A considerable number of miners still obtain profitable employment by working their claims when water is available, but, as the rainfall is not great in this part of the district, much time is lost for want of water for sluicing purposes.

The Mountain Hut Water-race is not yet completed, the owners having failed to comply with the requirements demanded before the subsidy is available.

The Oamaru Municipal Reserve and the Hospital endowment, on the lands of which alluvial gold is reported to exist, have not yet been resumed, but legislation for that purpose is being introduced.

Naseby.

In this district the number of miners engaged in alluvial mining and sluicing is still considerable. The elevating plants in the Hogburn Creek have been fairly continuously employed, as the rainfall and the melting of snow in the spring has furnished a better supply of water than usual.

The Mount Ida Water-race supply is already somewhat augmented from the Eweburn Reservoir, but, as water cannot be stored in it in any quantity until after the embankment is completed, some time must elapse before much advantage from this reservoir can be felt.

Inder and party, who hold a claim at Mount Buster, still carry on profitable operations during the summer months, but on account of its great elevation no sluicing can be carried on for the greater part of the year.

A few parties still continue to obtain gold at Hamilton, Hyde, Sowburn, Garibaldi, and other districts about the Maniototo Plains.

The water-race at Blackstone Hill still continues to afford the means of washing and sluicing to a few parties of miners.

Deep Stream Amalgamated Hydraulic Sluicing Company (Area, 195 acres; mine-manager, Henry Heimann).—This claim, which is worked on the elevating principle, has had about 12 acres operated on during the year. The length of water-races is over ten miles, with a capacity of twenty-five heads, and there is a mile of 18 in.–19 in. pipes. Seventeen men were employed. During the year 1,213 oz. 7 dwt. 18 gr. of gold was obtained, valued at £4,700 5s. 7d.

Hibernian Claim (Area, 20 acres; owners, Ross and party; mine-manager, Matthew Young).—This claim is operated on by ground-sluicing. No work has been done on it for over a year, but a start has just been made again. There is eight miles of water-races, with a right for three heads, and 40 chains of 15 in. pipes, valued at £1,000. Six men are employed.

Naseby Dredging and Hydraulic Sluicing Claim (Area, 100 acres; mine-manager, H. Ravenwood).—This claim, which is operated on by elevating, was only worked for seven months of the year through scarcity of water. There were 14,000 cubic yards of gravel treated during that period, yielding 203 oz. 3 dwt. of gold, valued at £782 4s. Three men were employed.

Brown Brothers' Claim (Area, 149 acres; owner, J. Brown; mine-manager, Moses Brown).—This claim, which is situated at Kyeburn, is worked by elevating and ground-sluicing. 1 acre, or 49,360 yards, of gravel were operated on during the year, which gave a yield of 308 oz. 10 dwt. of gold, valued at £1,187 14s. 6d. There are three water-races—one, of two miles, supplying three heads; one, fourteen miles, twelve heads; and three miles, four heads—the supplies from which are intermittent. There is a total length of 3,500 ft. of pipes, with all connections, two elevators, &c., valued at £1,000. The water-races are valued at £4,000. Seven men and two boys are employed. The owners say a claim of 61 acres has just been floated by them for the purpose of putting on a dredge, the name of the company being the Naumai Gold-dredging Company (Limited).

Enterprise Claim (Area, 20 acres; owner, Francis F. Brown).—This claim is worked by elevating, 1 acre being operated on during the year, from which 100 oz. of gold was obtained, valued at £385. The length of pipes is 660 ft., valued at £500. Two men were employed.

Kyeburn.

Reed Brothers' Claim (Area, 13 acres; owners, Reed Brothers; mine-manager, Nicholas Reed).—This claim is operated on by elevating, 1¼ acres being worked during the year. The water-race is half a mile in extent, and pipes 180 yards, 13 in.–19 in., with a pressure of 100 ft. Value of plant and water-races, £300. Three men were employed.

A considerable number of parties, including some Chinese, find employment throughout this district.

St. Bathan's.

Scandinavian Claim (Area, 47 acres; owners, Scandinavian Water-race Company; manager, Neil Nicholson).—The face of wash here is 120 ft., worked by hydraulic and elevating, the water-pressure being that due to a head of 350 ft. The water-race is twenty-five miles long, and has first rights to twenty-five Government heads from the Manuherikia River, a good portion of which is sold to other claims in the locality, the balance being used by the company. The yield of gold for the last year was 520 oz. This is one of the earliest worked claims in the district, and the owners were the first to bring in a good water-supply.

Several other claims owned by small parties are also worked in this locality.

The outfall for the tailings is by Muddy Creek, the channel of which has become filled up with tailings. It has been with great difficulty that a sludge-channel could be kept open, and various devices were resorted to, embankments built with tailings and matagowrie bushes being chiefly used. It has now been decided by the Government to grant a subsidy for this channel, and the use of plank fluming instead of embankments has been recommended.

The United M and E Company have two claims. That adjoining Mr. Ewing's Kildare Hill claim comprises an area of about 24 acres. The auriferous wash is overlain by a considerable thickness of barren ground. One nozzle and one elevator are ordinarily at work. The latter uses five heads of water, at a pressure due to a vertical height of 350 ft. The sluicing-nozzle passes four heads from a height of 180 ft. Depth of elevator, 55 ft. Four men are employed in the claim and one man on the races.

Morgan and Hughe's Claim, Shepherd's Flat (Area, 8 acres).—This claim adjoins Mr. Ewing's Shepherd's Flat claim, and is worked by sluicing, four men being employed. Work is carried on for eight hours per day, and water stored in dams at night. The face is about 100 ft. deep. Stones are filled by hand into a truck and hauled up an incline by a winch driven by a Pelton wheel.

Hunt's Claim.—Two men were employed sluicing, a large body of barren ground overlying the wash being first washed away. Rights are held for eight heads of water from Dunstan Creek, and the race is six miles long.

Eagle's Claim.—This claim adjoins that of the United M and E Company, and has an area of 3 acres. The auriferous wash has a dip of about 75° from the horizontal, and the easily accessible portion of it has been worked. For the last two years the work has been of a non-remunerative character, a large amount of barren ground having to be sluiced off in order to expose the deeper payable wash, the thickness of which is estimated at 100 ft. measured at right angles to the inclination of the deposit. Mr. Eagle states that the gold is not concentrated in his claims as in some of the neighbouring workings, but is more generally distributed through the entire wash. Water is conveyed from Mount St. Bathan's in a race seven miles long, and is high enough to give a pressure due to a vertical height of 400 ft. The work is carried on with about half the available pressure. The claimholders have a right to four heads of water. The pipe-line commences with a diameter of 22 in. and diminishes to 7 in. Two men are employed.

Gallacher and Party (Area, 3 acres).—This claim is situated between the township and the Scandinavian Claim, and has been worked for many years with a fair amount of success. Two men are employed. There is a small amount of water at a low head with which the sluicing is ordinarily done, but a two-head supply, with a pressure due to a head of 300 ft., is brought from the Scandinavian Company and used principally for breaking down the heaviest part of the ground. A small elevator is used at this claim.

St. Bathan's Sludge and Main Tailings Channel.—In consequence of the drought that has been experienced in this locality for a series of years, and the shrinkage of water in the Dunstan Creek, this costly work has been completely submerged by the flow of water and *débris* from the various claims within the St. Bathan's basin. At one time the tailings threatened to cover a large and costly bridge that spans the channel on the main road to the interior. Last season being a favourable one for water, advantage was taken of it by the claimholders interested in looking after the channel. With but a middling supply of water, the course of the channel has been scoured out, the tailings being reduced from 8 ft. to 10 ft. in depth by 13 ft. wide. Walls are being formed with the only material that can be obtained with economy—viz., matagowrie scrub. The work of deepening has been subsidised by the Government, £1 for £1 up to £1,000, the subsidy to extend over a period of three years. The work of deepening is under the supervision of Mr. J. Eagle, and, if carried out in accordance with a previous survey—viz., 58 ft. deep at All Nations Point—it will be a boon to those who depend upon mining within the prescribed area mentioned.

Ewing's Claims.—Mr. John Ewing, whose indomitable perseverance and skill has largely contributed to the success of hydraulic elevating, continues to control the operations of his various claims in Central Otago. At the Kildare Hill, at St. Bathan's, the material is elevated for a height of about 135 ft., which is the greatest depth reached in the district. Good provision is made for the safety of the employés, and at night the claims are mostly lit up with powerful electric lights. At Shepherd's Flat a large proportion of good-sized stones have to be dealt with. This is very successfully done by a stone-transit plant, or modified aërial tramway, which Mr. Ewing has designed for the purpose. The sluiced stuff is conveyed along a short race, fitted with a screen and trap-door at its lower end. The stones are caught on the screen and dropped through the trap-door into a truck having a loose body. When the truck is full the trap-door is closed, and the truck moved away on rails, another truck taking its place under the trap-door. The loaded truck-body is then attached to a hoisting-rope and raised to a convenient height, and then hauled along the wire-rope tramway to where a movable tipping apparatus is secured. This engages the truck-body and allows the load to be tipped, after which the empty truck is returned to its carriage, and the operation repeated on the truck which has been loaded in the meantime. Mr. Ewing states that twenty trucks per hour can be dealt with. The plant is worked by water-power. Number of men employed—Kildare Hill, 6; Vinegar Hill, 5; Shepherd's Flat, 16; Cambrians, 7: total, 34. The number of men in the other claims held by Mr. Ewing are—Matakanui, 7; Bald Hill Flat, 7; Roxburgh, 6: total, 20.

Matakanui (Tinker's), Dry-bread, and Devonshire.

On the whole the season has so far been a good one, and the water-supply has kept up well. The fears that it might soon give out, which were freely expressed by several of the miners, were dispelled to some extent by the very heavy rains which fell about the middle of January. Thirty-four men are employed at the several claims near the township; also, six men at the Dry-bread Diggings, and six at the Devonshire Diggings, making a total of forty-six men in the locality.

Two dredging claims have recently been taken up, one at each side of the township.

The opinion previously expressed—that to work the Matakanui field to the best advantage the whole of the claims should be consolidated, and a good storage-reservoir made in Thompson's Gorge, from which a continuous supply of water could be depended on—still holds good. The old system of paved tail-races, which are only washed up at long intervals, is still adopted here. But better results would in all probability be obtained if the later improvements elsewhere in use were to be adopted; cocoa-matting and the various kinds of riffles are found to save a larger percentage of gold than the old tail-races appear to have done in the past.

Bald Hill Flat.

Carrol and Lynch's Claim (Area, 16 acres; owners, Pierce Carrol and William Lynch; mine-manager, Pierce Carrol).—This claim is operated on by ground-sluicing and elevating, the amount of ground worked on during the year being 8 square chains. From this area, or 25,860 yards, 208 oz. 4 dwt. of gold was yielded, valued at £801 12s. 9d. The length of water-races is seven miles, with a capacity of six heads, and 2,000 ft. of pipes, 15 in.–9 in.

Ewing's Claim, Last Chance Claim, Wilkinson's Claim, and several small parties are also engaged in sluicing. Ewing's and Last Chance Claims are worked by elevating.

Several parties also continue to work claims in the vicinity of Coal Creek.

Roxburgh Amalgamated Claim (Area, 88 acres; owners, Roxburgh Amalgamated Mining and Sluicing Company, Limited; mine-manager, J. H. Waigth).—During the year a considerable amount of work has been done. The old road from the town to the cemetery has been enclosed, and a new road made in a northerly direction on the east side of the claim, joining the old road nearly a mile above the bridge crossing the Teviot Stream. A layer of sand from 25 ft. to 30 ft. thick overlies the wash, and a considerable area of this has been stripped by ground-sluicing. The pipe-line has also been diverted from the penstock to fit in with the altered conditions of the work, and the workshops, &c., removed further back. Three paddocks are open, and near the manager's house the wash is improving very materially, and appears to run back into the unworked ground. Twenty-two men are employed. Dividends were paid during last year. The total area of the claim is 88 acres, of which rather more than one-fourth has been worked. A plan of the claim is kept by the working manager. This is ruled into squares representing a chain each, and the face of the worked ground is marked on the plan from time to time. A similar arrangement exists at Blue Spur, and at the Empire Dredging Claim at Waipori. If working-plans of all mining and dredging claims were kept in a similar manner it would be found a decided advantage, and most useful. In some parts of the mine the bottom consists of clay, and in the other parts soft rock. Generally speaking the wash is not hard to treat, as the stones are not of a large nature, and are

easily handled. The nozzles are sufficiently strong to break off the dirt and bring down large falls to the elevator, consequently no blasting is required in the work. The water-supply has been good during the year, the dams at Lake Onslow being able to keep up a regular supply.

Dismal Swamp.

Enterprise Claim.—This special claim of 51 acres is situate in Block X., Long Valley Survey District, and is now the property of the Enterprise Hydraulic Sluicing Company (Limited), having been taken over from the original holders—Messrs. Stewart and party—at the beginning of last year. A new race was then constructed to bring water on to the claim at a higher level than formerly, and an additional 1,000 ft. of piping added to the main line to connect the new race with the claim. The mine is at present in the charge of Mr. Donald McLean. The formation is of fine quartz drift from the surface to the bottom of very soft schist, and carries gold through the whole mass. The claim is worked by hydraulic elevating. During the past year about an acre of ground has been worked, varying in depth from 8 ft. to 38 ft., the gold obtained being 70 oz., valued at £273 1s. 1d., or at the rate of £3 17s. per ounce. The return for the last quarter is not to hand yet, and further sluicing operations only began in October last. The claim being situate over 2,000 ft. above sea-level, work cannot be carried on during the winter months, owing to the severe frosts experienced at that altitude. The total length of water-races is nine miles, the capacity being fifteen Government heads. The length and dimensions of pipes are as follow: 300 ft. of 15 in., 3,400 ft. of 13 in., 300 ft. of 11 in., 300 ft. of 9 in. The pressure used for elevating is 200 ft., another 100 ft. being available if required. The run of boxes is 120 ft. in length and 3 ft. wide, 50 ft. of these being lined with angle-iron ripples, the remainder being lined with perforated plates, having cocoa-matting underneath. At the end of each box, which is lined with plates, there is a drop of 3 in., which makes provision for all the water and finer material which has passed through the plates in the preceding box being passed on to the top of the plates in the following one. Estimated value of water-races and plant, £1,700. Five men are employed.

Miller's Flat.

Golden Run Hydraulic Sluicing and Elevating Claim (Area, about 50 acres; owners, Golden Run Dredging Company, Limited; mine-manager, Patrick McLaughlin).—This claim, worked on the elevating principle, had 5 acres of ground operated on during the year, which yielded 889 oz. 14 dwt. of gold, valued at £3,425 7s. The length of water-races is eight miles, with one mile of pipes, the pressure used for elevating being 800 ft. Value of water-races and plant, £3,000. Fourteen men were employed. The Golden Run dredge was also employed in working this claim, and it is the intention of the owners to have a new and up-to-date dredge built, which will also be employed on the ground.

The necessity for a traffic-bridge across the river to connect Miller's Flat with the main road down the Molyneux Valley has long been felt. The punt hitherto used is now replaced by a substantial bridge, which is known as the Larnach Bridge, the erection of which was completed during the year. The Larnach Bridge, which should prove a great convenience to the public, consists of four spans, of 144 ft. 6 in. each, supported upon cylindrical cast-iron piers. The total cost of the bridge was £11,242, of which amount the Mines Department contributed £6,621.

Island Block.

Island Block Gold-mining Company (Limited).—Operations here are hydraulic sluicing and elevating. The surface is flat, and the wash averages 42 ft. deep. From 25 ft. to 30 ft. of the top part of the wash is poor, and is stripped off and passed over the sluice-boxes to catch any gold which it may have contained. Occasionally the wash at the bottom is in gutters formed in the bed-rock of mica-schist, which is ordinarily of a rather rough character. One sluicing-nozzle and one elevator were employed, with an additional elevator for pumping purposes only. The sluice-boxes are approximately 160 ft. long. At the head they have a fall of 8 in. in 12 ft., gradually reduced ¼ in. in each 12 ft. length until the grade is 5½ in. per box-length (12 ft.). The boxes are fitted with longitudinal bars and cross-riffles underlaid by cocoanut-matting. The first 12 ft. length is also provided with netting between the bars and matting. The total height of elevation from the bottom is 65 ft. The water-supply is from the Tallaburn and Fruad Creeks, principally the latter, with a storage reservoir for each creek. The races are six miles and a half in length, and terminate at an altitude of 700 ft. above the workings. This should give a pressure of 300 lb. per square inch, but, owing to the irregular way in which the sizes of the pipes (varying from 22 in. to 15 in. diameter) are laid, there is unnecessary friction, and the actual pressure as shown by a new standard gauge is only 225 lb. per square inch. The pipe-line is two miles and a quarter long. Fourteen men are ordinarily employed.

Lawrence.

Blue Spur and Gabriel's Gully Consolidated Gold Company, Limited (Area, 66 acres 3 roods).—This company continues to carry on operations for elevating and sluicing the gold-bearing washes and cements which constitute in this claim a very extensive deposit. The cement is first mined by the use of large quantities of explosives; afterwards it is broken up both by explosives and hand-hammers. The material is then sluiced by the use of a hydraulic nozzle through a series of boxes to the first elevator, after passing through which it runs through another series of sluice-boxes to the next elevator, and then through a second series of sluice-boxes into the creek. The gold is principally retained and saved in the bottom series of sluice-boxes, and from the other two runs a comparatively small quantity is obtained when cleaning up. The following extracts from the report furnished to the company by Mr. J. Howard Jackson give full particulars of the work done during the year:—

"The chief features of the past year's operations have been a good supply of water for sluicing purposes and, unfortunately, a slight diminution in the quantity of gold won. The year has been marked by neither accident nor failure, nor by any especial success; just steady work and a moderate return all the time. The subjoined figures show what exceptionally poor dirt is being treated with a margin of profit. Steady work, simple appliances, and constant vigilance are the only agencies which prevent that margin from showing the other way. The value of the gold is £3 19s. per ounce net; the quantity won during the year 3,026·4 oz., worth £11,954 8s. 8d., or 137·5 oz. less than last year. The total expenditure at the mine has been £5,647 18s. 8d. In spite of the unproductiveness of one part of the mine, 3,026·4 oz. of gold has been won, at a cost of 47·16 per cent. of its value. Last year this cost amounted to 50·15 per cent.—not a very large reduction, but sufficient to show that the plant in use is in an efficient state of repair. The 166 miles of head-races have been kept in repair, at a cost of £574 12s., and have delivered at the mine sufficient water to enable sluicing operations to be carried on for 8,171 hours, 126 days more than during last year. Wages and explosives continue to furnish the two heaviest items of expenditure. Owing to some difficulty in obtaining freights from England during the early part of the year, the colonial supply of roburite very nearly ran out, and I was compelled, much against my wish, to use powder for several large blasts, keeping what roburite cartridges remained for detail shots. This was a very serious matter, as the men had become so thoroughly accustomed to a completely safe explosive that being obliged to revert to the use of powder increased the risk of accident enormously. Quantity of powder used, 8,700 lb.; roburite, 4,044 lb. The cost of explosives for the year was £481 7s. 11d.; for wages, £3,737 18s. 10d. 8,171 hours sluicing and elevating treated 228,261 cubic yards of cement, producing 3,026·4 oz. of gold, an average of 6·53 gr. = 11·275d. per cubic yard. The number of men employed averaged forty."

Edie and Kirkpatrick's claim, on the Molyneux, between Island Block and Beaumont, continues to be worked under the management of Mr. Kirkpatrick, who carries on extensive hydraulic-sluicing operations.

The Local Industry Claim at Beaumont is again being worked, by a new company; and several parties of miners find employment about the beaches and terraces near the river.

Munroe's Gully.

Kitto and Co.'s Claim (Area, 20 acres; owners, John Kitto, Silas and William Hore, John and R. Hancock, and Ephraim Varcoe). This claim is worked by elevating, and 100,000 yards of gravel has been operated on during the year, giving a yield of 730 oz., valued at £2,810. The water-races and plant are valued at £2,000. Nine men were employed.

Messrs. Mills and Brown have also increased the area of their claim at Munroe's Gully, which is worked by hydraulic elevating.

The Local Industry Claim continues to be worked. The plant was moved down to the vicinity of Rocky Point, but operations in this locality have been unsuccessful.

Wetherstone's.

Golden Rise (Area, 73 acres; owners, Messrs. Smyth, Donlan, and Adams).—This claim is worked on the elevating principle, with a pressure of 220 ft. About 6 acres was operated on during the year, or 116,000 yards of material treated, which produced gold to the value of £3,700. There are fourteen miles of water-races with a capacity of five heads, with 2,500 ft. of 15 in. to 8 in. pipes. The whole of the plant is valued at £6,000. Seven men were employed. The owners say they have purchased a dredge and 28 acres of ground adjoining the Golden Rise Claim, at a cost of £525, and in repairs and machinery have expended a further sum of £1,200. The dredge is now in good working order, and a start is about to be made with it.

Waitahuna.

There is very little to report on in this locality. Another dredge has been started, under the name of the Imperial Dredging Company, on a special dredging claim on Waitahuna Flat, above the railway-line, and the prospects are good.

The Waitahuna Dredging Company (Kirby and party) are still working their ground below the railway-line, but are making arrangements to put on a more powerful dredge.

The five sluicing-claims at Waitahuna Gully belonging to Charles Thompson and party, employing thirteen men; the Sailors' Gully Company, employing seven men; Ferris and party, four men; Hagen and party, two men; and Quilter and party, three men, have all been working much the same as in former years.

The claim formerly owned by Messrs. Baker and party has been taken over by a company styled the German Flat Hydraulic Sluicing Company (Limited), with a capital of £1,300, and, now that the company have good storage-accommodation for water and plenty of pressure, I think the claim is likely to turn out a success.

Bakery Flat Claim (Area, 84 acres; owner, Bakery Flat Sluicing Company; mine-manager, John Thomas Johnson).—This claim is operated on by elevating only, and about 160,000 yards of gravel was worked during the year, which gave a yield of 400 oz. gold, valued at £4 per ounce. The length of water-races is sixty-three miles, with a capacity of twelve heads minimum and twenty maximum; there is also 3,820 ft. of pipes, the whole being valued at £4,000. Twelve men were employed.

The Post-office Creek Gold-mining Company have commenced to work a claim of 90 acres by hydraulic elevating, and the prospects are said to be favourable.

Golden Key (Area, 100 acres; owner, Golden Key Gold-mining Company; mine-manager, M. Whelan).—This mine is situated at Waipori. The lead of washdirt lies at a depth of 50 ft., and is worked from a shaft. The washdirt is 2 ft. in thickness, and is mined out in the ordinary way. There is an 8-horse-power boiler used for driving the winding plant, and also a Worthington

pump. Upwards of 500 cubic yards of washdirt has been dealt with for a return of 30 oz. of gold, valued at £116 5s. Eight men were employed. The manager says that the operations for the past six months have chiefly been prospecting, and that the ground will ultimately be worked by dredging.

Farrell's Deep Lead, Waipori (Owner, W. J. Farrell; manager, J. C. Nicholson).—A considerable amount has been expended in bringing water from the upper reaches of the Lammerlaw and Waipori Rivers. The races, which total a length approaching fifty miles, carry eight Government heads of water, and are now being enlarged. An elevator is at present at work with satisfactory results, and the erection of another is contemplated.

Manuka Creek.

Manuka Hill Gold-mining Company.—The Inspector of Mines for the Southern District, who visited the mine on 27th April, 1898, reports that Messrs. Stewart and Sons are working an alluvial claim, the wash from which is 30 ft. to 40 ft. thick, and of a fine character generally. The area of the claim is 6 acres, and there is 2 acres yet to work. The water-race is fourteen miles in length, and takes its water from Nuggety Gully (rights to eight heads) and small gullies (rights to two heads) which are crossed by the race. The actual water-supply is about 30 per cent. less than above, and the pressure at the nozzle is that due to height of face, 30 ft. This claim is worked by ground-sluicing, 60,000 yards being operated on during the year, giving a yield of 150 oz., valued at £577 10s. Five men were employed.

Pembroke.

A small number of miners obtain sufficient gold to enable them to continue working their claims when water is available. The Motapu Hydraulic Sluicing Company's claim has been let on tribute to Mr. George Scott.

Cromwell.

Several parties, both Europeans and Chinese, find employment in the terraces and beaches of the Clutha and Kawarau Rivers.

Cardrona.

Several parties are engaged in this locality. Mr. A. Lafranchi is engaged prospecting his claim with a small plant for hydraulic sluicing.

Small parties are also employed in the Bannockburn district.

Nevis.

Our Mutual Friend (Area, 15 acres; owners, W. W. Masters, C. Masters, John Adu, David Adu; manager, C. Masters).—This claim is worked by the owners themselves, and is operated on by elevating. About one-sixth of an acre was worked, and produced 150 oz., valued at £3 17s. per ounce. There are water-races twelve miles in length, connected with 1,200 ft. of 9 in. and 400 ft. of 7 in. pipes, the whole valued at £1,000. The owners say that a portion of the gold-bearing material consists of an underlay of gravel-wash lying at an angle of 45°, and covered by a yellow clay, and as this must be taken away with a safe batter the surface-clay has to be left, so that the width of the cutting will be 100 ft. The lift-pipe is 11 in. and the nozzle 2¾ in. in diameter. The lift, being 36 ft., and almost perpendicular, is made from 9 ft. of castings, with a throttle 6 in. at the smallest, and the balance hard steel. As the fall is restricted, a large quantity of water is used—about twenty-two heads. The water for elevating is obtained from a tributary of the Nevis known as Commissioner's Creek, southward of the claim, and the flushing-water from Deep Creek, another tributary of the Nevis, north of the claim.

Arrow River.

Arrow Flat.—A water-race is now in course of construction to bring in water some 500 ft. above Arrow Flat for the purpose of working the beaches by hydraulic elevating.

Arrow Falls Claim (Area, 21 acres; mine-manager, James Miller; legal manager, R. F. Cuthbertson, Invercargill).—The operations carried on in this claim are for the purpose of sluicing an immense deposit of gravel in the bed of the river just above the falls. The material, after being sluiced, is passed through a shaft connecting with the tunnel tail-race. After the bottom is cleaned the large boulders and stones are stacked in the middle, a steam-crane of 3 tons being used for that purpose. About 300 ft. of the river-bed was cleared during the year and 201 oz. 10 dwt. of gold was obtained, valued at £775 14s. 6d. Twelve men were employed. The water of the river in flowing through the claim is used for sluicing.

Shotover.

Arthur's Point Sluicing Company (Area, 16 acres and 23 perches).—This company has a claim (licensed holding) on Section 109, Block XIX., Shotover District, close to the Big Beach, formerly worked by the Sew Hoy dredges. About £700 has been spent in bringing in water and erecting an elevating plant. Six heads of water are picked up from various small creeks from the Coronet Peak Range, the race being twelve miles in length. Seven men are employed when water is available This claim has been recently let on tribute. The quantity of gold obtained during the year was 100 oz.; value per ounce, £3 17s. 6d.

Moonlight Sluicing Company (Area, 40 acres; mine-manager, James Birse).—This mine is worked by sluicing only, and 1 acre was operated on during the year, which produced 74 oz. of gold, valued at £286 15s. The water-race is one mile long, with a capacity of six heads, and 300 ft. of water-pipes from 8 in. to 10 in. in diameter, the whole valued at £1,500. Two men were employed.

Skipper's Point.

Johnson's Claim (Area, 53 acres; owner, Robert Johnson),—This claim is worked by ground-sluicing, about 2 acres being stripped during the year. The water is brought in by about a mile and a half of water-races with a length of 70 ft. of pipes. The pressure for sluicing is 250 ft. The value of water-races and plant is estimated at £4,000. The owner says that the claim wants 1,000 ft. rock-tunnel for a tail-race put in to where the ground is better, but this is an undertaking for a company, and that he intends trying to float one. The tail-race was washed up for a yield of 60 oz. of gold, valued at £231.

Londonderry Claim (Owners, Skipper's Sluicing Company, Limited; manager, James Scott).—The ground held comprises an area of 63 acres. The face of wash is very thick, averaging about 170 ft. and is of a light sandy character, containing a little gold throughout, the best part being in stony seams. The stuff is sluiced on to a false bottom, which is variable, consisting in some places of gravel and in others of white sand and tough clay. The bed-rock is mica-schist, but no gold is got below the false bottom. As there is good fall for tailings, no elevating is required. Two nozzles are employed. Water rights are held for twenty Government heads from Skipper's Creek, and the water is conveyed by a race five miles in length, and by 33 in. and 22 in. diameter iron pipes about two miles long. The water-race has a fall of 8 ft. to a mile. At the claim, iron sluice-boxes are set in a tail-race having a fall of 1 in 10, and tram-rails—fitted both crosswise and longitudinally—serve for riffles. The gold is of a character which admits of its being easily saved. Owing to the frost and snow at this altitude in winter, time-work is only carried on for about eight months in the year. Eight to twelve men are ordinarily employed. A tail-race tunnel 310 ft. long and 6 ft. by 5 ft. in section, which will admit of the claim being worked to better advantage, has been recently completed at a cost of about £1,000.

Upper Shotover.

On the Upper Shotover several parties are engaged in sluicing operations on the river-beaches. The material is raised by means of suction. Messrs. Alfred Smith and Sons were the first to engage in this method, and their example was in time followed by others, and there are at least half a dozen plants of a similar description now in use.

Messrs. A. Smith and Sons still continue to work their claim on the Shotover River with the suction elevator. The suction-pipe is attached to a bent pipe connecting with the horizontal pipe leading to the sluice boxes. This horizontal pipe is supported on a log structure, and is so adjusted that it can turn on its bed. The water from the race is conveyed through pipes decreasing to 5 in. in diameter at the nozzle. The nozzle is $1\frac{3}{4}$ in. diameter, and is fixed with a packed joint where it discharges into the bend-pipe and in a direct line with the horizontal pipe. On the water being turned on, a vacuum is created in the suction-pipe by the force of the water from the nozzle, and the wash is ejected through the horizontal pipe and into the sluice-box. At the lower end of the suction-pipe whatever material is convenient, whether water or gravel, is sucked up and carried along with the stream of water from the nozzle. As the material gets removed from its end the suction-pipe drops gradually down until the bottom is reached, the end of the pipe having in the meantime described an arc of a circle. The necessity for the packed joint is thus apparent, the nozzle remaining rigid and fast while the pipe into which it discharges has made a partial revolution. One great recommendation for this method is that all the parts can be moved with comparative ease, the whole of the fixtures being on the surface, and the plant can be set at any point without loss of time. The power used in working the pumps is from three sluice-heads of water with a pressure of 160 lb. to the square inch, which under the circumstances will develop upwards of 100-horse power. Therefore, although the work of elevating is conveniently and effectually done, the expenditure of power is very great, and this method of elevating will be only applicable to places where large water-power is available. But where such power can be got this method of elevating is unmistakably more convenient and effective for comparatively shallow ground than are those elevators in general use, which require the water-jet to be applied at the bottom instead of the top as in this case.

Success attendant on Messrs. Smith and Sons' operations has induced several other parties to adopt this method, and no doubt wherever water-power is available the plants will be effective for elevating purposes. The names of the parties who are working in this manner are Smith and Sons, B. Rogers, Gammell and Shursthardt, and Stoeller, all of whom are working on the Upper Shotover, above Skipper's Creek; Collins and party, Sainsbury, and Ward and Thompson work on the Shotover, but below Skipper's Creek. Several other claims are taken up in the river-bed, and will be worked by similar plants.

The following report and sketch-plan, furnished by Mr. Hayes, Inspector of Mines, Dunedin, gives a full description of, and conveys a general idea of, the working of the plant:—

"In accordance with request, I visited Smith and Sons' claim, and examined their arrangement for a horizontal-jet-pump elevator for working in river-beds. To make it clear, I send you a tracing (from actual measurements which I took) on a scale of $\frac{3}{4}$ in. to 1 ft. Messrs. Smith state that the proportions and sizes given are the result of a good deal of experimenting to arrive at the best for effective work. The whole affair is so simple that very little explanation is needed in addition to the sectional drawing. The bend-pipe, short throat-pipe, and first expanding-pipe are of good hard cast-iron. These are the only castings required. Although I have shown the supports like chocks, they may be made of two posts bolted together. Taking the applicability of the system for working on river-bed beaches, you may assume the arrangement being fixed in position with the uptake pipe (lower end) resting on the ground; a small hole is dug under it, and the pipe-end allowed to drop into the hole. The water being turned on, a rush of air is created in the uptake pipe, into which the ground which the operator looses with his pick is drawn. As the hole gets deeper the weight of the uptake pipe naturally causes it to describe the arc of a

circle and follow the excavations. You will see on reference to the tracing that the brass nozzle has a packed joint to admit of this. The entire casting and the sheet-steel expanding-pipe are quite free to make this partial revolution to accommodate the drop of the uptake pipe as the paddock gets deeper. When I was there the appliance was working splendidly, the vertical lift being about 14 ft., but they had not bottomed. Messrs. Smith say their claim is usually bottomed at 16 ft. or 17 ft., but the same appliance has frequently taken them down when it has required 20 ft. to bottom. Approximately, I should judge their penstock to be about 400 ft. above the claim, giving a pressure of, say, 160 lb. per square inch effective (sorry I had not my aneroid with me to test this.) There is a good deal of soakage into the claim; in fact, very considerable feeders of water were coming into the paddock from the river. A Californian pump could not have been well adapted to deal with the quantity (except on an exceptional scale, and having a very powerful motor for driving). To admit of working an increased area of beach, Messrs. Smith divert the stream when it is low.

"In the event of floods in the river the sluice-box is removed to a safe place, the 9 ft. length of pipe (9 in. to 11 in. diameter) is also removed, the uptake pipe lifted out of the paddock simply by turning it over, and the whole affair lashed by a chain to a good heavy pile driven into the ground alongside the elevator, or to a good big rock if such is handy. Nothing can then take any harm. For working river-beaches where a fair head of pressure-water can be had I think the appliance is splendidly adapted, and perhaps the best proof of this is the fact that Messrs. Smiths' appliance has been copied by seven or eight other parties, and I am informed that several claims have lately been taken up on the Shotover River which will be worked with this method. It is simple, handy, and inexpensive, and enables parties with comparatively small capital to work in river-beds where the water is too heavy to be dealt with by Californian pumps. I question whether the claims now working, and those about to start, would be able to do anything but for some such simple arrangement as that under notice. You will notice that, unlike the ordinary hydraulic elevator, the horizontal arrangement dispenses with the weight of the water (to be forced up) from the jet itself when its force has become expended. Experiments have also proved that if the discharge-pipe is carried to a greater length than shown there is a decrease in efficiency of lift. On the main pressure-pipe there is a 3 in. stopcock, to which a length of 3 in. fire-brigade hose having a 1¼ in. nozzle is attached. This is used for sluicing down ground to the uptake pipe, and also for cutting a narrow gut (alongside the piles) for sinking the steel plates when it is necessary to divert the stream."

Queenstown.

Sluicing operations of an unimportant nature are carried on near and around Lake Wakatipu.

Old Wakatipu (Area, 8 acres; owner, Bokoraki Gold-mining Company; mine-manager, Duncan Sinclair).—Sluicing operations have not yet been commenced, but the owners are constructing a water-race capable of carrying seven heads. The work, when completed, will cost £1,000.

Parawa Water-supply and Gold-mining Company, Limited.—This company is being wound up. The claim has latterly been worked on tribute.

Nokomai.

The Sew Hoy and Kum Poy claims are now the property of one company. An additional elevator has been erected, and operations in that way have met with a fair degree of success.

Golden Terrace Gold-mining Company (Area, 100 acres; manager, Kenneth McLean).—This company's claim—a ground-sluicing one—is situate on the terraces on the east side of the Mataura River, about two miles below its junction with the Nokomai Creek. The face at present worked is 90 ft. in depth, the formation being quartz and schist boulder and sharp sand. The main bottom has not been reached yet. During the year 188½ oz. of gold was obtained, of the value of £716 8s. 3d., or at the rate of £3 16s. per ounce. The water-race, 5 ft. by 2 ft., is two miles in length, and has a capacity of sixteen heads. A small reservoir has been constructed at the head of the race which enables the company to carry on sluicing operations for three hours per day all through the summer months. A full supply is only available for the twenty-four hours during three months in winter. The total length and dimensions of pipes are as follows: 800 ft. of 18 in.; 500 ft. of 9 in. The boxes are 120 ft. by 3 ft.; angle-iron ripples, and perforated plates with cocoanut-matting underneath, being used to save the gold. The pressure used for sluicing is due to a hydrostatic head of 250 ft. Value of water-races and plant, £1,900. The number of men employed was seven.

Waikaia.

At the landslip there have been workings on a small scale for several years. About eighteen months ago an attempt was made to form a company to work the ground by hydraulic sluicing, and a considerable sum was spent in preliminary expenses, laying off water-races, &c. As the flotation was not successful, the working of the ground is being resumed on the old lines by tunnelling and trucking out the washdirt. One party of two men at the end of last December made a start, and another party shortly after commenced operations.

Winding Creek Gold-mining Company, Limited.—This company is now carrying on the work at what used to be known as the Break-'em-All Claim at Winding Creek. About twenty-five miles of water-races have been constructed to bring in fifty heads of water from the Big and Little Leithen Creeks, the upper branches of the Waikaka, Winding Creek, and other small streams. The branch races supply a main race capable of carrying fifty heads. The races for a considerable length are made through rocky country covered with heavy bush. The hydraulic plant consists of about a mile of steel pipes of from 15 in. to 30 in. in diameter, and two elevators. The cost of the works is given by Mr. R. Hay, C.E., of Dunedin, under whose charge the water-supply and installation have been carried out, at upwards of £10,000, the capital being raised in England. Since operations commenced a lot of ground has been sluiced away near where Kennedy and party were

working, and an elevator is at work close to where the old bucket-elevator formerly stood. Preparations have been commenced for sluicing at the opposite side of the creek, where the prospects are of a favourable character.

Waikaia Gold-mining and Water-race Company.—This company have had a very unsatisfactory year's work, up till the 31st October their gold returns only amounting to 94 oz., valued at £361 12s., or at the rate of £3 17s. 6d. per ounce. Sluicing operations were then discontinued by the company, and the claim leased to a party of tributers, who, since the date they took the claim over, have only done six weeks' sluicing, owing to shortage of water during the summer months.

Argyle Claim (Area, 84 acres; mine-manager, John W. Stewart).—This claim is situated on Block I., Waikaia Survey District, and is the property of the Argyle Hydraulic Sluicing Company. The ground consists of alluvial flat, on top of which there has been a depth of accumulated tailings ranging from 6 ft. to 9 ft. in depth, the result of sluicing operations carried on in the past on the terraces surrounding this flat. Below the tailings is a layer of soft clay, which overlays a layer of wash consisting of slate and schist boulders and sand, ranging from 3 ft. to 5 ft. in thickness, the whole carrying gold in payable quantities. Underlying this wash there is a layer of sandstone boulders, sand, and clayey matter, 8 ft. in thickness, carrying a little gold all through. The bottom, a soft sandstone, is very irregular, forming parallel channels and ridges. On the top of these ridges good gold is found, but is absent in the channels. The ground is worked by hydraulic elevating, about 1½ acres having been dealt with during the past year—ten months' work—resulting in a yield of 651 oz. of gold, of the value of £2,540, the value of the gold per ounce being £3 18s. The total length of races in connection with the claim is over twelve miles, the capacity of the main race being twenty-five Government heads. During the year this company have acquired a second special claim of 80 acres, situate in Happy Valley, about one mile north of the one described above, which has also been equipped with a thoroughly up-to-date hydraulic elevating plant. The work of opening out has just begun at this claim, which consists also of an alluvial flat, the formation of which is as follows: 4 ft. of soft clay, 10 ft. of fine quartz-wash, all gold-bearing, resting on a very extensive seam of good lignite, the thickness of which has not yet been ascertained. The pressure used for elevating is 200 feet, the total length and dimensions of pipes used in working both claims being as follows: 150 ft. of 18 in., 3,128 ft. of 15 in., 2,970 ft. of 13 in., 1,584 ft. of 11 in., 240 ft. of 9 in., 450 ft. of 7 in. In the first claim referred to the run of boxes used in gold-saving is 120 ft. in length, having angle-iron ripples and perforated plates, with cocoanut-matting underneath. At the new claim the run of boxes leading from the elevator is 50 ft. in length and 3 ft. wide, being lined with angle-iron ripples and cocoanut-matting for 24 ft., then for the remaining length with perforated plates and cocoanut-matting. At the end of these boxes there is a system of tables 16 ft. in width, over which all the finer material passes, the rough gravel all passing on to the tail-race through another box. The value of water-races and plant is estimated at £3,100. Sixteen men are employed.

Croydon.

Mr. John Nicholson has a prospecting area of 180 acres on Crown lands at Croydon, near the eastern base of the Hokonui Range, and has got a small face open showing fine gold. His present water-supply is somewhat limited. The wash is in two divisions; the upper part is of small quartz pebbles and sand. A trial gave twenty colours to the dish; the lower wash (which is of coarse river-bed pebbles) showing about double the foregoing prospect. Some prospecting operations have also been conducted between this claim and the Charlton Flat. Fine gold has been found, and from the prospects obtained it is probable that dredges of medium size could work the ground to advantage.

Round Hill District.

The Ourawera Company has been successful in obtaining good returns from its elevating plant during the year.

The Round Hill Company have also had another year's successful operations.

Several other claims to be worked by hydraulic elevating, have been taken up in this locality.

The dry weather during last summer caused the water in the races to be much lessened, and the gold returns were consequently smaller than the average.

Orepuki.

A considerable number of men continue to be employed in the various claims, and their earnings are, on the whole, very satisfactory.

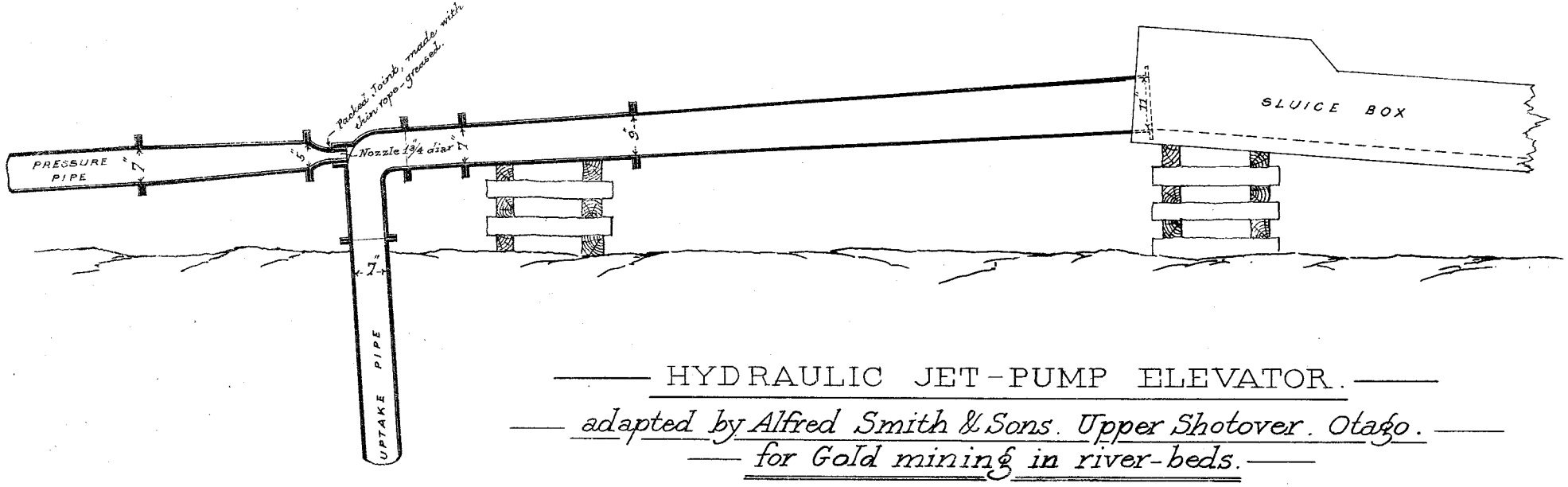
Waiau.

Waiau Beach Claim (Area, 58 acres 1 rood; owners, the Waiau Beach Hydraulic Elevating Company; manager, N. K. McLean).—This claim, which is worked by hydraulic elevating, has not, so far, yielded satisfactory results, 10 oz. of gold only being obtained. The water-race is 1 mile 7 chains in length, with about 450 ft. of pipes, and valued at £200. An average of three men were employed.

Several other parties find employment on the ocean beach in this locality.

The lead open to the west of the Waiau is all but deserted, the returns having been very small.

Throughout the Nelson, Westland, and Otago goldfields the production of alluvial gold chiefly depends on the rainfall, and during dry seasons the water-supply in many instances is inadequate for sluicing operations. The attention of those interested must now be directed to the conservation of the water that falls in the wet months, in order that a more even supply may be maintained. In Westland, where the rainfall is most continuous, but a moderate share of attention is paid to conservation, and it is found that in many instances, should no rain fall even for a few days, operations are suspended. If large dams and reservoirs were constructed, less time would be lost by those



HYDRAULIC JET-PUMP ELEVATOR.

adapted by Alfred Smith & Sons. Upper Shotover. Otago.

for Gold mining in river-beds.

J. Hayes. del.

engaged in sluicing operations. It is imperative therefore that advantage be taken of those places where a depression in the land or other natural configuration of the surface exists suitable for the purpose of constructing reservoirs for water-storage.

The output from these fields is gradually being curtailed, as the rich parts and those easy of access have long since been exploited, and it is only the poorer and more inaccessible leads and terraces that offer any inducement to the miner. These remarks are applicable to the Nelson and Westland districts, where the generous rainfall has to some extent been answerable for the neglect of any scheme for water-conservation. The condition of the industry, which, as already stated, is becoming less profitable because the fields are getting poorer, can only be reinvigorated by additional water-supplies, and by taking advantage of every natural facility for dealing with the extensive accumulations of auriferous-gravel drifts. Co-operation to a degree would also be of advantage, instead of limited or individual effort, in carrying out those operations—not that the individual is yet precluded from earning a livelihood on many parts of every field, but that concentrated effort on the part of mining companies or of mining partnerships is required for the more economical management and conduct of operations.

Westland is neither an agricultural nor a pastoral country; the peculiar character of the subsoil, which in most instances, excepting where the rock is near the surface, is composed of water-worn gravels closely packed and sometimes of a cemented character, prevents the growth of grass or other vegetation with the exception of timber, scrub, and rushes. In some of the river-flats, and in the Totara Flat, in the Grey Valley, however, good alluvial soil of a fertile character is found; but these are only exceptional instances, and great areas of the West Coast lands are fit only for timber-growing or for mining, and too much importance should not be placed on the value of land for other purposes to the exclusion of the hydraulic miner, who is the only one able to occupy and use the land with profit to the country and with advantage to himself.

In Otago the conditions are somewhat different. The introduction of dredging and of working alluvial ground as well as river-beds by that process does not necessitate the use of such quantities of water as in the case of ground-sluicing. Water-conservation must in this district also be taken in hand. Nevertheless there is this difference: that the lands in Otago in close proximity to ground that could be worked for gold are for the most part of a fertile character, especially if they can be irrigated, consequently the conservation of water in those places is of twofold importance in being necessary to both the farmer and the miner.

DREDGING.

This method of dealing with the gravels submerged in rivers and streams, and of extracting the gold they contain, still continues to excite great interest throughout the alluvial goldfields.

In Otago fresh claims are taken up in almost every district, and considerable areas in Southland have also been secured for dredging purposes.

In Marlborough, Nelson, and Westland attention is also being directed in that way.

The dredging system is most suitable for the Otago District, where the land is entirely free from timber; but in some parts of Southland, where forests are not yet banished, and throughout the Nelson and Westland fields, the presence of roots and trunks of trees will prove a great obstacle to dredging, but engineers are sanguine that the timber difficulty will be overcome. In such case it is probable that successful dredging on the West Coast, as well as in some parts of Southland, may yet benefit these districts.

The following list indicates the extent and number of the claims, and shows that the interest in dredging still remains unabated:—

West Coast, Otago, and Southland.

Abstract of Licenses for Special Claims and Licensed Holdings issued from the Wardens' Offices, and registered on or before the 31st March, 1899, in the Books of the Mining Registrar.

Date of License.	Area.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
	A. R. P.					
		Lyell.				
31/3/98	34 3 37	Murchison ..	I.	Tutaki ..	Matakitaki Gold-dredging Co.	William Faithfull.
21/7/98	47 1 20	" ..	"	" ..	Murchison No. 2 Gold-dredging Co.	R. T. Wheeler, jun.
17/8/98	61 0 27	Fern Flat ..	XVI.	Lyell ..	..	Buller Dredges Co. (Ltd.).
17/11/98	70 2 21	Matiri ..	XIII.	Matiri ..	Buller Gold-dredging Co.	Thomas Crumpton.
		Ross.				
8/2/99	35 3 7	Totara ..	III.	Totara ..	Totara Dredging Co.	George Guild.
		Naseby.				
13/10/96	100 0 0	..	III.	Naseby ..	Hogburn Dredging Co. (steam-dredging)	Naseby Dredging and Hydraulic Sluicing Co. (Ltd.).
29/9/96	47 0 0	Kyeburn River, Naseby	II., V.	Kyeburn ..	Kyeburn Junction Dredging Claim	Kyeburn Gold-dredging Co. (Ltd.).
29/9/96	75 0 0	Ditto ..	II.	" ..	Kyeburn Pioneer Dredging Co.	"
5/3/97	62 2 29	Cambrian, St. Bathan's	I. IV., VII.	St. Bathan's Blackstone	..	W. C. Pitches.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices—*continued.*

Date of License.	Area. A.	R	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
				Naseby—continued.				
25/3/97	100	0	0	Naseby ..	III.	Maniototo ..	..	Naseby Dredging and Hydraulic Sluicing Co. (Ltd.).
25/3/97	70	1	0	Enterprise Gully, Naseby	III., XVIII.	" ..	..	Enterprise Gully Dredging Co. (Ltd.).
5/11/97	59	3	24	St. Bathan's ..	II. VIII.	St. Bathan's Blackstone	Hawkdun Dream Gold-dredging Co.	Patrick Hanrahan and Ulick Fahy.
21/1/98	92	2	13	Cambrian, St. Bathan's	IV.	"	New Arrival Gold-dredging Co.	John Beattie.
21/1/98	93	0	25	St. Bathan's ..	I.	St. Bathan's	..	John Ewing.
28/4/98	84	0	0	Dunstan Creek	IV.	Blackstone ..	..	John Tait and Louis Gards.
3/5/98	10	0	0	Macrae's ..	I.	Highlay ..	..	Macrae's Flat Gold-dredging Co. (Ltd.).
12/5/98	31	0	0	" ..	I., II.	"	..	Ditto.
12/5/98	27	1	5	" ..	I.	Highlay, and part of Macrae's Township Reserve	..	"
19/7/98	24	2	6	Little Kyeburn	IV.	Kyeburn ..	..	James Fotheringham.
19/7/98	67	0	0	Kyeburn River	II.	" ..	..	Mount Ida Gold-dredging Co. (Ltd.).
19/7/98	60	1	0	"	I. II.	Swinburn Kyeburn	..	"
6/10/98	100	0	0	Taieri River ..	VI., X.	Upper Taieri	Linburn Gold-dredging Co.	Robert Ross.
6/10/98	81	0	0	Spec Gully, Naseby	I.	Kyeburn ..	..	James Smith, jun.
6/10/98	53	1	0	Ditto ..	II.	Naseby ..	..	Hugh Donnelly.
6/10/98	29	1	27	" ..	"	" ..	..	George William Mason.
10/12/98	98	3	30	Naseby ..	I. III.	" Maniototo	..	Naseby Dredging and Hydraulic Sluicing Co. (Ltd.).
17/12/98	59	0	0	Taieri River ..	VI.	Upper Taieri	..	Robert Wilson.
				Queenstown.				
17/1/88	8	0	0	..	XIX.	Shotover ..	..	Monte Christo Dredging Gold-mining Co.
10/11/91	46	1	4	..	XI.	Skippers Cr'k	..	Shotover Quartz-mining Co.
26/2/98	66	1	0	..	III.	Shotover ..	..	Richard J. Cotter.
				Arrowtown.				
14/8/96	30	3	0	..	II.	Kawarau ..	..	Edward Parker, William Gould Joseph.
31/5/97	96	2	0	..	VII.	Cardrona ..	..	Joseph P. Grossman.
31/5/97	100	0	0	..	VI., VII.	" ..	..	George Lubin Tacon.
31/5/97	95	0	0	..	VI.	" ..	..	"
9/9/97	36	0	0	..	V.	Kawarau ..	..	Alfred Lancelot Tait, Vallis Albert James.
26/2/98	21	2	0	..	I.	"	..	James Cosgrove.
26/2/98	66	2	20	..	IX.	Shotover ..	..	Gengel Baker.
25/3/98	23	0	0	..	I., IX.	Kawarau ..	..	William Stephenson.
25/3/98	55	3	0	..	VIII.	Shotover ..	..	Sew Hoy.
				Cromwell.				
16/7/96	76	0	0	Kawarau ..	I., II.	Cromwell ..	Electric ..	Roy and McGeorge.
6/4/96	41	0	0	" ..	I.	" ..	Electric No. 2 ..	"
1/10/96	55	0	0	Nevis River ..	III.	Nevis ..	..	Thomas Steel.
1/10/96	46	2	0	" ..	"	" ..	..	A. D. Silk.
1/10/96	32	0	0	Cromwell Brewery	I. VI.	Cromwell Wakefield	..	Hartley and Riley Beach Co.
29/3/97	56	1	16	..	I., III.	Nevis ..	..	Olaf Magnus.
29/3/97	98	0	26	..	I.	" ..	..	John Mackersey and party.
18/9/97	52	2	23	..	III.	" ..	..	James Fotheringham.
18/9/97	99	2	16	..	III., XIII.	" ..	..	Robert Ross and party.
12/3/97	9	3	10	Kawarau Gorge	II.	Cromwell ..	..	Magnetic Co.
1/12/97	24	1	10	Kawarau ..	I.	" ..	Electric No. 3 ..	Samuel Crow.
17/9/96	15	0	0	Nevis Crossing	"	Nevis ..	..	Robert Ritchie.
2/4/98	31	0	0	Molyneux ..	VI.	Wakefield ..	Riley Beach ..	Riley Beach Claim Co. (Ltd.
10/3/98	32	0	4	Kawarau ..	I.	Cromwell ..	Cromwell ..	Cromwell Gold-dredging Co. (Ltd.).
2/4/98	57	2	0	Criffel ..	XIV.	Cardrona ..	..	Henry Schlaadt.
12/7/98	32	1	16	Bendigo ..	II.	Wakefield ..	..	Spencer G. Smith.
21/4/98	57	0	0	" ..	III.	" ..	..	August Sorenson.
13/8/98	95	1	5	Nevis ..	I.	Nevis ..	..	John Sheppard.
17/9/98	22	0	0	Kawarau ..	II.	Kawarau ..	..	Thomas Aitken.
10/11/98	10	0	0	Molyneux ..	VI.	Wakefield ..	..	William Foreman.
8/12/98	17	0	0	Kawarau ..	II.	Kawarau ..	..	Adam Aitken.
14/1/99	68	0	16	Nevis ..	XIII.	Nevis ..	..	Robert Ross and party.
14/1/99	22	0	20	Molyneux ..	VI. XVII.	Wakefield Leaning Rock	..	John Dewar.
14/1/99	94	0	0	Nevis ..	III.	Nevis ..	..	A. C. McGeorge.
14/1/99	100	0	0	" ..	"	" ..	..	"
13/2/99	23	1	0	Kawarau ..	II., VI.	Kawarau ..	..	James Chalmers.
2/3/99	6	0	20	" ..	II.	Cromwell ..	..	Samuel Crow.
23/2/94	25	12	0	Bannockburn ..	I.	" ..	..	Thomas Rooney.

ABSTRACT of LICENSES for SPECIAL CLAIMS and LICENSED HOLDINGS issued from the Wardens' Offices—*continued*.

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
					Clyde.			
1/12/98	97	0	0	Molyneux River, Muttontown	I., VII.	Leaning Rock	Matau Dredging Co. (Ltd.).	Matau Dredging Co. (Ltd.).
26/6/97	42	0	0	Molyneux River, Clyde	I., II.	"	Victoria Dredging Co. (Ltd.).	Victoria Dredging Co. (Ltd.).
1/12/98	89	0	0	Ditto ..	I.	"	Unity Dredging Co.	Philip Brennan and others.
3/10/98	61	0	0	" ..	"	"	Vincent Gold-dredging Co. (Ltd.).	Vincent Gold-dredging Co. (Ltd.).
7/5/98	49	0	0	Molyneux River, below Muttontown	VII.	"	Perkins and Co. ..	A. C. Perkins and another.
1/12/98	26	0	0	Ditto ..	I., VII.	"	New Alexandra Gold-dredging Co. (Ltd.).	New Alexandra Gold-dredging Co. (Ltd.).
28/2/98	50	0	0	Molyneux River, above Clyde	III.	"	Monte Christo Co.	Benjamin Naylor and another.
7/5/98	23	0	0	Fraser River ..	XIV.	"	Fraser River Gold-dredging Co.	Robert McLean and others.
					Alexandra.			
11/10/93	65	0	0	Alexandra ..	VII.	Leaning Rock	Molyneux Hydraulic Co.	Molyneux Hydraulic, Elevating, and Gold-mining Co.
2/2/94	52	0	0	Molyneux River, opposite Sandy Point	"	"	Enterprise Dredging Co.	Enterprise Gold-dredging Co. (N.L.).
16/10/95	28	0	0	Molyneux River, below Alexandra	I.	Fraser ..	Manuherikia Dredging Co.	Olaf Magnus and others.
16/10/95	58	0	0	Molyneux River, Sandy Point	VII.	Leaning Rock	Chicago Dredging Co.	George Spencer.
16/10/95	95	0	0	Ditto ..	"	"	Perseverance Gold-dredging Co.	R. M. Finlay and others.
16/10/95	98	0	0	" ..	"	"	Ditto	"
30/11/95	95	0	0	" ..	"	"	Earnscleugh No. 1 Co.	Charles Weaver and another.
24/11/96	84	0	0	" ..	"	"	Earnscleugh No. 2 Co.	"
16/9/96	100	0	0	Poverty Beach	I.	Fraser ..	Golden Beach Gold-dredging Co.	Golden Beach Hydraulic, Elevating, and Dredging Co. (Ltd.).
17/12/96	57	0	0	Manuherikia River, Mouth of Chatto Creek	VI.	Tiger Hill ..	Chatto Creek Dredging Co.	Chatto Creek Dredging Co.
7/6/97	48	0	0	Manuherikia River	IX.	Leaning Rock	New Zealand Gold-dredging Co.	New Zealand Gold-dredging Co.
16/7/97	99	0	0	Ditto ..	"	"	Manorburn Dredging Co.	Manorburn Gold-dredging Co.
18/9/97	..			Bank of Molyneux, above Alexandra	VII.	"	Golden Point Dredging Co.	Golden Point Dredging Co. (Ltd.).
18/9/97	60	0	0	Manuherikia River	VI.	Tiger Hill ..	Nil Desperandum Co.	Louis Gards.
18/9/97	28	0	0	Molyneux River, Alexandra	I.	Fraser ..	Eureka No. 1 Dredging Co.	C. J. V. Leijon and others.
29/9/97	46	0	0	Ditto ..	"	" ..	Eureka No. 2 Dredging Co.	"
6/12/97	23	0	0	Molyneux River, below Alexandra	II.	" ..	Island Basin Gold-dredging Co.	Island Basin Gold-dredging Co.
16/12/97	22	0	0	Molyneux River, Fourteen-mile	III.	Cairnhill ..	Fourteen-mile Beach Co.	Fourteen-mile Beach Gold-dredging Co. (Ltd.).
23/2/98	86	0	0	Manuherikia ..	VII. VI.	Leaning Rock Tiger Hill ..	Otago Dredging Co.	John Tait.
23/2/98	28	0	0	Molyneux River, below Alexandra	II., VII.	Cairnhill ..	Gorge Gold-dredging Co.	August Magnus.
23/2/98	30	0	0	Ditto ..	II.	" ..	Doctor's Point Gold-dredging Co.	John Magnus.
7/3/98	96	0	0	Sandy Point ..	X.	Leaning Rock	Glasgow Gold-dredging Co.	William Hansen and others.
7/3/98	34	0	0	Molyneux River, below Alexandra	I.	Fraser ..	Tinolus Gold-dredging Co.	John Bruce.
7/3/98	26	0	0	Fourteen-mile Beach	III.	Cairnhill ..	Fourteen-mile Beach Co.	Thomas Steel.
7/3/98	40	0	0	Manuherikia River, below Manorburn Co.	VII.	Leaning Rock	Golden Link Dredging Co.	Thomas C. Donnelly.
7/5/98	94	0	0	Molyneux River, opposite Sandy Hook	"	"	Ngapara Gold-dredging Co.	Robert Ross and others.
27/6/98	100	0	0	Sandy Point	X.	"	Earnscleugh No. 3 Co.	J. Kelman and another.
12/7/98	59	0	0	Molyneux River, Alexandra	I.	Fraser ..	Clyde Dredging Co. (Moa)	Clyde Dredging Co. (Ltd.).
					Black's.			
25/2/98	100	0	0	Ophir ..	II.	Tiger Hill ..	..	Ophir Gold-dredging Co. (Ltd.).
25/2/98	100	0	0	" ..	"	" ..	..	"
29/3/98	97	0	0	Matakanui ..	VII.	Lauder ..	Klondyke Gold-dredging Co. (Ltd.).	Archibald Smith and others.
25/5/98	98	0	0	" ..	"	" ..	Thompson's Gorge Dredging Co.	Peter Flannery.

ABSTRACT of LICENSES for SPECIAL CLAIMS, and LICENSED HOLDINGS issued from the Wardens' Offices—*continued*.

Date of License.	Area. A.	R.	P.	Locality.	Block.	Survey District.	Name of Claim.	Name of Registered Owner.
					Roxburgh.			
16/3/94	59	0	0	Molyneux River	VIII.	Benger ..	Ettrick Gold Steam-dredging Co.	Ettrick Gold Steam-dredging Co.
2/12/95	62	0	0	Miller's Flat ..	III., VI.	" ..	..	Golden Gate Dredging Co.
19/11/95	66	0	0	" ..	"	" ..	..	Golden Treasure Dredging Co.
18/2/97	47	0	0	" ..	III.	" ..	..	Otago Gold-dredging Co.
7/6/97	41	0	0	Molyneux River	I.	Teviot ..	..	Dunedin Gold-dredging Co. (Ltd.).
7/6/97	62	0	0	"	VII.	" ..	Rennie and Party ..	Thomas Gourley and others.
6/6/98	20	0	0	Horseshoe Bend	IX., XV.	Crookston ..	Undaunted Co. ..	John Edie and another.
2/8/93	52	0	0	Miller's Flat ..	III.	Benger ..	Golden Run Co. ..	Golden Run Dredging Co.
25/8/94	57	0	0	Molyneux River	III., VI.	" ..	Pringle and Party ..	John Pringle and others.
					Lawrence.			
13/9/89	170	2	35	..	XIV. IV. VII.	Tuapeka East Waipori .. T'n of Waipori	Upper Waipori ..	Upper Waipori Alluvial-gold Dredging Co. (Ltd.).
8/10/94	185	2	0	..	XIV.	Tuapeka East	Jutland Flat ..	Jutland Flat (Waipori) Gold-mining Co. (Ltd.).
25/3/96	61	1	0	..	I.	Crookston ..	..	Edwin Pyrke.
9/12/95	67	2	0	..	"	" ..	..	Hugh Crossan.
10/8/96	30	1	20	..	III.	Tuapeka East	..	Evans Flat Dredging Co. (Ltd.).
30/11/96	76	3	0	..	XXI., XVIII.	Crookston ..	..	William C. McGregor.
15/2/97	14	2	24	..	I.	Waitahuna W.	..	Robert McLeod and others.
15/2/97	26	1	0	..	III.	Tuapeka West	Evans Flat Dredging Co.	Evans Flat Dredging Co. Ltd.).
29/3/97	27	3	13	Weatherstone's	XIX.	Tuapeka East	Klondyke Dredge Co.	W. P Smyth and party.
3/8/97	48	2	34	Tuapeka Flat ..	VI.	Tuapeka West	Tuapeka	Tuapeka Dredging Co. (Ltd.).
12/11/97	34	0	13	" ..	XX.	Tuapeka East	Record Reign ..	William Murray.
17/2/98	98	3	18	Waipori ..	IV., V.	Waipori ..	McNeil and Party..	James McNeil.
11/1/98	7	1	0	Glenore ..	III.	Table Hill ..	Nil Desperandum ..	Arnold Sturm.
18/3/98	83	2	21	Waipori ..	V.	Waipori ..	..	Empire Gold-dredging Co. (Ltd.).
18/3/98	61	3	39	" ..	"	" ..	..	"
17/2/98	33	0	38	Tuapeka Flat ..	VI.	Tuapeka West	Balclutha Dredging Co. (Ltd.).	James Henley and party.
18/3/98	36	2	16	" ..	VI. IV.	" Tuapeka East	..	Alexander John Mackay.
18/3/98	57	1	5	Tuapeka River	X. XI.	Tuapeka West Waitahuna W.	Charles Todd and Party	Charles Todd and party.
4/7/98	46	0	16	Beaumont ..	XV. VII.	Crookston .. Beaumont ..	Sunlight Gold-dredging Co. (Ltd.)	Sunlight Gold-dredging Co. (Ltd.).
18/11/98	57	3	22	Tuapeka Flat ..	XX.	Tuapeka East	Tuapeka Flat Dredging Co.	John Harris and party.
18/11/98	88	3	15	Waitahuna ..	X. XXXIII XXXIV.	Waitahuna E. T'n of Havelock "	Scott and Party ..	George Scott.
15/12/98	90	0	0	Waipori ..	V.	Waipori ..	..	Success Gold-dredging Co. (Ltd.).
15/12/98	84	1	36	Waitahuna ..	X. XXXI. XXXIII. XXXIV.	Waitahuna E Town of Havelock	Waitahuna Gold-dredging Co.	Roger Kirby and party.
26/1/99	22	0	35	Gabriel's Gully	XIX.	Tuapeka East	Murray and Hogg ..	W. Murray and W. Hogg.
					Waikaia.			
23/12/96	44	1	24	..	XIV.	Chatton ..	Waikaka Dredging Co.	John R. Perry.
22/4/98	39	3	20	Waikaka ..	"	" ..	Ditto	John Marr and party.
1/3/98	27	1	3	" ..	"	" ..	Record Dredging Co.	W. Little and party.
3/5/98	18	3	14	" ..	IX.	" ..	Waikaka United Gold-dredging Co.	Waikaka United Gold-dredging Co.
5/7/98	9	1	21	" ..	XIX.	" ..	Perry's	John R. Perry.
23/1/99	66	2	20	Waikaia ..	XIV.	" ..	Little Waikaka Dredging Co.	James Brownlee and party.
31/1/99	17	3	21	" ..	IX.	" ..	Waikaka United ..	Waikaka United Gold-dredging Co.
28/2/99	18	2	13	" ..	"	" ..	..	Parsons and party.
28/3/99	100	0	0	" ..	V.	Gap ..	..	W. Hendry and party.
					Riverton.			
29/11/97	49	0	0	West Waiau ..	VII.	Longwood ..	Rowallen ..	Philip Payne.
8/1/98	96	2	0	Waiau ..	Section 111	Takitimo ..	Belmont	Belmont Gold-dredging Co. (Ltd.).
29/7/98	62	2	0	" ..	" 146	" ..	Excelsior ..	James Giffen.
29/7/98	95	1	0	" ..	" 144	" ..	Blackmount ..	Caleb Froggatt.
29/7/98	99	3	0	" ..	" 145	" ..	Redcliffe Gold-dredging Co.	"
10/10/98	98	3	14	Round Hill ..	X.	Longwood ..	Great Western Gold-dredging Co.	Donald McLeod.
15/10/98	37	0	9	Waiau ..	Section 118	Takitimo ..	Lee's Basin ..	Charles W. Brown.
14/1/99	100	0	0	" ..	" 149	" ..	Progress Dredging Co.	Arthur Ernest Otway.
14/1/99	100	0	0	" ..	" 150	" ..	Four-Crown Dredging Co.	George S. Otway.
21/2/99	30	0	0	Preservation ..	VIII.	Preservation	Wilson's River Dredging Co.	William Y. H. Hall.
7/3/99	97	1	0	Waiau ..	Section 151	Takitimo ..	Ruby Gold-dredging Co.	William Taylor.
7/3/99	98	0	0	" ..	" 141	" ..	Lilliburn Gold-dredging Co.	"
21/2/99	98	0	0	" ..	XVII.	Longwood ..	Blackwatch Dredging Co.	Allen Carmichael.
21/2/99	100	0	0	" ..	"	" ..	Connaught Rangers Gold-mining Co.	William Affleck and P. Glynn.

The attached list of dredges at work, and of some of the monthly returns of gold obtained, shows in many cases the profitable nature of the industry:—

NAMES and LOCALITY of DREDGES, and some of the RETURNS of GOLD OBTAINED, during the Year ended 31st March, 1899.

Name of Company or Dredge.	Locality of Operations.	Yield of Gold. 1898. April.	May.	June.	July.	August.	September.	October.	November.	December.	1899. January.	February.	March.	Total Yield of Gold.
West Coast.		Oz. dwt. gr.	Oz. dwt. gr.	Oz. dwt. gr.	Oz. dwt. gr.	Oz. dwt. gr.	Oz. dwt. gr.	Oz. dwt. gr.	Oz. dwt. gr.	Oz. dwt. gr.	Oz. dwt. gr.	Oz. dwt. gr.	Oz. dwt. gr.	Oz. dwt. gr.
Buller Dredge	Fern Flat	71 12 0	59 7 0	..	90 7 0	45 13 0	23 17 0	24 5 0	168 13 0	203 15 0	88 19 0	68 17 0	195 2 0	1,040 7 0
Matakitaki Dredge	Murchison	..	..	..	..	44 9 0	32 13 0	..	..	..	..	..	..	77 2 0
Otago and Southland.														
Alpine	Cromwell	..	..	..	..	523 0 0	91 0 0	218 11 0	106 11 0	55 0 0	33 0 0	156 10 0	197 8 0	1,381 0 0
Black's	Black's	..	..	..	..	..	..	..	..	..	..	82 11 0	..	82 11 0
Carrick	Nevis	..	..	..	..	..	..	..	..	..	..	..	..	200 0 0
Chatto Creek	Chatto Creek	..	..	..	..	..	..	..	..	..	..	34 18 0	95 0 0	129 18 0
Clyde	Alexandra	49 0 0	6 0 0	97 0 0	49 0 0	339 0 0	75 2 0	99 0 0	96 0 0	37 0 0	49 0 0	19 0 0	208 0 0	1,123 2 0
Dunedin	Roxburgh	50 0 0	32 0 0	28 5 0	98 10 0	39 0 0	84 10 0	16 10 0	133 7 0	18 10 0	160 0 0	26 6 0	65 3 0	752 1 0
Empire	Waipori	..	..	..	127 0 0	70 3 0	97 15 0	102 11 0	..	112 6 0	109 13 0	118 2 0	81 13 0	819 3 0
Enterprise	Alexandra	80 12 0	41 9 0	128 5 0	225 0 0	96 0 0	123 15 0	78 17 0	51 1 0	83 10 0	82 18 0	48 9 0	60 17 0	1,100 13 0
Ettrick	Moa Flat	57 0 0	89 10 0	59 10 0	41 5 0	22 0 0	43 10 0	66 5 0	16 8 0	12 10 0	8 15 0	12 5 0	50 0 0	478 18 0
Evans's Flat	Lawrence	..	..	..	..	43 0 0	27 0 0	..	..	28 10 0	24 14 0	70 13 0	80 10 0	437 9 0
Golden Beach	Alexandra	..	..	..	90 1 0	388 17 0	388 10 0	238 1 0	133 5 0	76 4 0	205 0 0	153 17 0	212 10 0	1,886 5 0
Golden Gate	Miller's Flat	81 11 0	75 13 0	10 3 0	..	27 1 0	67 4 0	14 8 0	46 11 0	80 12 0	138 0 0	134 5 0	165 0 0	840 8 0
Golden Point	Alexandra	..	..	..	..	..	..	..	..	..	..	..	115 0 0	115 0 0
Golden Run	Miller's Flat	45 0 0	80 8 0	29 0 0	76 0 0	150 0 0	74 0 0	45 0 0	51 0 0	131 6 0	90 0 0	52 0 0	47 0 0	870 14 0
Golden Terrace No. 1 / Golden Terrace No. 2	Tucker Beach	86 18 0	106 1 0	106 2 0	129 11 0	144 17 0	170 6 0	117 0 0	134 5 0	113 0 0	105 13 0	106 18 0	123 16 0	880 0 0 / 564 7 0
Golden Treasure	Miller's Flat	47 10 0	50 13 0	107 10 0	91 13 0	136 5 0	90 5 0	71 5 0	63 16 0	..	70 15 0	20 10 0	41 2 0	791 4 0
Hartley and Riley	Cromwell	..	..	..	..	..	..	..	..	..	70 4 0	106 13 0	45 3 0	222 0 0
Jutland Flat	Waipori	128 6 0	117 10 0	57 12 0	9 10 0	104 11 0	120 14 0	161 6 0	91 17 0	106 2 0	63 5 0	132 19 0	131 10 0	1,225 2 0
Kyeburn	Kyeburn	..	..	..	47 14 0	39 11 0	23 19 0	44 10 0	50 6 0	37 16 0	17 4 0	65 14 0	32 0 0	358 14 0
Lion Rock	Alexandra	26 0 0	53 15 0	13 15 0	44 10 0	12 12 0	..	..	..	..	..	..	..	150 12 0
Magnetic	Cromwell	..	..	..	..	..	..	..	..	..	..	50 0 0	244 17 0	294 17 0
Manorburn	Alexandra	..	..	..	..	..	..	..	..	..	73 5 0	86 15 0	72 15 0	645 0 0
Manuherikia	"	..	..	..	..	..	..	..	..	..	..	..	34 0 0	34 0 0
Maori	Cromwell	..	..	..	..	..	..	..	..	..	..	106 0 0	37 13 0	143 13 0
Matau	Alexandra	..	..	..	..	..	..	..	..	..	..	53 10 0	191 4 0	244 14 0
Molyneux Hydraulic Dredging Company	"	64 10 0	98 6 0	115 2 0	16 16 0	..	42 14 0	87 1 0	41 19 0	15 3 0	89 0 0	42 7 0	15 6 0	628 4 0
Naseby Dredging and Hydraulic Sluicing Co.	Naseby	..	..	..	..	..	..	..	..	..	..	..	..	541 4 0
Nil Desperandum	Chatto Creek	..	..	..	..	..	..	..	55 9 0	..	..	..	..	55 9 0
Otago	Miller's Flat	36 15 0	..	..	90 6 0	134 9 0	142 15 0	132 14 0	148 18 0	93 4 0	66 16 0	35 16 0	101 19 0	947 12 0
Success Dredging Co.	Waipori	..	..	..	21 0 0	25 15 0	..	..	64 17 0	..	..	25 6 0	59 11 0	196 9 0
Sunlight	Island Block	..	..	..	..	..	..	..	..	37 8 0	72 0 0	25 19 0	29 0 0	164 7 0
Tuapeka	Lawrence	..	..	..	..	30 9 0	18 0 0	..	..	..	22 7 0	44 0 0	46 17 0	329 12 0
Undaunted	..	..	..	..	..	..	..	..	44 9 0	73 2 0	112 8 0	48 0 0	140 13 0	418 12 0
Upper Waipori	Waipori	..	60 13 0	57 5 0	83 6 0	80 2 0	95 11 0	103 8 0	16 2 0	67 7 0	82 19 0	122 2 0	98 14 0	867 9 0
Vincent	Clyde	..	..	..	..	..	..	..	..	..	..	26 5 0	57 15 0	84 0 0
Waimumu	Waimumu	..	..	..	..	..	..	..	..	..	..	..	52 0 0	52 0 0
														21,173 12 0

The returns of gold from dredging could not be obtained with accuracy, as many of the owners will not give information about their operations; but such returns as could be collected are given. Future information will, however, be more complete, as it will be compiled from the returns furnished to Inspectors under clause 102 and Form No. 34 of the regulations of "The Mining Act, 1898."

In consequence of being engaged on other duties it was impossible for me to visit the dredges during the year. I have, however, obtained some information about dredging which may prove of use in showing the methods adopted in carrying on operations. The paper by Mr. Cutten contains a complete history of the industry, from the earliest attempt made at this kind of work with the primitive spoon-dredge up to the latest improved dredges now in use, and gives much valuable information on the subject; while the notes about the working of dredges by Mr. W. Crookston and other dredgemasters supply practical information about the mooring and movements of a dredge whilst at work. The paper—"Dredging: Its Present and Future Outlook"—by Dr. Hyde, who has for a number of years been intimately associated with dredging, will also afford much valuable information.

Obstructions are occasionally met with, sometimes in the form of large boulders and trunks or roots of trees imbedded with the gravel, in dealing with which much delay occurs. In the removal of large stones it is sometimes found practicable, after working around a boulder as much as possible, to raise up the ladder and permit the dredge to float away from the face. On reaching a suitable distance the ladder is again lowered and a cavity excavated with the buckets. The dredge is then drawn forward, and a grappling passed around the stone, which is dragged into the excavation by moving the dredge backwards. After the removal of any boulder the dredge is brought back into position and operations again commenced, and continued until some fresh obstruction may be encountered, to be again removed in the manner described.

On meeting with logs much difficulty is experienced, especially when they are large. After excavating under and about them as much as possible, and their removal by dragging out found to be ineffectual, explosives have to be used to burst them into manageable pieces. Explosives are also sometimes used to break up boulders into pieces of such size as will admit of their being raised in the buckets by the ordinary way. When a bucket containing a large stone reaches the level of the deck the machinery is stopped until the removal of the stone by hand is effected, and when it is landed on deck the machinery is again started. When stones accumulate on the deck they are cast overboard in some place where they will not cause future obstruction.

The suction-dredge might possibly prove of benefit where such obstructions occur; but it is doubtful if it would be capable of recovering all the gold-bearing gravels. A dredge of this description, fitted up with Wellman's suction plant, is now being erected at Waiho, and it is to be hoped that it will be more successful than those of this kind formerly introduced.

Dredging as a Profitable Means of working Alluvial Auriferous Drifts.

The following paper, on "Dredging as a Profitable Means of working Alluvial Auriferous Drifts," was read before the New Zealand Institute of Mining Engineers on the 23rd August, 1898, by W. H. Cutten, consulting engineer, member of Council of the New Zealand Institute of Mining Engineers:—

"The process of dredging for gold in some of our rivers and auriferous flats is now so extensively practised, and so profitable to those interested, that it is fast becoming one of the most important systems of mining in New Zealand. It is not a new thing, as it has been carried on almost continually for the last thirty-four years.

"As far as the author can ascertain, it was first started on the Clutha River, near Alexandra, by a man named Brown, who made a primitive spoon-bucket dredge. This spoon was simply an iron ring and ox-hide bag, attached to a long pole, with a hauling-rope fastened to the iron ring and led ashore to a hand-winch. The method of working was to carry the pole with the bucket attached out into the river in a boat and drop it down to the wash at the bottom, pressing the bucket hard down by means of a pole, while the whole contrivance was hauled along the bottom to the shore by the winch. The wash thus obtained was then cradled in an ordinary miner's cradle.

"The next advancing step in dredging was taken by two men named Ben Knight and Edward Halliday, who made a larger and improved spoon-dredge. This consisted of a wooden punt about 26 ft. long by 12 ft. wide and 3 ft. deep, carrying an ordinary hand-winch and a cradle. The spoon consisted of a strong iron ring bolted to the end of a long pole. The part of the ring furthest from the pole was flattened to form a cutting-edge, and to the back of the ring a bag was fixed, made of ox-hide. The punt was moored in the river by a rope and an anchor, while two poles were driven into the gravel, one on each side of the punt, to keep it steady. The spoon was lowered on to the bottom, at the end of the punt furthest from the winch. A rope was fastened to the lower end of the pole near the spoon, and led to the winch on deck. Another rope was secured to the upper end of the pole and to the side of the punt, to hold the spoon down into the wash. At the winch, either one or two men then wound the spoon towards the winch, along the bottom, while another man pushed the spoon down into the wash, and guided it by means of the pole. In this way the auriferous washdirt was scraped up into the ox-hide bag, and lifted on to the punt, to be afterwards cradled to separate the gold. It took five and sometimes six men to work the dredge, and during the day of eight hours about 15 tons of wash could be lifted in favourable dirt, but the quantity raised depended upon the nature of the ground. Quite a number of these dredges were put upon the Clutha River at different parts, but mostly between the Townships of Manuherikia and the Dunstan, now called Alexandra and Clyde respectively. Some of these dredges did apparently very well, for, although the returns were usually kept secret, it sometimes leaked out that as much as 70 oz. to 80 oz. of gold had been obtained for a week's work. These dredges were mostly put on

and worked by parties of working miners, but some were put on by individuals who paid the men wages, ranging from 15s. to £1 per day.

"During the time the spoon-dredges were working there were also extensive sluicing claims being worked along the banks. These claims discharged immense quantities of tailings into the river, and the tailings so interfered with the dredges that they ceased to pay, and one by one they were laid up, sunk, or washed down the river by floods. A man named Sedeberg then built a steam spoon-dredge to try and cope with the drifts or tailings which were travelling in the river. As near as can be ascertained, this was in the year 1870, and it was the first occasion on which steam was used to work upon the river. The dredge was made with two pontoons, held apart by beams bolted on to the decks, so as to leave a well of about 3 ft. wide between them. A strong pole was driven down hard into the river-bottom at the bow end of the dredge, and two struts of timber were secured to the lower end of this pole, and to the two pontoons, at about the centre. A sheave or block was fastened near the lower end of the pole, and a chain passed through the sheave and to the steam-winch on deck. The spoon was somewhat similar to that used by Messrs. Knight and Halliday, but much larger. It was lowered at the after end of the dredge between the pontoons, and was drawn along the bottom by a chain attached to the winch, then lifted by a rope attached to the spoon. This machine was kept working for about two years, and paid fairly well for a time. Although it lifted much more dirt than the ordinary spoon-dredge, it could not cope with the ever increasing quantity of tailings coming down the river, and was finally abandoned.

"After a lapse of some years, an enterprising engineer, named Charles McQueen, induced a number of Dunedin and Alexandra men to form a company and allow his firm to build a steam bucket-and-ladder dredge. During the time this dredge was being constructed, another engineer, named Scott, built a small bucket-dredge with a wooden hull; but, although this was the first in actual work, to Mr. McQueen belongs the credit of constructing the first steam bucket-and-ladder dredge. The small dredge was called the Eureka, and it was finished and made a start a short time before the large one, in the year 1882; but the fatal mistake was made in purchasing an old worn-out boiler and engines, which, being much too large and heavy, crushed the pontoons out of shape and the machinery out of line, while the consumption of fuel was so great that the dredge did not pay. The engines and boiler were then thrown out, and side paddle-wheels fitted, which were driven by the force of the current in the river and transmitted the power to the buckets, while a number of square sheet-iron buckets attached to the paddle-wheels lifted the water required to wash the dirt. The dredge, after a varied career, fell into the hands of two working miners, who were fortunate in striking good gold. It has done so well ever since that its owners are now in very comfortable circumstances, and possess two fine large dredges of modern type. The dredge was kept working until 1890, when it was again fitted with steam-power to follow the leads of gold into the beaches, where there was no current to drive the paddle-wheels.

"Meanwhile, McQueen's dredge, or rather the Dunedin Dredging Company's dredge, started work in 1882. It was a most elaborate machine. The hull was 70 ft. long, 15 ft. beam, and 6 ft. deep, made of iron, and had a sharp bow. There were two bucket-ladders, one on each side of the hull, and two chains of buckets, driven by one set of compound condensing-engines set in the centre of the hull. The buckets discharged the spoil into two revolving perforated cylinders, which screened the fine dirt and gold into the sluice-boxes or tables. These boxes were fitted with revolving copper pans to amalgamate the gold, but they were soon thrown off as useless, and the gold caught on matting in the boxes. The two ladders were not altogether a success, for the alternate action of dredging into the wash, first on the one side and then on the other, occasionally rolled the decks under water, while the sharp bow made the dredge almost unmanageable in a strong current. Several dredge-masters were appointed, but none seemed to work the dredge satisfactorily, or profitably, until an old miner and seafaring man, named McClay, took charge. He had a pair of wooden pontoons fitted, one on each side, outside the ladders, thus increasing the stability. The dredge then commenced to pay, and did fairly well for some years, when her owner, either thinking the claim worked out, or that distant fields looked greener, floated the dredge some twenty-six miles further down the river, to a place called Coal Creek Flat, where it paid remarkably well. For some time it was getting returns of about 150 oz. of gold per week, the highest being 175 oz. The two ladders were afterwards taken off, and one with much larger buckets substituted. The dredge is still running, though not doing so well, but during the sixteen years it has worked it has taken over 15,000 oz. of gold out of the river, of the value of nearly £60,000.

"The success of the Dunedin Company's and Eureka dredges induced others to turn their attention to the matter, and some twelve current-wheel dredges were put on the Clutha River at different places. Eight of these have since had steam-power put on them. Some of them did not pay, but most have made little fortunes for their lucky owners, some of whom have retired to live on their means, while others are still building much larger dredges for new claims.

"In the year 1889 a wealthy and enterprising Chinaman, named Sew Hoy, took up a claim on the Shotover, a tributary of the Clutha River, which was known to be rich in gold in the early days. A company was formed of three hundred £10 shares, and a small steam bucket-dredge put on the claim. Although the ground had been thrice worked by hand, twice by Europeans and then by Chinamen, the dredge got so much gold that the £10 shares rose to nearly £250 each. A boom set in, and ground was taken up in all manner of places, quite regardless of its gold-bearing qualities. Companies were floated with excessive loading, and nineteen steam bucket-dredges were built, at an average cost of about £3,500. Some of them have done well, while others did not pay, for various reasons, generally want of gold in the claim, unsuitable plant, and gross mismanagement. In one case a dredge has dredged out over thirty-two thousand pounds' worth of gold in eight years, and only £4,200 has been paid in dividends. Towards the end of 1892 there came a slump, and a number of the dredges which had been put upon the upper reaches of the Kawarau River, and did not pay, were sold in liquidation. Several of them were bought cheap by private parties, and shifted down on to the Clutha River, between Alexandra

and Clyde, where they got such good returns that the public's attention was again turned to the industry, and a number of claims were pegged off along the low banks and beaches of the Clutha River.

"Up to this time the dredges were only working the river-beds and low beaches, but could not work the higher banks on account of the difficulty in stacking the tailings clear of the stern. In June, 1894, while engaged working the Enterprise dredge, the author was confronted with this difficulty, and took the matter in hand, designing and constructing a machine, now called a 'tailings elevator,' which consisted of a ladder fixed to the dredge, and projecting over the stern at an angle of about 35 degrees to the water-level. On this ladder there is a continuous chain of buckets, or rather trays, working over tumblers at the top and bottom of the ladder. The rough portions of the tailings, after being washed and separated from the fine by a revolving screen, were delivered into the elevator, carried up and stacked to any desired height or distance from the stern of the dredge, according to the length of the elevator. This was the first attempt to deal with the difficulty, and the author has great satisfaction in stating that the success of this machine has simply revolutionised the dredging industry. Claims have been pegged off and dredges put to work claims where dredging was previously considered next to impossible, and now several large dredges can be seen tearing down the high banks of the Clutha, in some cases fully 40 ft. above the river-level, and passing the whole of the dirt through their gold-saving appliances.

"The ideal positions for dredges are within the vicinities of Alexandra and Clyde. At these places dredging is carried on under most advantageous conditions—the auriferous wash, lying on a clay bottom, is uniform in size, with fairly good gold well distributed throughout, intersected by numerous rich leads. As showing how long the seven-mile reach between Alexandra and Clyde is valued as a dredging area, it is interesting to record that at present there are no less than ten dredges at work, with five more under construction, and also that within a radius of seven miles of Alexandra there are no less than seventeen dredges at work, with nine more under construction. Fourteen of those now working are yielding payable returns. The returns from most of these dredges are not divulged, as they belong to private parties, but those which belong to public companies have their returns published regularly. One dredge named the 'Moa,' belonging to the Clyde Dredging Company, paid dividends to its shareholders amounting to £75 on each £50 share, and carried forward a substantial reserve, and that within twelve months of date of starting work. In another case a dredge some twenty-five miles higher up the river, and belonging to a private company, obtained a return of 658 oz. of gold for one week's work, and something over 2,800 oz. for the twelve months. This private company has since put on two large dredges, at a cost of over £5,000 each.

"There are some sixty-nine gold-dredges working in the South Island of New Zealand, sixty-four of which are in Otago and five on the West Coast, twenty-nine of these being owned by public companies, and forty by private companies, parties, or individuals; and besides these there are twenty-nine under construction, chiefly for Otago. The machinery for one is being made in Dunedin, from designs by the author, to be shipped to Russia to work in Central Siberia. The cost of the smallest dredge being built is about £2,000, and the largest nearly £8,000, while the average cost is about £3,500. The general impression amongst miners for some time was that 2-cubic-foot buckets were large enough, and that a larger bucket would lift too much dirt to be efficiently washed. Experience has, however, proved this to be erroneous, and now most of the buckets being made are from 4 to 4½ cubic feet capacity, while one dredge which the author's firm has now in hand is being made with 6-cubic-foot buckets. This is the largest gold-dredge yet built in New Zealand, and a description of it may not here be out of place. It is called the 'Earnscleugh No. 2,' and belongs to a private party of five men. It has a hull 98 ft. long by 30 ft. beam and 7 ft. 6 in. deep aft, tapered to 6 ft. 6 in. forward, and has a ladder-well 5 ft. wide forward, and a short well 5 ft. 6 in. wide for the elevator aft. The hull is built of New Zealand kauri, with Tasmanian hardwood frames, while the framework for the machinery above deck is made of kauri. The bucket-ladder is 70 ft. long, and will dredge to a depth of 38 ft. below water-level. It has thirty-six steel buckets of 6 cubic feet capacity each, working over two cast-steel tumblers, which have been imported from England. The gearing is all of cast-iron, made very heavy, and shrouded to the pitch-line of the teeth throughout. The main spur-wheel on the top tumbler-shaft weighs about 3 tons. On the gearing between the engine and the buckets there is a very neatly arranged friction-clutch, which not only allows the buckets to stop when they come in contact with anything too hard or heavy to lift, and start again when the heavy pressure is removed, but a mere movement of a lever instantly stops the buckets without stopping the engine or interfering with any other part of the machinery. The man working the winches has this lever close at hand, and can control his buckets independently, and without communicating with the engine-driver. The ladder is raised and lowered, and the dredge moved, by six steel-wire lines, worked by a separate steam-winch, with seven barrels, or drums, so arranged that one man can work any one or the whole seven at the same time by the movement of levers. The seventh barrel is a spare one, to be used for lifting weights, or for a spare head-line in case of heavy floods. The winches occupy a space of 18 ft. long by 6 ft. wide, and the winchman need never move more than 15 ft. to work the whole seven barrels. There are six flexible-steel wires attached to the winch—one to raise or lower the ladder, one head-line to hold the dredge in the current and to resist the backward thrust while dredging, and four quarter-lines, two from each side, to move the dredge across the cut. The dredge is driven by compound surface-condensing engines of 20 nominal, but capable of indicating 80- to 90-horse power. They are connected to the machinery by a 15 in. belt, which absorbs all shocks due to the unequal strains put upon the machinery by the buckets dredging in rough ground or rocky bottom. Another belt from the fly-wheel of the engine transmits power to a 12 in. centrifugal pump, which supplies water to wash or sluice the dirt. The pump also does double duty as a circulating pump, for it draws its water through the condenser of the engine. In frosty weather, when the tables are liable to freeze, the heat imparted to the water from the condenser tends to prevent this occurring. The main

engines and the winch engines are supplied with steam from two 16 nominal horse-power boilers, carrying 140 lb. pressure. It was contemplated putting in one 30-horse-power boiler, but the difficulty of transporting up-country prevented this. The boilers are on a principle specially designed for dredges where dirty water has to be used. They are what may be called loco-tubular boilers, with circular furnaces. The furnace end is much larger in diameter than the other, the object being to reduce both weight of boiler and contained water, as well as to allow for the unequal expansion which comes on the Cornish type of boiler when fired straight through without returning the flue on the bottom. The engines and boilers have been imported from Messrs. Marshall and Sons, Gainsborough, England.

"The cost of fuel is usually high in out-of-the-way places, and it is found advisable to use the highest class of engines and boilers obtainable. These boilers are also specially adapted to burn the local fuel, which is usually a low class of lignite. The elevator consists of a long steel ladder, made in the form of a box, open at the top, and latticed at the sides below the box to form a girder. It is fixed to the stern of the dredge by a pivoting-shaft, and supported by four steel-wire ropes, leading to two masts of 40 ft. high, set in the centre of the dredge, and it is stayed sideways by two light steel pipes from the stern corners of the dredge up to about 30 ft. from the upper end. At each end of the elevator there is a pair of light seven-sided tumblers, over which a continuous chain of buckets work; and inside the upper portion of the ladder there are six pairs of rollers, on which the buckets travel, also six pairs of rollers on the lower side down which the returning empty buckets travel. The elevator is driven from the lower tumbler by a train of gearing connected to the main gearing by means of a belt. The whole of the machinery, with the exception of the centrifugal pump, air-pump, and condenser, is above deck, under the eye of the driver, and every point is considered to make the machinery convenient to work, and accessible in case of repairs.

"The dirt after being lifted is discharged into a double shoot made of steel, heavily barred with steel bars. From this it is again discharged into two revolving steel cylinders, each 16 ft. 6 in. long by 4 ft. diameter, and perforated for about 12 ft. of their length with holes ranging from $\frac{5}{16}$ in. at the upper end to $\frac{1}{2}$ in. at the lower. These screens are set with a fall towards the stern of the dredge, and there is a perforated pipe through each cylinder near the top. From these pipes a continuous shower of water falls upon the washdirt, which is tumbled about as it passes down through the cylinders. The fine dirt, sand, and gold is all washed through the perforations on to the tables below, while the coarser dirt and stones pass out at the lower end into the tailings-elevator. The gold-saving tables consist of a series of four boxes, each 3 ft. wide and 13 ft. long, on both sides of the dredge. These boxes are made of steel, 10-gauge thick, set parallel and secured together, the one being stepped below the other to correspond with the fall or pitch of the screens, and each set of boxes has a fall from the centre towards the sides of the dredge, where they again discharge into the tail-shoots, 2 ft. wide, leading aft, where they deliver the fine dirt behind the stern.

"The boxes or tables are covered with cocoanut-matting, in lengths of 4 ft., for convenience in lifting and washing. Calico is laid on the bottom of the boxes to catch any fine gold that may pass through the cocoanut-matting, and the matting is held down by strips of wood laid along the edges, and wedged by wooden wedges, or clips, along the side-divisions of the boxes. The mats on the upper end of the gold-saving tables are usually lifted every morning, and sometimes oftener if the dredge is getting a large amount of gold. They are washed in large troughs, and the gravel, sand, and gold is then streamed down on either plush, baize, blanket, or cocoanut-matting in a box about 12 ft. long and 20 in. wide. After this nothing but the gold and heavier portions of the sands remain, and this is taken out by either panning it off in a dish or amalgamating it, usually the former. The coarser dirt and stones, after passing out of the revolving cylinders, are discharged into the tailings-elevator, lifted up and stacked behind the dredge, at such a distance that the stern will not touch or ground upon them. The dredge will work its way into the bank from the river, stacking its tailings to a height of 40 ft. behind it, forming its own dam or paddock, which will be raised by letting a stream of water flow into it, and thus raise the dredge to any level required to work the ground. It has to work almost continuously, night and day, and in all weathers, and the whole of the machinery, with the exception of the revolving screens and the tailings-elevator, will be comfortably housed in, and lighted at night with the electric light.

"This dredge would be capable of lifting and treating about 19,800 cubic yards of gravel per week if the buckets could be kept continually running full, but allowing 25 per cent. of loss for buckets coming up not full, the dirt lifted would be, say, 14,800 cubic yards. The working-expenses will be: Wages, £23; fuel, £16; wear-and-tear to machinery, £12; oil, waste, and sundries, £2: in all, £53 a week. This would make the average cost of lifting and treating a cubic yard of dirt something under 1d.

"It is interesting to note the way in which the tailings from a dredge will stack up under different conditions. A dredge with a single sluice-box, into which the whole of the washdirt is discharged, will require about 20 per cent. more room to stack the tailings than they formerly occupied; but one fitted with a revolving screen will require fully 33 per cent. more room, due to the fact that the fine dirt is separated from the coarse, and only gets partially mixed again when discharged at the stern by the two shoots; while the tailings from a dredge with a tailings-elevator require nearly 50 per cent. more space to stack. In this case the fine dirt, and all that passes through the perforations in the revolving screen, is delivered close under the stern of the dredge, and settles on the bottom, while the coarse dirt and stones are carried up the elevator and stacked on top of the fine stuff, which gets no chance of being mixed with the stones. The interstices between are not filled, consequently much more room is required.

"As illustrating the state of perfection to which the New Zealand type of dredges has been brought, the largest of them are being worked by only two men per eight-hour shift, and one

dredgemaster, who is also the engineer, in charge, making in all seven men to work the dredge continuously for 144 hours per week. This is principally due to the compactness and handiness of the winches and simplicity of the machinery, which is almost automatic in its working. In comparison with this we have in Dunedin Harbour a large dredge made on the usual harbour-dredge type. It takes eight men per shift to work it, and the average cost of dredging a cubic yard of clay and delivering it into the hopper-barge is 3·81d. It is difficult to make a fair comparison, seeing that the gold-dredge is kept running almost continuously, while the harbour-dredge is only worked during daylight, which necessitates considerable lost time; but, as against this, with every cubic yard of gravel lifted by the gold-dredge there is also about 7 tons of water lifted to wash it, and the power absorbed in lifting the water is fully 50 per cent. of the total power exerted by the dredge; and also, the expense of fuel and repairs in the out-of-the-way up-country districts are far in excess of town prices. This leaves the comparison still very much in favour of the gold-dredge.

"Dredging in New Zealand is attracting attention all over the world. The author's firm is continually being called upon by persons coming to Dunedin to inquire about or investigate the matter. Quite recently two Russian gentlemen not only came out to New Zealand, but have since cabled out instructions to have plans prepared and the machinery made here and shipped to Russia; while communications have come inquiring for designs from London, Glasgow, British Columbia, Victoria, New South Wales, Tasmania, Borneo, and New Guinea. California is profiting by our New Zealand experiences, for a gentleman from New Zealand is now building bucket-dredges, which from all accounts are doing fairly well.

"In New South Wales sixteen miles of claims on the Macquarie River have been taken up for dredging, and already one dredge is in course of construction, and five more are being arranged for, to work these claims.

"Dredging for gold by means of suction-dredges has also been tried to a considerable extent in New Zealand, but has proved a failure in every case. There have been sixteen suction-dredges put upon different claims, including two fine plants sent out by Messrs. J. H. Gwynne, of London, and in no case have they proved profitable investments. There is a considerable amount of wear-and-tear on the pumps, and the power required to drive them is so great that the fuel account is out of all proportion to the amount of work done. In hard wash, where the best gold is generally to be found, the suction-pump appears to be almost useless, for it will not lift the wash without some kind of a cutter to disturb it, and so far no cutter has yet been made in New Zealand that will stand in the wash or gravel. From reports issued by the Mines Department of Canada it seems that suction-dredges have also been tried there, but from the published returns in their reports they do not seem to be very successful."

Dredging: Its Present and Future Outlook.

[By Dr. J. E. Hyde, Clyde, Otago.]

From the earliest days of the discovery of gold in the Molyneux dredging has been a prominent feature of gold-getting; in fact, if gold-dredging did not have its birth upon this river, its development and rise to such prominence as it occupies to-day certainly did. The progress of this industry, more especially in the last five years or so, has been indeed phenomenal; but for the first twenty years of its development improvements in methods were slow. Although the present state of the industry must be considered satisfactory, still much remains to be done, and I consider it my duty to point out what appear to me to be the chief difficulties now to be overcome. They are as follows: (1.) The difficulty of saving the large percentage of gold lost in the present process; this loss is estimated from as low as 5 per cent. to as high as 30 per cent. or even higher, and, indeed, the loss does vary according to the ground being worked and to the more or less perfect methods employed in saving the gold. (2.) The difficulty of disposing of the drift or fine stuff. (3.) The difficulty of dealing with rocks and large boulders. (4.) The difficulty of saving the gold on rock bottoms. (5.) The difficulty and necessity of cheapening the present expensive methods of dredging, as poorer ground has to be worked when richer becomes exhausted.

As a general practice much more water and a much greater fall on tables is now being used than formerly, with marked results. The miner of the earlier days was afraid of using a proper quantity of water, and very gradually more and more water has been employed, until now the quantity rushing over the dredge-tables would surprise a miner of the sixties or seventies, or even the eighties. But clean mats must be the rule if gold is to be saved, and more gold is lost by using too little water than by too much. We now have our dredges using four to six heads of water on these tables, with the tables having a fall of from 2 to 4 in 12, and I am convinced that, as far as this portion of the gold-saving process is concerned, both the quantity of water and amount of fall are required. As a supplementary means of saving gold, wire netting or expanded metal, which have come so much into use of late, are indeed valuable, for, by creating a ripple and protecting deposited gold, they render considerable aid, and for saving the lighter flakes of gold are invaluable. But with all this there is still a quantity of gold lost, as is often proved by testing the tailings. Many inventions have been tried, to which it is unnecessary now to refer, none, however, with anything like success. This department of the industry offers a splendid field for the inventor, whose success would be rewarded magnificently.

The next improvement required is a better method of disposing of the fine stuff—sand and drift. How often do we find that, although a dredge is capable of stacking the coarse stuff—that is, the large gravel, stones, and even boulders—to a height of 40 ft. or 50 ft., the same dredge will be pushed ahead by the accumulated fine stuff, which is deposited but little above water-level, and which consequently interferes with the dredge working to advantage. Various methods have been tried to overcome this difficulty, with varying success. Among these may be mentioned the settling-box, and small elevator to empty the same and deposit the fine stuff on the large elevator. This appears to offer the best chances of success. Another method was to allow the water from

fine stuff as it passes from the tables to flow off and convey the settlement from the fine stuff direct into the main elevator. This, although meeting with a certain measure of success, is not entirely satisfactory. But in the near future, without doubt, this difficulty will be overcome.

I now come to the difficulty of dealing with rocks too large for the dredge to lift or roll aside. This drawback has not been much felt in the past; but, now so many gorge claims are about to be worked, the difficulty will have to be faced and overcome if these dredges are to yield profitable returns. Various means have been proposed. I favour chiefly the idea of either blasting, as submarine experts would suggest or direct, or a Priestman's grab, with crane on dredge. Should the Government determine to send an expert from the Defence Department to instruct the miners in the use of the best means for this purpose much good may result.

A very important matter is the next difficulty—that of saving gold from rocky bottoms. The very action of the water must result in the gold finding lodgment in cracks and crevices of a rocky bottom; and I have been credibly informed by managers of claims yielding large returns working rocky bottoms that they consider more gold is left than is obtained. The question of how to overcome this difficulty has still to be solved. One proposition is that a tube or pipe, together with a strong suction-power, be used after buckets have cleaned the bottom as well as they can, but how to apply this is a question for the inventor. Buckets of a peculiar shape to work crevices or cracks have been invented, but the general expert opinion is not favourable to them.

A genuine effort in the direction of an improved method of cheapening the cost of gold-production by dredging is about to be made by the use of electricity. The conditions could hardly be more favourable to the use of this power. Besides having a rapid river with unlimited power, we have what is better—water at high elevations, and a moderate climate; so that the water can be used for all the year over the greater portion of our dredging country. I refer more especially to the Molyneux, Clutha, and Kawarau Rivers. This natural power has been, to me most unaccountably, neglected in the past. Two large companies are now about to make use of electricity—viz., Earnscleugh No. 2, on a large scale, obtaining the power from Fraser River; and the Fourteen-mile Claim, with power from Obelisk Creek. That the use of electricity will result in a cheapening of the method of dredging none will doubt, and its adoption is a step in the right direction.

Now, as I have stated the improvements that have to be made or in some cases perfected, let me now review the chief improvements that have of late years been accomplished in this most important industry. These have been chiefly in the direction of better, stronger, and more improved machinery, and much stronger and larger dredges, treating greater quantities of spoil. The largest dredge now has 6-cubic-feet buckets, whereas but three years ago 2-cubic-feet buckets were commonly in use.

The adaptation and improvement of the elevator is a very prominent feature in the modern dredge, and too much importance cannot be attached to this, for without it most of our modern dredging would be impracticable.

The use of the force-pump to break down faces which would not otherwise fall into paddock may also be mentioned.

In no industry could the old adage "Necessity is the mother of invention" be proved more true, and, as it has proved so in the past, let us hope it will do so in the future, and that the necessary improvements will be made either on the lines pointed out or upon others which will be proved more effectual.

Notes on Gold-dredging in Otago.

Mr. W. Crookston, a well-known dredge-owner, now at Cromwell, who has been intimately connected with the dredging industry since its inception on the Molyneux River about the year 1864, has afforded the following information:—

"At that time, the first dredge used was on the spoon principle, worked from three canoes lashed together. The dredge had been constructed at Beaumont, and removed to a portion of the river near Miller's Flat. The gravel raised by the spoon was taken ashore and washed by cradling. The next dredge at the same place was on a built pontoon, about 35 ft. by 12 ft., the spoon method still being adopted. Material from a depth of 20 ft. could be raised by the use of the spoon. The pontoon was held in position by an anchor and chain placed ahead, but worked by two long poles known as 'sets.' The gravel raised was cradled on the pontoon. A stretch of the river for four or five miles was worked at different places by these appliances. The next improvement was made in building a bucket-and-ladder dredge on two pontoons, with power derived from a current-wheel. This dredge was capable of raising material from a depth of 28 ft., but it was found that the bottom on which the richest deposits existed could not in some places be reached. The wash, however, frequently contained payable gold throughout the whole depth. The current-wheel was introduced about 1868, and successfully used by Mr. Ward near Miller's Flat, and, on his giving up, part of the machinery used on his dredge was taken and improved, and used by Crookston and party on a current-wheeler in 1875. The first improvement in dredging after this was by Mr. Scott, who built a dredge, which worked by steam-power, near Clyde. The steam-engine did not at that time prove a success, and the vessel was afterwards altered into a current-wheeler. A later steam-dredge, built and used near Alexandra by the Dunedin Company, had two ladders and sets of buckets, one on each side. This method, however, was found impracticable, inasmuch as when the buckets on one side were loaded the vessel tilted to such a degree that the opposite buckets did not reach the bottom. This was afterwards obviated by building pontoons, which were attached on the outside of the ladders, and which prevented the vessel from tilting. The dredge afterwards worked successfully for a number of years. Since this dredge was built the single-ladder principle has been found the most effective, and is now solely in use. The Dunedin dredge was subsequently altered to work with a single ladder, which was probably about 45 ft. in length. Since that time dredges have been enlarged and improved until they are now built with ladders of 75 ft. in length, capable of dredging from a depth of 50 ft."

Mooring of Dredges.

In rivers where the current is strong it is found best to secure the vessel to suitable moorings about 300 or 400 yards ahead of the place where operations are to be commenced, and it is also found desirable to provide a second fastening and line in case of accident to the chief head-mooring. Lines are also attached to shore-moorings placed in positions to admit of their being used from the bow and stern on each side. The head-line and the four side-lines are in connection with one of the set of steam-winches with which every dredge is necessarily provided, and any of those lines may be readily hauled in or slacked off by the winchman.

Mode of working Dredges.

When the dredge is securely moored at the point where operations are to be commenced, the ladder is lowered and the machinery set in motion. The buckets soon clear a hole, and the ladder is gradually lowered until the bottom has been reached and the wash containing gold cleaned up. The dredge is then moved sideways for about 18 in. by slacking off the lines at one side and hauling in those on the other side. According to the nature of the material, the ladder may have to be raised or lowered as required, but is not otherwise moved until the fresh portion of bottom within reach has been thoroughly cleaned up. It will thus be seen that if the dredge is moved sideways it can be made to travel from one side of the stream to the opposite side, and the head-line by which it is moored is not in any way altered in length. The line of the portion of bottom cleaned is slightly curved, being an arc of a circle described by the mooring as a centre, and the radius the distance between the dredge and the head-mooring.

On the completion of cleaning-up of the first course the head-mooring line is shortened and the dredge hauled ahead about 3 ft. or 4 ft., so that a fresh course can be traversed, and the gravel raised, the length of line being so adjusted that no portion of the bottom is missed by the buckets between the first course and the succeeding line of working.

METHODS of WORKING DREDGES furnished by some of the Dredge-masters.

Mooring of Dredges, and Mode of placing and shifting Moorings.

Jutland Flat Dredge, Waipori.—Moored by five lines in ordinary weather; with gales preventers are put out—that is to say, heavy manila lines on the weather side. The five lines are two for bow, two for quarter, and one head-line; and spare lines are according to requirement. Waist-lines, stern, and preventers at right angles. Moorings are shifted as a rule without stopping. A manila line is put out to replace the steel mooring while the dredge is being shifted. Lines are shifted with a boat by two or more men, as required. The moorings are placed to suit the work, about 120 degrees from the face.

Evans Flat Dredge, Lawrence.—This dredge is moored by one head-line, two bow-lines, and two stern-lines to pieces of 6 in. by 6 in. timber sunk to a depth of about 3 ft. Moorings are shifted as required by going on shore and hauling "backers" forward into holes previously sunk. In working, the ladder is raised sufficiently from the bottom to allow of a "cut" being taken by the side-lines, such "cut" being rather less than width of buckets, the bottom of each "cut" being cleaned before again raising ladder.

Manorburn Dredge, Alexandra.—Flexible steel-wire ropes $1\frac{3}{4}$ in. in circumference; side-lines and head-line, $2\frac{1}{4}$ in. in circumference are used. The ropes are fastened to logs of wood buried from 2 ft. to 3 ft. deep.

Unity Dredge, Clyde.—One head-line and four side-lines (two bow and two stern) attached to sleepers buried in trenches above high water.

Enterprise Dredge, Alexandra.—For head-line a hole from 4 ft. to 6 ft. deep and about 8 ft. long is sunk. Place backer in same, which should be a piece of blue-gum or some other strong wood not less than 6 in. by 8 in. Bend the line on to it with the pulling part at the bottom; side-lines in proportion. If working in still water keep side-lines with a draw astern; in case of high winds it keeps dredge from being blown on to the face being worked.

Golden Terrace No. 1, Tucker Beach.—Two lines on each side and one in front, fastened to logs sunk in the ground, with a couple of piles driven in front to prevent drawing.

Alpine Dredge, Cromwell.—Moorings, wire rope; working cable up stream and made fast to a backer sunk in the gravel; side-wires four, two on each side of river, one being forward and one aft on each side, all connected to barrels on steam-winch.

Carrick Dredge, Nevis.—Wire ropes, and backers sunk in the ground.

Buller Dredge.—When available, trees are used as mooring-posts. When they cannot be got we bury a log, say, 5 ft. deep and make fast to it.

Mode of working and moving the Dredge so that no part of the Bottom that can be easily reached will be missed by the Buckets.

Jutland Flat Dredge.—This depends entirely on the intelligence of the winchman, assuming that the dredge has winches which will correspond with the speed of the buckets. The speed of the winches for side movement should never be more than will permit of having a bucket on the bottom; fast winches are no good—they move beyond. It may be necessary to have fast winches in the river for other work, but for cleaning-up they are of little use. The intelligence of the winchman does all the work.

Evans Flat Dredge.—Where practicable — that is, where there is sufficient room between stern of dredge and the tailings—I believe in working the dredge diagonally to the face, so that no part of the bottom may be missed. That is to say, supposing I work the dredge with the bows parallel to the face, and across the full width of it, in returning with the diagonal positions I get whatever bottom may have been left in ridges by the previous parallel cut.

Manorburn Dredge.—Dredge is moved by steam-winch. Dredge is never moved more than 1 ft. each feet sideways across face. In taking feet ahead cut varies from 1 ft. to 3 ft., according to nature and depth of ground.

Unity Dredge.—With the length of head-line as a radius, the dredge is moved across the cut with the side-lines, taking the wash in a face of any convenient width, the buckets being kept scraping the bottom. After the cut is finished the dredge is pulled ahead from 1 ft. to 4 ft., and the same process gone through again.

Enterprise Dredge.—Take dredge ahead from 2 ft. to 4 ft., according to depth of ground working, and then work across the cut on the bottom.

Golden Terrace No. 1.—Pulling the dredge ahead about 4 ft. at one side of the cut, and keeping the buckets on the bottom. Pull the dredge sideways towards the opposite side as the dirt becomes exhausted.

Alpine Dredge.—When once on the bottom, by taking the dredge about 2 ft. ahead at a time, and working sideways, the bottom is thoroughly cleaned.

Carrick Dredge.—Always keep the buckets on the bottom, and keep moving the dredge from one side of the cut to the other.

Buller Dredge.—After hauling ahead, say, 3 ft., which is the length of our cut, the dredge is hauled across the face by the side-line, the buckets always cleaning up the bottom, which is of soft clay.

Mode of dealing with, or Removal of, Boulders larger than can be taken up by the Buckets.

Jutland Flat Dredge.—By sinking a hole alongside or near the rock (if the bottom is soft), and dropping or pushing the boulder into the excavation. By blasting, or other means, have shifted a block estimated at 40 tons. By sinking a hole for it and pushing it in with the side of bottom tumbler. By blasting with an old boiler-tube charged, if the current is not too strong. All depends on current and possible means of sounding as to extent and size of rock, &c. Modern dredges, if intelligently handled, can shift anything.

Manorburn Dredge.—If ground permits, stones too large to lift are buried by boring a hole in bottom and pushing stone in. If working in a flat they can often be pushed out on to face by judicious use of buckets and winches worked together.

Unity Dredge.—Clean round and leave them.

Enterprise Dredge.—Large boulders: Work up to and around same as far as possible. If working on sand or soft-clay bottom, sink into the bottom close to the boulder, so that it will settle into it; if on hard bottom, work up to it and lift ladder over it, and continue so until you get ahead, so that buckets will clear it.

Golden Terrace Dredge No. 1.—We are not troubled much with large stones. Merely lift the ladder over them and drop it again on the opposite side.

Alpine Dredge.—By using large hooks, which take the place of a bucket. These either take up the stones or push them to one side.

Carrick Dredge.—Sink into the bottom alongside the stone. Then roll it in.

Buller Dredge.—Large boulders are taken off the ladder on to the deck, and are put overboard again sufficiently far from the face to clear the buckets.

Mode of dealing with Roots or Trunks of Trees.

Jutland Flat Dredge.—Though very annoying, can be shifted by stripping. Have shifted as many as eleven in a cluster, and some 4 ft. in diameter and over 60 ft. long, by merely intelligent work. Roots and trees are the least trouble. Butts with roots 15 ft. in diameter, &c., can be easily enough shifted if stripped. Tackles, &c., have to be put on them, they can then be ferried away from the scene of operation.

Evans Flat Dredge.—Have no large trunks of trees, the only roots being gorse-roots, which the buckets can effectively deal with.

Manorburn Dredge.—If possible get under one end, and if it will not break it will generally be possible to bend it to surface, and then cut in sections with axes.

Golden Terrace Dredge No. 1.—Very few trees met with. If stump gets jammed in the buckets, lift the ladder and fasten a rope or chain to it, and lower the ladder. Either take the stump ashore or convey to the after end of paddock and let sink.

Buller Dredge.—Cutting, blasting, dredging out, and hauling astern when practicable.

EXTRACTS FROM MR. WARDEN HAWKINS'S ANNUAL REPORT.

Messrs. J. Holland and party intend putting a dredge on their special claim on the Waikaia River above Glenavy, and the Nugget Gold-mining Company are also preparing to have a dredge placed on their claim at Growler's Flat, near the same locality.

The prospects are said to be good in several cases where dredging areas are being applied for, near Waikaia and at Wendonside.

Waikaka.

Two dredges—viz., those of Messrs. W. McGill and party and J. R. Perry—have been in active work for the last year, and the returns have been very good.

Messrs. J. Marr and party and W. Little and party are busily engaged building dredges for their claims, and they will soon be ready to start work. Besides these, three more claims have been granted, and the dredges are ordered or in course of erection. A very large portion of the land in this locality is known to be gold-bearing and suitable for dredging, and I shall not be surprised to see eight or ten dredges at work in the course of a year or two.

Gore.

One dredge is now working on the Mataura River above Gore. A dredge is also at work on freehold land on the Waimumu, and another is in course of erection, while companies have been formed for working a third claim there and one on Chatton Creek. These lands are at present not included in the Mining District of Otago.

Glenore.

The dredging claims in this locality are still doing well, and have been working constantly throughout the year. The following are the dredge-owners—viz., Messrs. J. Nelson and party, the Golden Bank Gold-dredging Company, the Sterling Gold-dredging Company, and the Woolshed Dredging Company. The former one, I understand, has been on rather poor worked ground for some time, but the three latter have been on good gold, some of the weekly returns from the Sterling and Woolshed being as high as 40 oz.

The mining district has been extended in the direction of Milton, taking in the bed of the Tokomairiro River. One other claim has been taken up, and it is probable that others will follow. The new one taken up is the River-bank Dredging Company, and they are now preparing to build the dredge.

Tuapeka Mouth.

The dredge on Messrs. McLeod and party's claim in this locality has been working on the flat during the year, but the returns have not come up to expectations.

I may mention that two dredging claims have been applied for on the Clutha River just above the Tuapeka mouth, but the applications have not as yet been finally disposed of.

Wetherstone.

Messrs. Smyth, Adams, and Donlan purchased the claim and dredge on Wetherstone Flat from Mr. John Robertson. They have named the dredge the Golden Rise, and have had it overhauled and almost entirely rebuilt, at a cost of about £1,200, and it is now working again.

Waipori.

The mining enterprise in this locality is still going ahead and attracting public attention. Nearly all the ground available or suitable for dredging purposes has been taken up. There are six dredges working, and they are all doing well. Two more are being built; one will start work shortly and the other in a month or two.

The one mentioned as starting shortly, belongs to the Empire Gold-dredging Company, being the second dredge built by the company. As they hold two special claims, a dredge is required for each claim. This dredge is being built at a cost of about £3,300, and fitted up with all the latest improvements. The dredge put on this company's claim less than twelve months ago has done exceedingly well. The weekly returns have been good and regular, and dividends of 1s. per month have been paid since last July.

The Success dredge has continued to work throughout the year with very satisfactory results, having won 843 oz. of gold and paid dividends amounting to £240.

Messrs. McNeil and party (private party): This dredge is an established success, and the returns have been good throughout the year.

The Jutland Flat (Waipori) Company have worked steadily for the year, and have won 1,226 oz. of gold, and dividends amounting to £1,500 have been paid.

The Upper Waipori Alluvial Gold-dredging Company (Limited) have also been working for the greater part of the year. The yield of gold was 850 oz., and dividends amounting to £600 have been paid.

Lawrence.

Five dredges have been working throughout the year on Tuapeka Flat and River below the Lawrence Township. They are as follows:—

William Murray and party, known as the Record Reign dredge, have worked nearly all the available ground round about the Chinese camp, part of the time, I understand, getting fair returns.

J. Harris and party have been at work steadily for the last nine months, with fair average returns.

The Evans Flat Dredging Company has been doing very well, obtaining 437 oz., and paying dividends amounting to £350.

The Tuapeka Dredging Company has also done well for the past twelve months, having won 329 oz. of gold, and the prospects for the future appear bright.

Lower down the river is the Balclutha Dredging Company, which, I am informed, has been getting only fair returns.

Beaumont.

A new dredging company, called the Sunlight Dredging Company, has recently started operations on the Clutha River, at the Horseshoe Bend, above the Beaumont, and the returns are very satisfactory.

EXTRACTS FROM MR. WARDEN MCCARTHY'S ANNUAL REPORT.

This method of mining has become the fashion of the hour. In the district under my care there are fifty dredges, the capital cost of which cannot have been less than £250,000, and nearly all of these are in active work, of which a goodly proportion are dividend-paying. Before the close of the next financial year I hope to be able to report the construction of ten additional dredges, at a cost of at least £50,000.

Most of the Molyneux River from the Tallaburn to Cromwell, as well as considerable stretches of the Manuherikia, the Kawarau, and Clutha Rivers, are under application, and the attention of investors is now being directed to the Nevis, Lindis, Dart, and Cardrona Rivers and adjoining flats.

In passing, I may state there are at the present time 192 applications awaiting the preliminary hearing, of which no less than seventy-five are set down for hearing at the next Cromwell Court.

Extracts from Mr. Warden Poynton's Annual Report.

Much interest is being taken by the Southland people in dredging. A number of claims have been taken up in the bed of the Upper Waiau River. A dredge is being built on one of them, and will be at work during the winter. If successful, others will be built. Prospects are said to be very good.

Dredging claims have also been applied for at Lake George, near Round Hill, and at Colac, adjoining. Old miners who have worked in the neighbourhood say that rich leads traverse the area between those places, but are too deep to be worked otherwise than by dredging.

The beds of several streams outside the boundaries of the mining district are to be tested by means of dredging. Many of the river-beds and low terraces in Southland are gold-bearing.

Dredging has some advantages over other forms of mining when applied to private lands. The tailings and *débris* can be kept on the land to a great extent, and the running water required is but small.

Gold-dredging in Southland promises to become an industry of great importance.

Extracts from Annual Report of Mr. John Hayes, Inspector of Mines, Otago.

Dredging.

The interest taken in this method of gold-mining continues to increase, and at the close of the year ended 31st March the number of dredges in work in Otago and Southland was upwards of seventy. Four are undergoing removal, nine are standing for various reasons, and (approximately) not less than thirty new dredges are either in course of construction or projected. There is an all-round tendency to build dredges very much larger and more powerful, recent examples being the Magnetic and Electric No. 3 dredges at Cromwell, the Earnscleugh No. 2 and Golden Point dredges at Alexandra; but much larger dredges even than these are under consideration.

Some of the flats in Southland were well worth attention for dredging purposes. This is now being fully recognised, and during the year dredges have been built at Coal Creek, near Gore, and Waimumu, near Mataura, whilst others are now being built in various parts of the district. Additional dredges are being built at Waikaka; one is in course of construction on the Mataura River, near Gore; and others are proposed to be built some twelve miles above Waikaia, and also near Round Hill.

During the year the dredge formerly at work near the Landslip at Waikaia has been removed to Inch Valley or the Shag River, some six or seven miles above Palmerston; and another has been built at Macrae's Flat. New dredges have been built at Chatto Creek and at Ophir, whilst dredging operations are about to commence at Matakanui. All these districts (Ophir excepted) are, together with Gold Creek and Waimumu, new fields for the dredging industry.

New dredges have been completed at Glenore, Tuapeka, Waipori, and on the Molyneux River about Alexandra, Clyde, and Cromwell; also on the Kawarau River, and at Nevis.

As a matter of fact, snug fortunes have been made in a very short time by owners of dredges, and it is very questionable if any other class of mining properties in the colony is so genuinely reliable as dredging. That the industry will extend to other parts of the district there is no doubt. Last year I expressed my opinion as to the possibility of Cardrona being a field for dredging. Since then claims have been taken up for the purpose, and prospecting operations are now in hand.

I have visited most of the dredges at work during the year, and have noted with pleasure that greater care is exercised and better provisions made for safety than was the case previously.

Under the head of "Accidents," it will be noticed that they have been very few in comparison with previous years, notwithstanding the fact that the number of dredges has increased.

Dredging in New Zealand compared with Siberian Methods.

The *Otago Daily Times* in a recent issue contained the following information relative to the visit of two Russian gentlemen who are engaged in dredging operations in Siberia:—

"Mr. W. H. Cutten, of the firm of Cutten Brothers, civil and mining engineers, recently returned from a trip to Central Otago, whither he had gone with the object of showing two Russian gentlemen, who accompanied him, what was being done in the way of gold-dredging in this part of the world. One of the gentlemen in question, Mr. I. Hein, is a civil engineer representing a large mining company in Siberia; the other being Mr. Sheestakoff, a practical miner interested in the same mine. As neither of the two are very conversant with the English language, they have an interpreter with them in the person of Mr. Colmer. The party went first to Lawrence, and, after paying a visit to the Blue Spur, they inspected the Tuapeka and Tuapeka Flat dredges. On seeing the former machine in operation, Mr. Sheestakoff remarked that in Siberia five hundred men and twenty-five horses would not do the work that the Tuapeka dredge was doing. From Lawrence the party proceeded to Miller's Flat, thence to Alexandra, Clyde, Cromwell, Black's, St. Bathan's, and Naseby. During their tour they visited altogether twenty-one dredges, and Mr. Hein took photographs of most of them. The Russians were very pleased with what they saw, and Mr. Hein said he thought the Matau dredge, near Clyde, was the roomiest and nicest-looking dredge that he had seen. They were most astonished with what they saw on going on board the Vincent dredge, at Clyde—a large dredge 109 ft. long. The dredge-master was laid up owing to an accident,

the stoker happened to be on shore, and the engineer was running the dredge himself. As a dredge in Siberia has twelve men to a shift, it astonished the visitors to find so large a machine being operated by only one man, who was apparently working it with ease. Altogether they were very much struck with what the dredges were doing. They described a dredge which was working in Siberia, on the Amoor River, and built in Holland at a cost of £10,000. The greater part of the money seemed to have been spent in cabin fittings, regardless of efficiency. The dredge was only fitted with hand-winches, and four men were required to raise and lower the ladder, while it took twelve men per shift to work it, and they only worked during the daytime. The dredge, however, succeeded in getting as much as 150 oz. in an eight-hours shift. The claim that Mr. Hein is interested in is about three thousand miles inland from St. Petersburg, and is four hundred miles in length. It is held on a hundred-years lease, on condition that the rent is paid regularly. If, however, the rent is more than ten days overdue, the claim is absolutely forfeited, and cannot be taken up again by the same parties.

"This is not Mr. Hein's first visit to the colony, he having been here twelve months ago. On that occasion he instructed Messrs. Cutten Brothers to get a dredge built for the company he represented. The dredge has since been constructed by Messrs. A. and T. Burt, and Mr. Hein is at present waiting in Dunedin to ship it. He has also given Messrs. Cutten Brothers instructions to get two more dredges built for his company, and forwarded to Russia. These are likewise to be made by Messrs. A. and T. Burt. The dredge Mr. Hein intends to take away with him is constructed very much on the lines of the Matau, and Hartley and Riley dredges, but is not so long. It will dredge to a depth of 25 ft., and elevates 18 ft. The buckets have a cubic capacity of 4½ ft., and the gear is very heavy and strong all through. Mr. W. H. Cutten states that most of the dredges he visited on his recent trip are getting exceedingly good returns. The Earnscleugh No. 2 was having an elevator fitted on at the time of his visit; and the Matau and Golden Treasure dredges were stopped working in order to put in new tumblers.

"In addition to the two new dredges for Siberia, which have already been referred to, it may be mentioned that Messrs. Cutten Brothers are designing a new dredge for the Totara River, near Ross, on the West Coast; also one for the Mokoia Dredging Company, on the Buller River. They have likewise in hand two powerful dredges for the Clutha River—one for the Perseverance Company and one for the New Alexandra Company. The elevator of the one is 72 ft. long, and that of the other 46 ft. long, but both dredges are arranged to carry 90 ft. elevators when required. The capacity of the buckets is 5 cubic feet. Besides these dredges, the firm are designing another for the Upper Waimumu, and are rearranging the old Cocksparrow dredge for the Consolidated Dredging Company on the Buller River on the West Coast. Mr. Cutten says that dredges are now being increased in size to enable them to treat larger faces of poor material; and he is of opinion that in a few years in a number of the claims the elevators will have to be considerably lengthened in order to admit of the claims being worked properly."

Marlborough, Nelson, and West Coast.

Wakamarina Dredge.—For some time past this dredge has not done any work. Unfortunately, during the last flood the front portions of the pontoons were filled with water, consequently the dredge is virtually standing on end.

Imperial Dredge.—This dredge is not yet completed.

Mahakipawa Dredge.—This dredge is idle, and information of a reliable character could not be obtained as to future operations.

Buller Dredge.—The mechanical appliances of this dredge are of the most improved types. Since operations were commenced a large area of ground has been gone over with satisfactory results. Owing to the high bank it was found necessary to lengthen the elevator, but, apart from this stoppage, the dredge has been kept steadily at work, every part of the machinery running well. The dredge is fully equipped with all the necessary appliances for the safety of the persons employed.

Matakitaki Dredge.—This dredge when in full work gives employment to eleven men and one boy, exclusive of two men who are employed by contract for the supply of timber.

Mahinapua Dredge.—This dredge, after working some time in Lake Mahinapua and in the creek, has been laid up, operations not being profitable.

Mr. Warden Stratford, in his report, thus refers to the dredging industry on the West Coast:—

"A number of dredging claims have been taken up all over the district, and it is expected that this mode of working will open up a new era in the West Coast mining.

"At Canoe Creek, three miles north from Barrytown, where the creek discharges into the sea, 200 acres have been taken up for dredging purposes. The place is admirably adapted for this style of mining, and good prospects have been obtained. Some doubt is expressed as to whether the heavy black sand will leave the buckets or be retained in them by suction, but a little alteration in construction will obviate this defect.

"Several claims for dredging have been taken up in the Grey River, and good prospects have been obtained in most of them. Steps are being taken to obtain suitable machinery. The Grey River Dredging Company tested the property which they hold near Stillwater by means of a small dredge procured from the Grey Harbour Board, and the results were so satisfactory that a local company was formed, and plans are now being prepared in Dunedin for a dredge of suitable power to work the company's claim. The dredge which this company are procuring will cost over £5,000, and will compare favourably with the best dredges in use on the Otago rivers. Another dredge is being obtained to work on the Grey River near the Little Grey Junction. The cost of this machine will be over £3,000.

"The whole of Stillwater Creek from its confluence with the Grey River to Maori Gully has also been taken up, and is now being prospected for dredging purposes, some of the prospects

DREDGE

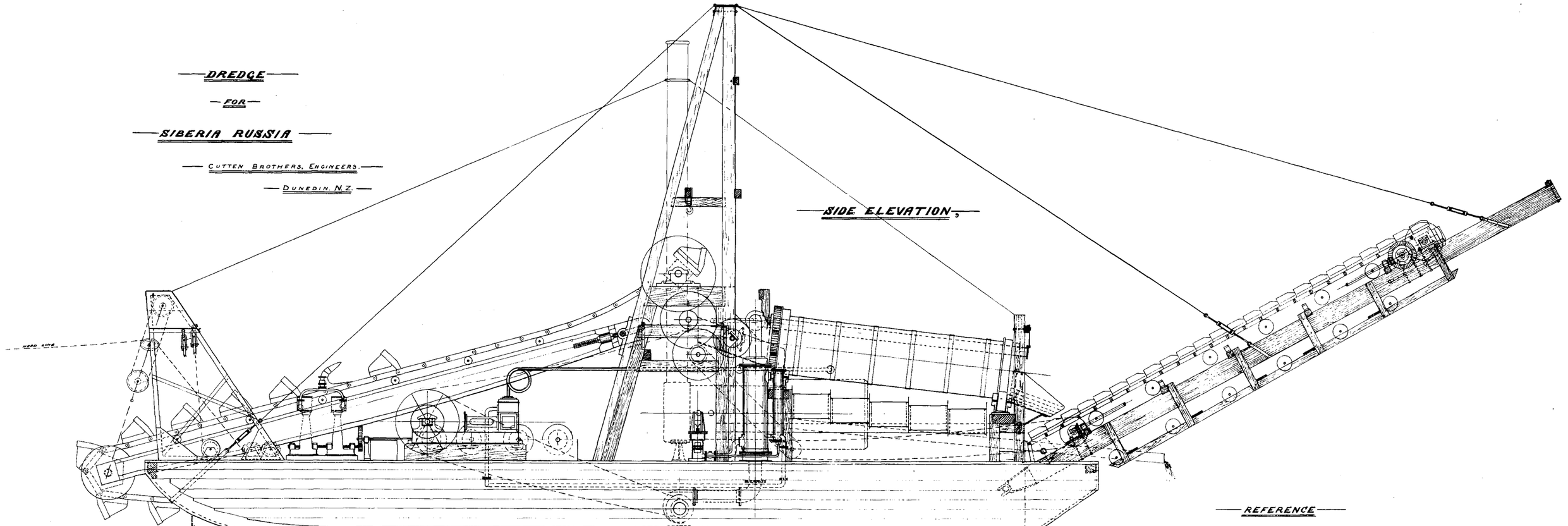
FOR

SIBERIA RUSSIA

CUTTEN BROTHERS, ENGINEERS.

DUNEDIN, N.Z.

SIDE ELEVATION

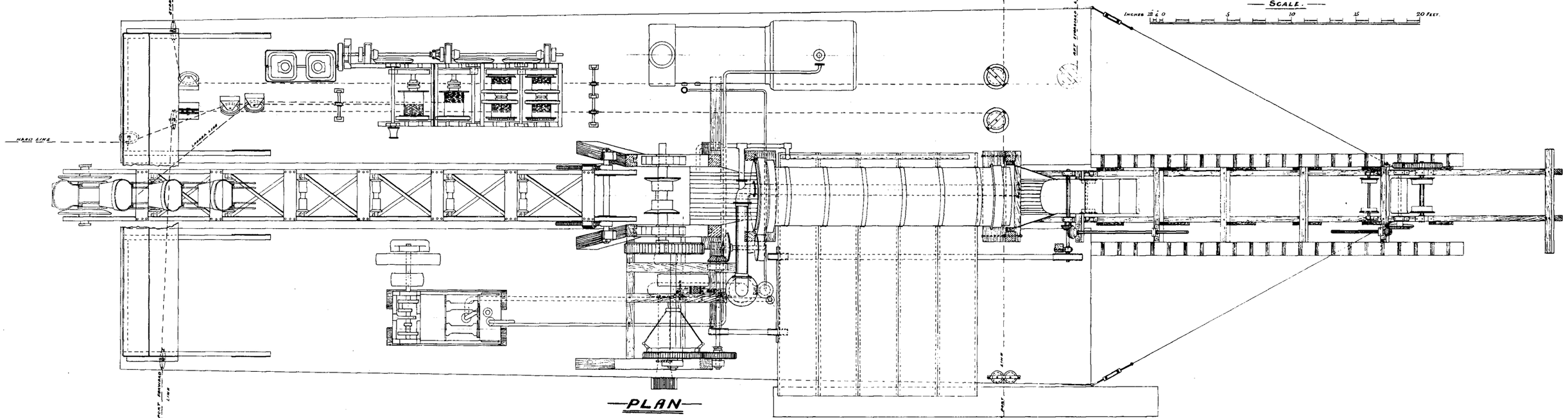


REFERENCE

LENGTH 76 ft. BREADTH 29 ft. DEPTH 6.6"

SCALE.

INCHES 12 6 0 5 10 15 20 FEET.



PLAN

already obtained being very good. Besides the places mentioned, all the streams running into the sea south of Greymouth, such as Saltwater and New River, offer great facilities for dredging, and will ultimately be worked in this way.

"It is reasonably anticipated that in the course of a year or two the West Coast rivers will be as actively engaged in the dredging industry, as those in Otago are at present. The conditions obtaining here point to the success of dredging operations, and if the companies referred to prove successful there is no doubt that their success will induce capitalists to give ready attention to the dredging industry as applied to the West Coast."

Accidents at Dredges.

Two serious accidents, and one fatal accident happened during the year.

J. W. Bodenhausen, an employé on the Cambrian's dredge, had his leg broken on the 8th September, 1898. He was in the act of stepping on the buckets or chain when in motion, and got his foot fast between the links. On coming into contact with a guide-roller he was thrown down on the deck, sustaining the injuries referred to. A trick of this sort is a senseless one, and at variance with the regulations framed for the safety of men employed on dredges, in which special mention is made of this stupid and dangerous practice.

James Hewitt, manager of the Vincent dredge, Clyde, had his right hand severely crushed on the 16th March, 1899, by being caught between gear-wheels when replacing the cover of an oil-cup whilst the machinery was in motion.

Alexander Patrick, employed on the Hartley and Riley dredge near Cromwell, was accidentally drowned on the 17th March, 1899. Patrick had been ashore, and while lowering himself from the bank to the dredge by the bow-line he fell into the water and was carried by an eddy into the swift current.

The estimated number of men employed on dredges is about five hundred. The proportion of fatalities is thus about one per thousand, and compares favourably with the figures of last year, which were 11·9 per thousand.

With a view of compelling the owners of dredges to take every precaution against loss of life or injury to the persons employed on or about dredges, the following regulations under "The Mining Act, 1898," are now in force:—

[Extract from *New Zealand Gazette*, No. 8, 30th January, 1899.]

"*Special Provisions as to Dredges.*

"The following special rules shall be observed in the case of every dredge used for mining purposes:—

"(1.) Every dredge used for mining purposes shall be kept provided with safety appliances as follows: (*a.*) A life-buoy, a light-line, and a boat-hook, near the bow of the dredge. (*b.*) A life-buoy, a light-line, and a boat-hook, near the stern of the dredge. (*c.*) A boat containing a light-line and a boat-hook.

"(2.) In every case where the Warden or Inspector notifies the owner or manager of the dredge that the stream at which it is worked is deep or swift-flowing, then, in addition to the foregoing appliances, the dredge shall be kept provided with not less than two boats, each of which must be furnished with a life-buoy, a light-line, and a boat-hook. Life-belts shall also be provided, and each member of the crew of any boat shall wear a life-belt when engaged in shifting the mooring-lines of the dredge.

"(3.) All safety appliances shall be kept in conspicuous places within easy reach, and when damaged or lost shall be immediately renewed.

"(4.) The well-hole of every dredge shall be fenced or covered over as far as is reasonably practicable, and where such fencing or covering is not practicable a movable gangway of not less than 2 ft. 6 in. wide, and fitted with a substantial hand-rail at each side, shall be provided and used by persons for crossing the well-hole.

"(5.) No person shall step on the buckets or chain when in motion.

"(6.) All exposed gearing, belting, or machinery shall be kept fenced to the satisfaction of the Inspector.

"(7.) On any dredge which is not entirely covered in, the sides of the uncovered portion of the hull shall be fitted with stanchions not more than 8 ft. apart, and also with two substantial hand-rails or tightly-stretched wires or chains, the lower rail, wire, or chain not being more than 10 in. above the deck, and these may be made movable for the purpose of taking coal and material on board the dredge, but shall be kept in position at all other times.

"(8.) Every dredge working close to a bank shall be provided with a gangway not less than 2 ft. 6 in. wide and of sufficient length to reach from the dredge to the bank. Such gangway shall be provided with a substantial hand-rail at each side and secured to the deck of the dredge in such a manner as to prevent its being upset.

"(9.) A copy of these regulations shall be kept posted in a conspicuous place on every dredge, and shall be renewed as often as torn or defaced.

"(10.) It shall be the duty of the owner and manager of the dredge to faithfully comply with the foregoing rules, and if they fail or neglect so to do they shall be severally guilty of an offence."

Description of Dredge constructed in Dunedin for Central Siberia.

The following is a description, together with illustration, of a gold-dredging machine being built in Dunedin, New Zealand, to the order of Mr. Hein, to work in Central Siberia: The pontoons, which are to be built of timber on the claim, will be 76 ft. long by 29 ft. beam and 6 ft. 6 in. deep, with a well forward for the ladder and a short well aft for the elevator-tumbler

to work in. The timber to be used in the construction will be larch. The buckets are 4½ cubic feet capacity, and the ladder is 45 ft. long. It will dredge to a depth of 25 ft. below the water. The dredge will be fitted with a tailings-elevator to stack the tailings to 20 ft. above the water-level aft, to allow the dredge to work into the dry land. The washdirt, after being lifted by the buckets, will be delivered into a semicircular drop-shoot lined with heavy bars of cast steel 2 in. thick bolted to the shoot. The dirt will be delivered from the shoot into a perforated screen or cylinder 20 ft. by 54 in. diameter, made of steel plates perforated with some thousands of holes, varying from $\frac{5}{16}$ in. diameter at the top end to ½ in. at the lower end. The screen revolves slowly, and the fine dirt, sand, and gold falls through the perforations on to the gold-saving tables below, while the stones and coarser dirt is delivered out at the lower end of the screen into the tailings-elevator to be carried up and stacked. The process of screening is assisted by a continuous shower of water, which falls from a perforated pipe passing along the top of the screen inside, and washes the gold through the perforations, and sluices it upon the gold-saving tables, which are usually covered with cocoanut-matting with wire-netting laid upon it. The water will be supplied by a 10 in. Tangye's centrifugal pump, which forces its water through a surface-condenser before it reaches the screen, thereby doing double duty as a circulating pump for the engine. The centrifugal pump and the buckets will be driven by two belts off a 12-horse-power compound condensing-engine capable of working to 50-horse power, supplied with steam from a 30-horse-power boiler of a type specially designed for burning firewood. The gearing for driving the buckets is all very heavy: the largest wheel has teeth 4 in. pitch and weighs close upon 2 tons, and all the rest of the gear is in the same proportion. The winches are on an entirely new principle, different from anything yet constructed in New Zealand. They have the usual four barrels for the side-lines, a barrel for the ladder-lifting line, and two barrels for the head-line, one in case of emergency. In addition to these seven barrels there is a surging-drum for odd purposes. Any one of the eight barrels can be used separately, or the whole eight can be used at the same time, by one man. The winches are very strongly constructed, with the gearing shrouded on both sides of the teeth, and will be driven by a pair of independent vertical engines. The designing of this dredge has been intrusted to Messrs. Cutten Brothers, consulting engineers, of Dunedin, and the contract for the construction of the machinery is being carried out by Messrs. A. and T. Burt, of Dunedin. The engines, boiler, and winch-engines will be made by Messrs. Marshall and Sons, Gainsborough, England. Messrs. Hein and Sheestakoff, for whom it is being built, are now in Dunedin making arrangements to have the machinery, which will be finished in a few weeks, shipped to St. Petersburg.

Builders of Dredges and Dredging Machinery.

A. and T. Burt (Limited); Joseph Sparrow; New Zealand Engineering and Electrical Company, Dunedin; Cossens and Black, Dunedin; Morgan and Cable, Port Chalmers; Joseph Johnston and Son, Invercargill; J. and A. Anderson, Christchurch; and Johnston and Son, Melbourne, from whom it was found necessary to import some machinery, as the local foundries could not keep pace with the demand.

Most of the engines and boilers on dredges are from the works of Messrs. Marshall and Sons (Limited), Gainsborough, Lincolnshire, England, who make a specialty of high-class steam plant for dredging purposes. The boilers, which are of the highest possible character in point of structural detail and workmanship, have been specially designed for the purpose, and are a combination of the Cornish and locomotive types, requiring no brickwork. The boilers are in two diameters, the larger of the two being at the furnace end, and is diminished by curved plates to the smaller-diameter shell. That portion of the shell which is largest in diameter carries the furnace, which terminates in a tube-plate; from this tube-plate a number of locomotive-boiler tubes pass through the smaller-diameter shell to another tube-plate at the smoke-box end. The smoke-box is fitted with the usual door, and a funnel about 25 ft. in height.

STATEMENT of AFFAIRS of MINING COMPANIES, as published in accordance with the Mining Companies Acts, 1891 and 1894.

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 up per Share.	Arrears of Calls.	Number of Shares forfeited.	Number of Shareholders at present.	Number of Men employed.	Quantity and Value of Gold or Silver produced since Registration.		Total Expenditure since Registration.	Total Amount of Dividends paid.
											Quantity.	Value.		
AUCKLAND DISTRICT.														
		£	£	£		£ s. d.	£ s. d.				Oz.	£	£	£
Talisman Extended Gold-mining Co. (Ltd.) ..	29/7/95	19,483	2,706	..	129,888	0 0 5	114 2 0	..	275	4	..	..	3,269	..
Broken Hill Gold-mining Co. (Ltd.)	16/1/95	13,500	1,875	..	90,000	0 0 5	43 15 2	..	208	2	..	..	2,354	..
Comstock Gold-mining Co. (Ltd.)	30/1/95	15,000	1,667	..	100,000	0 0 4	68 13 11	..	215	2	..	..	2,223	..
Waihi Beach United Gold-mining Co.	12/10/98	562	562	..	127,500	0 0 6	..	..	103	6	..	..	428	..
Maratoto Gold-mining Co. (Ltd.)	13/9/98	5,000	250	..	60,000	0 0 1	57 5 10	..	42	6	..	..	368	..
May Queen-Hauraki Co. (Ltd.)	2/7/96	..	12,388	82,000	..	..	..	..	500	50	3,184	8,722	24,989	..
Moanatairi Gold-mining Co. (Ltd.)	7/11/95	170,000	47,050	50,000	..	..	..	..	351	50	4,045	10,954	64,630	..
Omega Gold-mining Co.	29/10/96	5,000	1,579	..	100,000	0 0 2¾	..	14,833	23	..	..	..	1,576	..
Progress-Castle Rock Gold-mining Co. ..	19/9/95	9,750	2,573	..	65,000	..	..	14,332	94	5	..	172	3,169	..
Kuranui Gold-mining Co. (Ltd.)	12/9/95	15,000	1,671	..	60,000	..	78 10 10	..	49	10	..	213	2,424	..
Alpha Gold-mining Co.	30/3/95	7,500	3,964	187	50,000	0 1 9	623 15 0	..	146	6	26	15	5,261	..
Barrier Reefs Gold-mining Co. (Ltd.) ..	29/5/97	100,000	5,802	80,000	100,000	0 7 0	..	8,000	51	28	..	..	6,645	..
Exchange Gold-mining Co.	23/7/96	2,500	952	..	50,000	0 0 4	..	25,194	16	..	..	..	949	..
Coromandel Freehold Proprietary Gold-mining Co.	11/11/95	18,750	10,000	..	150,000	..	..	..	197	..	..	..	10,823	..
Queen of Beauty Gold-mining Co.	24/10/96	10,000	960	..	100,000	..	..	..	21	..	..	..	956	..
Welcome Find Gold-mining Co. (Ltd.) ..	18/4/95	17,500	9,970	1,000	70,000	0 3 6	146 7 6	31,300	141	13	767	2,186	12,059	..
Nonpareil Gold-mining Co.	27/8/96	6,000	1,642	..	60,000	0 0 4	..	29,837	71	6	597	1,651	3,111	..
Adelaide Gold-mining Co.	4/9/95	15,000	5,131	..	60,000	0 1 7	82 1 9	48,333	47	1	367	786	6,167	..
City of Auckland Gold-mining Co.	7/8/96	18,750	1,189	..	75,000	..	..	30,158	59	2	..	4	2,583	..
Wentworth Gold-mining Co.	23/11/96	2,825	1,279	..	56,500	..	..	11,662	59	..	..	..	1,217	..
Balfour Gold-mining Co.	11/12/95	10,500	1,400	..	70,000	..	..	..	138	..	..	..	1,287	..
Hauraki No. 2 Gold-mining Co.	10/7/95	12,000	6,058	..	80,000	0 1 5	..	55,071	37	2	..	..	6,053	..
Imperial Gold-mining Co.	22/2/95	10,000	4,667	417	100,000	0 0 11	..	18,295	252	5	44	85	5,413	..
Tamihana Gold-mining Co.	22/10/96	10,000	800	..	50,000	..	..	..	54	..	..	..	798	..
Eclipse (Ltd.)	19/11/98	7,500	..	750	150,000	..	..	..	4	8	..	397	393	..
Egerton Gold-mining Co.	10/10/97	3,750	187	..	75,000	..	..	..	7	..	..	..	162	..
Kennedy's Bay Township and Gold-mining Co. (Ltd.)	11/8/96	2,000	922	250	200	1 5 0	77 10 0	..	9	1	..	..	797	..
Alburnia East Gold-mining Co.	17/9/95	8,250	2,560	..	55,000	0 1 0	..	49,057	19	..	14	39	2,573	..
New Whau Gold-mining Co.	13/3/95	18,750	4,310	1,354	125,000	0 0 11	..	29,724	132	..	41	109	4,911	..
Minerva Gold-mining Co. (Ltd.)	24/2/90	12,000	6,172	400	23,645	0 5 11	160 16 7	355	36	2	821	..	10,448	..
Waihi Consols Gold mining Co.	18/10/95	16,200	7,348	50	162,000	0 0 4½	..	49,626	260	..	..	..	7,173	..
Ohinemuri Gold-mining Co.	6/8/96	8,000	1,200	1,200	80,000	7·2d.	..	..	192	..	..	..	1,127	..
Rising Sun Gold-mining Co.	16/10/95	1,800	1,699	600	120,000	8·3d.	..	3,466	198	..	..	..	2,321	..
Puru Consolidated Gold-mining Co. (Ltd.) ..	17/7/97	24,562	1,730	7,915	65,500	0 3 2	689 1 0	..	132	2	177	468	8,306	..
Puru Junction Gold-mining Co.	6/10/96	10,000	863	4,250	100,000	0 1 1	..	59,410	38	..	..	..	789	..
Chicago Gold-mining Co.	16/3/98	18,750	2,400	14,750	37,500	10/ on A 6/ on B	..	220	89	1	40	117	3,955	..
Waverley Gold-mining Co.	13/12/94	6,000	3,028	..	39,467	0 0 11	1 5 0	23,633	65	3	..	..	2,954	..
Waihi Extended Gold-mining Co. (Ltd.) ..	12/8/95	149,967	2,974	..	149,967	1/2½ 0/2½	588 7 6	1,255	353	4	..	..	3,183	..
Waihi South Gold-mining Co. (Ltd.)	18/6/96	18,000	7,375	..	120,000	0 2 2	..	6,175	158	12	..	..	7,676	..
Grace Darling Gold-mining Co. (Ltd.)	30/1/94	30,000	5,907	..	59,941	0 17 4	402 8 5	684	204	5	129	171	9,770	..
Aorere Gold-mining Co.	22/8/95	6,000	1,565	..	60,000	6·2d.	..	13,799	70	4	141	343	1,612	..
Buffalo Gold-mining Co.	2/8/95	10,000	1,533	..	80,000	4·6d.	..	142	175	2	203	596	1,610	..
Bay View Gold-mining Co.	7/5/96	4,000	452	..	80,000	1·35d.	..	68,550	73	..	81	214	1,161	..
Flossie Gold-mining Co.	4/11/97	1,925	114	..	57,750	0·44d.	..	38	2	28	78	189	..	
Golden Shore Gold-mining Co.	9/9/97	7,500	1,250	..	75,000	0 0 4	..	..	10	..	3	7	1,358	..
Harbour View Gold-mining Co.	27/6/95	16,000	1,333	..	160,000	0 0 2	..	..	348	10	85	231	1,790	..
Hinemoa-Hauraki Gold-mining Co.	14/1/97	6,000	846	..	80,000	2·53d.	..	71,535	16	..	..	..	863	..
Matawai Gold-mining Co.	12/9/95	6,000	1,476	..	60,000	5·9d.	..	54,600	19	2	1	1	1,462	..

STATEMENT of AFFAIRS of MINING COMPANIES, as published in accordance with the Mining Companies Acts, 1891 and 1894—*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 up per Share.	Arrears of Calls.	Number of Shares forfeited.	Number of Shareholders at present.	Number of Men employed.	Quantity and Value of Gold or Silver produced since Registration.		Total Expenditure since Registration.	Total Amount of Dividends paid.
											Quantity.	Value.		
AUCKLAND DISTRICT—*continued*.														
		£	£	£		£ s. d.	£ s. d.				Oz.	£	£	£
Pukewhau Gold-mining Co.	20/9/95	6,000	1,627	..	60,000	6·5d.	..	30,625	101	2	7	19	1,642	..
Queen of the North Gold-mining Co.	2/12/97	1,733	540	..	60,000	2·1d.	..	43,120	18	7	43	126	661	..
Star of Waihi Gold-mining Co.	16/10/96	6,000	900	..	80,000	2·7d.	..	..	120	..	..	..	777	..
Wynyardton Gold-mining Co.	14/11/95	10,500	2,401	2,100	70,000	10·2d.	..	..	116	..	51	152	2,414	..
Albert Gold-mining Co.	9/7/96	12,000	3,147	..	80,000	0 0 6	..	28,455	125	6	..	..	3,071	..
Waitekauri King Gold-mining Co.	26/2/96	11,545	2,636	..	117,450	0 0 6	..	91,768	55	..	..	10	2,597	..
New Four-in-hand Gold-mining Co. (Ltd.)	30/6/98	20,500	2,602	..	82,000	0 5 0	..	..	10	8	..	..	1,096	..
Portsea Gold-mining Co. (Ltd.)	14/3/94	11,250	776	4,500	45,000	0 2 3½	..	..	118	..	..	..	770	..
Original Great Barrier Gold- and Silver-mining Co.	23/11/96	6,000	1,111	..	71,000	0 0 2¼	1 0 10	37,650	30	2	..	..	2,794	..
Te Puke Gold-mining Co.	8/11/97	1,295	669	30,000	81,800	0 0 3½	63 2 7	4,550	96	2	..	..	615	..
Bunker Hill Gold-mining Co. (Ltd.)	21/6/96	15,000	8,250	6,000	60,000	0 4 9	80 3 3	200	290	12	298	883	10,411	..
Waiotahi Gold-mining Co. (Ltd.)	1/8/71	18,000	15,000	..	6,000	2 10 0	..	..	46	18	60,233	167,961	137,631	35,550
Aotea Gold- and Silver-mining Co.	23/11/96	4,000	922	..	54,233	0 0 2¾	6 17 6	30,027	55	4	..	..	1,381	..
Iona Gold- and Silver-mining Co.	17/10/96	3,000	1,604	..	60,000	0 0 6	31 18 6	7,250	64	..	..	..	1,586	..
Great Barrier Gold- and Silver-mining Co.	3/10/96	3,000	1,310	..	60,000	0 0 4½	..	100	95	10	..	34	1,368	..
Totals		1,017,397	226,874	287,723	4,807,341	..	3,317 3 2	993,011	6,033	327	71,426	196,744	303,149	35,550
NELSON DISTRICT (INCLUDING WEST COAST).														
Julian Gold-mining Co. (Ltd.)	17/6/93	100	100	Nil	48,000	Nil	..	250	66	8	90	361	2,296	..
Mont d'Or Gold-mining and Water-race Co. (Ltd.)	25/7/82	12,000	10,800	..	12,000	0 18 0	..	..	24	23	21,970	84,922	66,978	29,400
Boatman's Exploration Gold-mining Co. (Ltd.)	17/3/97	46,800	642	..	46,800	0 0 4	89 9 1	..	49	6	..	..	601	..
Johnston's United Mining Co. (Ltd.)	27/6/81	18,585	13,239	1,668	20,000	17/8½, 17/2½	..	745	48	3	10,439	37,579	49,734	1,916
Keep-it-Dark Quartz-mining Co. (Ltd.)	2/3/74	20,000	6,208	10,000	20,000	0 16 2½	..	..	52	31	67,337	262,242	178,079	113,417
No. 2 Dark Gold-mining Co. (Ltd.)	26/8/98	5,071	233	..	20,285	0 0 4	..	..	44	7	4	17	335	..
Poneke Gold-mining Co. (Paparoa)	25/11/97	12,000	960	..	24,000	0 0 10	..	..	34	8	..	..	766	..
Maritana Gold-mining Co. (Ltd.)	2/7/98	10,000	42	..	20,000	0 0 0½	..	4,000	14	2	..	..	41	..
Snowy Creek Gold-mining Co. (Ltd.)	29/4/98	3,000	200	..	24,000	0 0 2	..	..	33	6	..	..	296	..
Welcome Gold-mining Co. (Ltd.)	24/7/96	100,000	15,000	85,000	100,000	1 0 0	..	..	149	9	33	131	7,452	..
Big River Gold-mining Co. (Ltd.)	11/4/91	12,000	600	..	24,000	0 0 6	..	..	63	15	20,578	82,509	48,048	40,500
Lord Edward Gold-mining Co. (Ltd.)	13/11/83	12,000	3,650	12,000	24,000	0 13 0½	..	544	47	..	33	134	3,770	..
New Zealand Asbestos Co. (Ltd.)	18/1/98	37,500	3,556	25,000	37,000	£1 on A, 7/ on B	818 12 0	..	211	..	..	..	2,026	..
Barrytown Flat No. 2 Gold-mining Co.	7/6/98	10,250	1,849	2,562	23,912	1/, 2/, 3/, 4/, 5/	713 10 0	..	83	1	..	..	969	..
Roaring Meg Sluicing and Hydraulic Power Co. (Ltd.)	25/10/97	9,725	4,725	5,000	97,250	0 2 0	..	..	30	9	..	..	2,276	..
Pactolus Sluicing Co.	25/4/98	25,000	2,583	13,000	25,000	£1 on A, 4/9 on B	225 0 0	225	50	6	1	5	2,404	..
Dee Creek Gold-sluicing Co.	6/5/97	36,000	4,875	14,100	36,000	£1 on A, 2/6 on B, 4/6 on C	..	..	49	7	52	201	4,822	..
Hercules Quartz-mining Co. (Ltd.)	22/11/89	24,000	9,250	..	24,000	0 7 8½	..	7,562	63	..	3,405	14,329	20,143	3,600
Consolidated Goldfields of New Zealand (Ltd.)	22/2/96	225,000	225,000	..	225,000	1 0 0	..	..	1	46	2,269	9,236	143,688	..
Progress Mines of New Zealand (Ltd.)	8/12/96	250,000	50,000	200,000	250,000	1 0 0	..	..	17	231	13,714	55,872	91,212	..
Humphrey's Hydraulic Sluicing Co. (Ltd.)	1/6/96	145,000	50,000	95,000	145,000	1 0 0	..	..	182	44	701	..	10,470	..
Parapara Hydraulic Sluicing & Mining Co. (Ltd.)	18/6/92	49,800	26,360	19,200	302	£200	..	..	44	19	1,724	6,558	28,294	..

Addison's Long Tunnel Gold-mining Co. (Ltd.)	24/9/98	867	167	..	..	..	6 5 0	..	23	..	120	47	608	..
Venture Gold-mining Co. (Ltd.)	30/4/95	3,750	..	..	..	..	..	..	19	10	1,598	..	5,546	1,156
Shamrock Lead Gold-mining Co.	29/9/92	12,000	6,222	5,430	12,000	1 0 0	3 10 0	725	155	13	2,550	10,072	19,014	..
Waiwhero Sluicing Co.	28/9/97	31,000	9,321	16,000	31,000	£1 on A, 12/6 on B	54 0 0	100	88	38	145	579	9,677	..
Kumara Long Tunnel Gold-mining Co.	16/5/82	8,000	7,433	..	16,000	0 9 3½	..	3,440	21	7	4,865	26,309	25,500	7,344
Kirwan's Reward Gold-mining Co. (Ltd.)	21/3/98	56,000	..	..	56,000	..	..	..	18	..	..	..	..	..
Golden Lead Mining Company (Ltd.)	30/10/90	12,000	10,254	..	24,000	0 8 7	46 9 5	200	34	2	2,170	8,727	17,556	..
Wakamarina Gorge and Deep Creek Gold-mining Co. (Ltd.)	16/7/95	27,950	8,680	10,000	27,950	£1 & 13/	463 16 0	672	205	13	52	198	8,704	..
Alpine Extended Gold-mining Co. (Ltd.)	25/8/97	25,000	..	..	50,000	..	..	..	180	58	3,813	14,792	19,693	..
Wakamarina Golden Bar Gold-mining Co. (Ltd.)	–/9/94	24,000	1,394	1,000	24,000	0 2 1½	109 3 9	11,938	32	..	..	..	1,424	..
Garden Gully Gold-mining Co.	1/10/97	1,800	511	..	48,000	0 0 3	89 3 3	..	43	4	..	..	428	..
Crœsus (Paparoa) Gold-mining Co.	18/5/97	35,937	5,000	23,570	57,500	0 10 0	..	..	146	32	279	1,137	9,253	..
Sunlight Gold-mining Co.	10/7/97	..	732	..	42,000	0 0 4¼	3 15 0	1,500	30	2	..	..	709	..
Total	..	1,302,135	479,586	538,530	1,634,999	..	2,622 13 6	31,901	2,347	660	157,942	616,383	782,812	197,333

OTAGO DISTRICT.

Phœnix Water-race	12/10/67	1,500	1,500	..	1,000	1 10 0	..	..	22	..	..	..	..	6,275
Evans Flat Dredging Co. (Ltd.)	14/8/97	2,525	2,125	400	2,525	1 0 0	..	..	36	7	251	968	3,360	..
Tuapeka Dredging Co. (Ltd.)	31/7/97	2,530	2,230	300	2,530	1 0 0	..	..	29	7	202	778	3,410	..
Empire Gold-dredging Co. (Ltd.)	13/7/97	5,000	2,970	..	5,000	18/ & 1/	..	..	35	7	735	2,830	4,348	960
Upper Waipori Alluvial Gold-dredging Co. (Ltd.)	3/9/89	12,000	5,950	5,000	24,000	0 8 6	..	..	83	9	9,127	35,107	31,303	4,800
Gold Creek Dredging Co. (Ltd.)	3/3/98	2,500	1,915	..	2,500	0 17 0	209 19 0	..	53	6	..	67	2,773	..
Parrawa Gold-mining Co. (Ltd.)	1/7/96	1,500	1,500	..	1,500	1 0 0	..	..	32	..	..	115	2,115	..
Golden Key Gold-mining Co. (Ltd.)	1/9/98	2,000	250	1,750	2,000	1 0 0	..	..	15	11	..	..	205	..
Sailor's Gully (Waitahuna) Gold-mining Co. (Ltd.)	3/6/96	2,000	100	1,800	2,000	0 10 6	..	..	8	5	439	1,700	2,243	..
Matakitaki Gold-dredging Co. (Ltd.)	7/7/92	2,000	2,000	..	2,000	1 0 0	..	81	42	12	2,440	9,432	12,734	..
Golden Terrace Dredging Co. (Ltd.)	14/12/97	5,000	3,750	..	5,000	0 15 0	..	..	66	19	1,344	5,177	4,476	500
Jutland Flat (Waipori) Gold-mining Co. (Ltd.)	2/7/90	15,000	4,000	3,750	15,000	8/ & 15/	..	..	44	11	7,246	28,279	19,290	7,500
Hartley and Riley Beach-dredging Co. (Ltd.)	14/7/97	6,500	6,191	200	6,500	1 0 0	108 17 6	..	95	9	..	..	4,898	..
Sunrise Gold-mining Co.	14/10/97	3,890	1,745	..	7,460	0 4 6	53 8 9	40	61	5	..	..	1,671	..
Clyde Dredging Co. (Ltd.)	17/5/95	3,850	3,850	150	4,000	1 0 0	..	..	55	7	4,005	15,465	7,450	7,300
Matau Dredging Co. (Ltd.)	16/10/97	7,000	6,077	800	7,000	1 0 0	122 10 0	..	115	..	..	..	5,705	..
Mokoraki Gold-mining Co.	9/8/98	1,500	312	550	1,500	£1,7/,6/, and 5/	1 5 0	25	16	6	..	..	436	..
Ourawera Gold-mining Co. (Ltd.)	23/5/95	2,800	2,200	..	2,800	£1 & 10/	..	..	17	11	1,849	7,304	7,938	1,840
Lion Gold-mining Co. (Ltd.)	15/12/97	11,545	5,229	3,500	11,545	13/ & £1	..	..	66	3	..	..	3,405	..
Miller's Flat Electric Dredging Co. (Ltd.)	20/12/98	3,250	..	1,750	5,000	0 5 0	448 15 0	..	50	7	..	..	96	..
Blue Spur and Gabriel's Gully Consolidated Gold-mining Co. (Ltd.)	1/2/88	91,266	37,622	60,000	91,266	1 0 0	..	..	369	45	30,652	119,963	132,139	21,784
Post-office Creek (Waipori) Gold-mining Co. (Ltd.)	10/6/98	2,000	1,712	200	2,000	1 0 0	87 10 0	..	31	11	..	59	1,773	..
Moonlight Sluicing Co. (Ltd.)	14/5/94	2,000	1,363	450	2,000	0 17 6	..	..	26	3	717	2,763	3,421	1,109
Macrae's Flat Gold-dredging Co. (Ltd.)	25/4/98	4,400	3,211	750	4,400	1 0 0	439 7 6	..	44	..	..	..	3,964	..
Arrow Falls Gold-mining Co. (Ltd.)	4/4/98	20,000	500	19,000	20,000	0 19 6	..	..	23	13	6	24	748	..
Shotover Quartz mining Co.	9/3/98	6,000	1,100	1,500	24,000	0 1 10	..	..	31	6	..	..	1,109	..
Golden Beach Hydraulic Elevating and Dredging Co. (Ltd.)	20/8/97	6,000	4,500	7,000	12,996	0 15 0	..	125	114	12	1,445	5,468	2,180	2,236
Roxburgh Amalgamated Mining and Sluicing Co. (Ltd.)	2/3/89	29,152	12,737	15,000	29,152	18/ & £1	..	825	140	22	14,075	54,565	51,049	17,227
Winding Creek Gold-mining Co. (Ltd.)	5/2/98	14,167	8,000	6,167	14,167	1 0 0	..	..	16	12	..	..	10,144	..
Otago Syndicate (Ltd.)	12/8/96	20,000	15,000	..	20,000	0 15 0	..	..	43	..	..	..	10,503	..
Kawarau Dredging Co. (Ltd.)	9/7/97	12,451	4,951	7,500	12,451	1 0 0	..	..	33	7	..	..	5,500	..
Manorburn Gold-dredging Co. (Ltd.)	28/1/96	3,000	3,000	..	3,000	1 0 0	..	..	7	7	1,611	6,262	9,572	75
Achilles Gold-mines (Ltd.)	22/4/98	85,747	31,934	51,448	685,979	0 1 0	2,365 11 0	..	1,547	..	..	..	24,653	..
Success Gold-dredging Co. (Ltd.)	16/7/97	2,400	2,400	..	2,400	1 0 0	..	..	18	7	838	3,224	5,367	240
Balclutha Gold-dredging Co. (Ltd.)	5/5/98	1,000	1,000	150	1,150	1 0 0	..	..	10	6	105	408	1,608	..
Otago Gold-dredging Co. (Ltd.)	20/5/95	4,000	2,000	2,000	4,000	1 0 0	..	..	40	6	3,018	11,816	7,466	4,700

STATEMENT of AFFAIRS of MINING COMPANIES, as published in accordance with the Mining Companies Acts, 1891 and 1894—*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 up per Share.	Arrears of Calls.	Number of Shares forfeited.	Number of Shareholders at present.	Number of Men employed.	Quantity and Value of Gold or Silver produced since Registration.		Total Expenditure since Registration.	Total Amount of Dividends paid
											Quantity.	Value.		
OTAGO DISTRICT—*continued*.														
		£	£	£		£ s. d.	£ s. d.				Oz.	£	£	£
Dunedin Gold-dredging Co. (Ltd.)	1/9/81	8,700	7,540	..	8,700	0 17 4	..	..	92	..	15,965	61,488	46,789	14,835
Waimumu Gold-dredging Co. (Ltd.)	13/11/97	5,000	4,976	1,000	6,000	1 0 0	203 10 0	..	60	..	..	..	5,430	..
Ettrick Gold Steam-dredging Co. (Ltd.)	29/8/90	2,500	1,937	2,000	4,500	0 15 6	..	..	44	6	4,159	16,013	14,940	2,700
Benger Burn Gold dredging Co. (Ltd.)	20/9/97	1,800	1,618	..	1,635	1 0 0	17 16 8	..	20	6	79	306	1,067	..
Golden Treasure Dredging Co. (Ltd.)	19/7/91	1,500	1,384	1,500	3,000	1 0 0	..	124	22	6	5,043	19,416	13,045	7,693
Tarawera Mining Co.	30/3/98	24,000	1,321	12,000	24,000	£1 on A, 2/4 on B	8 6 8	2,300	35	..	..	..	1,090	..
Alpha Gold-mining Co.	1/9/97	24,000	4,950	12,000	24,000	£1 on A, 8/3 on B	31 11 3	..	107	15	32	104	5,021	..
Deep Stream Amalgamated Hydraulic Sluicing Co. (Ltd.)	4/2/97	8,500	8,500	3,500	12,000	1 0 0	..	..	56	17	1,169	4,447	10,978	1,150
Golden Run Dredging Co. (Ltd.)	29/6/91	7,000	7,798	2,000	9,000	1 0 0	..	1,085	70	15	5,401	20,794	21,552	5,194
Golden Gate Dredging Co. (Ltd.)	13/3/95	2,500	2,500	..	2,500	1 0 0	..	..	40	6	2,851	10,988	10,057	3,000
Golden Site Extended Gold-mining Co. (Ltd.)	11/2/97	57,828	5,312	43,750	57,828	17/6 on A, 13/9 on B	62 0 3	100	157	32	138	520	6,387	..
Morning Star Gold-mining Co.	26/1/95	24,000	3,008	12,000	24,000	0 5 6	291 18 2	487	104	64	11,302	45,788	38,529	11,463
Waiau Beach Hydraulic Elevating Co.	11/2/97	4,500	1,227	1,500	9,000	0 4 4	40 13 6	150	23	3	6	24	1,423	..
Golden Mascotte Sluicing Co.	5/11/98	4,500	744	1,500	4,500	0 5 0	381 5 0	..	66	..	..	..	102	..
Kyeburn Gold-dredging Co. (Ltd.)	29/9/97	4,000	3,467	500	4,000	1 0 0	32 10 0	..	73	7	362	1,395	5,040	..
New Sandhills Gold-dredging Co.	22/4/96	1,250	812	..	2,500	0 6 6	..	..	3	9	864	3,327	3,669	125
Island Block Gold-mining Co. (Ltd.)	23/11/88	57,117	31,754	25,316	57,117	1 0 0	47 5 0	..	202	15	..	44,703	37,270	..
Inch Valley Gold-dredging Co. (Ltd.)	15/9/98	2,600	1,624	1,800	4,400	0 12 6	56 17 6	..	39	..	..	..	1,859	..
Chatto Creek Dredging Co. (Ltd.)	12/8/97	4,150	3,640	600	4,750	£1,10/,7/6	106 12 6	..	74	8	..	..	4,236	..
Bakery Flat Sluicing Co. (Ltd.)	10/9/96	2,500	1,667	300	3,000	0 16 6	67 0 0	..	27	10	497	1,885	3,295	..
Golden Point Dredging Co. (Ltd.)	31/8/97	5,400	5,217	600	6,000	1 0 0	182 10 0	..	80	8	..	..	5,800	..
Skipper's Sluicing Co. (Ltd.)	30/7/97	3,000	2,373	..	3,000	0 16 0	27 4 0	..	21	9	..	..	3,010	..
Glenrock Consolidated (Ltd.)	1/7/95	..	..	..	450,007	0 10 0	6,000 0 0	3,105	1,600	40	Cyanide, 254 Mill, 6,229	780 25,005	25,808	..
Turakina Gold-dredging Co. (Ltd.)	27/5/97	4,000	2,990	1,000	4,000	1 0 0	10 0 0	..	8	7	478	1,880	5,208	200
Barewood Quartz-mining Co. (Ltd.)	18/9/95	420	420	2,400	84	5 0 0	..	..	24	1	989	3,566	4,283	451
Enterprise Gold-dredging Co.	24/8/91	2,000	2,000	..	2,000	1 0 0	..	..	20	7	4,060	15,633	13,993	3,121
Sunlight Gold-dredging Co. (Ltd.)	14/10/98	3,000	896	700	3,000	0 8 0	24 0 0	..	47	6	43	165	2,251	..
Upper Waikaia Sluicing Co. (Ltd.)	4/12/97	3,000	1,500	1,500	3,000	1 0 0	..	..	17	6	18	68	2,319	..
Naseby Dredging and Hydraulic Sluicing Co. (Ltd.)	16/10/97	5,000	1,942	2,000	5,000	0 13 3	45 18 9	..	18	10	553	2,128	4,221	..
Molyneux Hydraulic Elevating and Gold-mining Co. (Ltd.)	19/12/90	8,490	8,487	1,200	9,690	1 0 0	2 10 0	..	79	8	..	9,050	17,570	1,769
New Zealand Gold-dredging Co. (Ltd.)	22/2/98	2,875	1,467	1,400	2,875	1 0 0	8 9 6	..	19	7	26	100	2,254	..
Enterprise Water-race Co.	7/2/67	4,800	4,800	..	16	300 0 0	..	..	7	3	6,670	25,299	25,862	13,481
Mount Ida Gold-dredging Co.	20/11/97	4,000	3,279	500	4,000	1 0 0	220 17 6	..	65	7	..	292	3,901	..
Pleasant Valley Gold-mining Co.	4/3/95	700	560	300	1,000	0 16 0	..	..	31	6	1,270	4,849	..	1,400
Magnetic Gold-dredging Co.	12/7/97	5,000	5,000	2,000	7,000	1 0 0	..	..	80	8	..	..	7,556	..
Ophir Gold-dredging Co.	11/11/97	4,500	3,966	500	4,500	1 0 0	33 15 0	..	20	9	127	489	5,070	..
Nokomai Hydraulic Sluicing Co.	26/3/98	19,500	2,500	17,000	1,950	10 0 0	730 0 0	..	17	44	615	2,376	3,340	738
Westralia and New Zealand Gold Explorers (Ltd.)	4/2/96	6,383	1,596	..	63,839	0 3 0	29 5 0	..	34	22	1,261 Cyanide, 206	5,113 547	12,380	..
Totals		727,486	329,696	343,481	1,876,212	..	12,499 0 0	8,447	6,933	726	150,772	640,312	765,657	143,857
Grand Totals		3,047,018	1,036,156	1,169,734	8,318,552	..	18,438 16 8	1,033,359	15,313	1,713	380,140	1,453,439	1,851,618	376,690

STATEMENT of AFFAIRS of MINING COMPANIES, as defined by Section 2 of "The Mining Companies Acts Amendment Act, 1897," and published in accordance with "The Mining Companies Acts Amendment Act, 1897."

Name of Company.	Date of Registration of Office in Colony.	Subscribed Capital.	Amount of Capital actually paid up in Colony.	Value of Scrip given to Shareholders on which no Cash paid.	Number of Shares on Colonial Register.	Amount paid up per share: Colonial Register.	Arrears of Calls: Colonial Register.	Number of Shares forfeited: Colonial Register.	Number of Shareholders on Colonial Register.	Number of Men employed in Colony.	Quantity and Value of Gold or Silver produced since Registration.		Total Expenditure since Registration.	Total Amount of Dividends paid in Colony.
											Quantity.	Value.		
AUCKLAND DISTRICT.														
		£		£		£ s. d.	£ s. d.				Oz.	£	£	£
Waitekauri Gold-mining Co. (Ltd.)	6/5/95	143,000	2,650	30,000	11,151	1 0 0	1 0 0	..	69	300	..	112,913	194,073	1,367
Kathleen Gold-mine (Ltd.)	26/9/95	74,784	..	21,625	..	..	..	..	..	20	..	..	24,212	..
Hauraki Peninsula Exploration Co. (Ltd.)	8/11/97	..	..	..	..	..	..	..	..	54	..	..	6,146	..
Success Gold-mines (Ltd.)	9/10/95	49,753	..	29,500	..	..	..	..	..	16	621	1,780	17,995	..
Royal Oak of Hauraki (Ltd.)	28/3/95	249,757	..	50,000	5,841	0 5 0	..	..	4	120	12,994	32,747	42,677	..
New Hauraki Gold Properties (Ltd.)	26/7/95	78,112	..	30,000	..	..	..	..	..	20	..	..	13,590	..
Scotty's Gold-mine (Ltd.)	30/8/97	75,043	..	..	5,693	0 4 6	..	..	1	34	..	..	4,197	..
Monowai Gold-mines (Ltd.)	12/10/96	25,000	..	75,000	73,870	1 0 0	..	..	136	40	44	83	..	..
Kuranui-Caledonian Gold-mining Co. (Ltd.)	13/8/96	150,000	..	109,615	63,000	1 0 0	..	..	173	41	..	6,304	17,242	..
New Zealand Jubilee Gold-mine (Ltd.)	14/5/97	100,000	..	75,000	..	..	..	..	..	40	..	..	15,497	..
Ohinemuri Syndicate (Ltd.)	4/3/96	45,918	2,252	20,000	20,253	1 0 0	1 10 0	..	315	20	..	..	16,390	..
Union-Waihi Gold-mining Co. (Ltd.)	20/11/95	141,250	436	100,000	605	0 15 0	78 10 0	..	32	35	..	..	37,058	..
New Zealand Crown Mines Co. (Ltd.)	27/6/96	200,000	..	100,000	21,983	1 0 0	..	..	103	310	Gold, 24,375 Silver, 22,901	106,438	154,781	652
Waihi Consolidated Gold-mines (Ltd.)	30/4/96	175,000	..	140,000	43,756	..	..	..	53	1	..	..	18,713	..
Golden Pah (Hauraki) (Ltd.)	7/8/96	58,825	..	22,500	..	..	..	..	..	31	178	542	15,004	..
Woodstock Gold-mining Co. (Ltd.)	30/7/95	150,000	40,625	112,500	28,985	1 0 0	..	..	99	160	..	44,120	85,567	..
Waihi Grand Junction Gold-mining Co. (Ltd.)	19/4/98	150,000	2,571	..	8,538	0 18 0	17 10 0	..	15	60	..	..	15,928	..
Tui Gold-mines (Ltd.)	22/9/96	75,625	..	20,000	20,000	1 0 0	..	..	10	1	..	..	4,527	..
Hauraki (New Zealand) Associated Gold-mines (Ltd.)	20/7/97	86,202	5,398	..	163,050	0 4 0	632 15 2	..	221	50	2,163	6,138	12,634	..
Kathleen Crown Company (Ltd.)	27/2/96	75,000	..	..	..	..	..	..	..	24	18	53	17,339	..
Blagrove's Freehold Gold-mining Co. (Ltd.)	—/5/95	62,500	..	12,500	..	..	..	..	..	34	43	130	25,992	..
Karaka (Ltd.)	—/5/97	129,807	..	..	3,000	1 0 0	..	..	4	9	..	24	4,119	..
Mahara Royal (Ltd.)	—/3/97	138,750	..	..	48,890	1 0 0	..	..	163	36	..	6,323	15,728	..
Total	..	2,434,326	53,932	948,240	518,609	..	731 5 2	..	1,398	1,456	43,337	317,595	659,409	2,019
NELSON DISTRICT (INCLUDING WEST COAST).														
New Inkerman Mines (Ltd.)	—/7/98	..	..	..	..	..	..	..	..	35	..	..	5,172	..
New Zealand Consolidated (Ltd.)	29/5/96	50,000	..	..	..	..	..	..	..	3	..	..	1,869	..
Total	..	50,000	..	..	..	..	..	..	..	38	..	..	7,041	..

PETROLEUM.

Boring operations carried on at Frankley Road, about four miles from Moturoa, were discontinued in the beginning of the year.

The following extract from a report by Mr. Alexander McKay, Government Geologist, gives an exhaustive account of boring for petroleum in the Taranaki District:—

"The Government Geologist visited New Plymouth on the 23rd August to collect evidence bearing on the past history and the present prospects of boring for petroleum in the Taranaki District. Little or no information could be obtained respecting the discovery and the earliest efforts to obtain oil, beyond what was obtained in the report by Sir James Hector in 1866–67.* At a later date boring was carried on to greater depths, and one of two bores put down near the landward end of the breakwater attained a depth of 900 ft. From these bores oil was obtained, but apparently not in sufficient quantity to warrant the further prosecution of work at that place. Mr. McKay could not learn the nature of the strata at 900 ft. from the surface, or whether the oil obtained from that depth originated from that or a higher level. Subsequently the New Zealand Petroleum Company determined upon a site about half a mile more to the eastward, and here two boreholes were put down to a depth of 2,000 ft., and as these proceeded approximately correct records of the strata passed through were kept.† In No. 3 bore the superficial sands and underlying volcanic agglomerate proved to be 275 ft. thick, below which sandy papa was entered upon, and continued to a depth of 810 ft., when a bed of rather coarse quartz-sandstone was encountered. This passed, fine quartz-sand, containing oil, was met with at 915 ft. The supply was not an abundant one, and the bore was continued to greater depths, care being taken to exclude the water and oil of the higher levels from the lower part of the well as the bore was proceeded with. Between 1,900 ft. and 1,996 ft. oil and gas were again struck, and in such quantity as seemed to afford hopes of the ultimate success of the undertaking; but to obtain the oil pumping had to be resorted to, and then it was found that the supply was intermittent. This failure of continuity of the yield of oil, it is supposed, arose from one or other of two causes—(1) Material sucked into and around the foot of the pipe, and thereby preventing the access of oil to the well; or (2) the drawing-away of the loose sands of the porous oil stratum, and the coming-together of the impervious strata above and below the oil-bearing bed. Owing to the destruction of the derrick by fire, the well has since then been closed down, except occasionally, when the accumulated gases and some oil are allowed to escape, the oil being collected in tanks prepared for that purpose. A fourth bore was afterwards put down four to five chains south of No. 3, where the derrick was destroyed, and passed practically through the same strata at the same depth, the difference of surface-levels considered. At the 915 ft. horizon of No. 3 bore, traces of oil were obtained, but the quantity was considerably less than in No. 3 bore. At the greater depth of between 1,900 ft. and 2,000 ft. no oil was obtained, and No. 4 bore was for the time being abandoned, and a site was chosen some distance further to the eastward, where a bore put down 300 ft. failed, owing to the incoherent nature of the volcanic agglomerate passed through at that depth. The last effort of the company—the present bore, No. 6—is situated on a flat terrace a short distance west of No. 5 bore. This has been successful so far as the piercing of the volcanic agglomerate to the depth reached—about 140 ft.—but in this locality it has yet to be ascertained whether the thickness to be bored before reaching the papa-rock will be much greater than at Moturoa.

"About five miles east of, and nearly in a line between, the breakwater and the Township of Inglewood, numerous gas springs escape from a stratified formation composed of fine and coarse alternate layers of volcanic material, which appears to have been stratified under water. Other gas springs exist in the district—as, for instance, at and near the Township of Inglewood—but they were not visited.

"In No. 3 bore, and in all subsequent bores, due precautions were taken at proper intervals to prevent leakage of oil or water to the lower depths of the wells, and thus in No. 3 bore, whilst the oil is slowly escaping from the oil stratum at 900 ft., this does so outside the sheathing, while in the inner pipe, inside the sheathing, the accumulated gas and oil are under considerable pressure. Ample evidence of the great pressure under which the gas and oil from the deeper part of the well accumulates, and its non-connection with that at 900 ft., was afforded by slightly opening the valve and allowing a portion of the gas and oil to escape.

"As regards the prospect of successful boring for oil in the vicinity of New Plymouth, this is not of the most hopeful kind; and yet it is perfectly manifest that there exists a source of oil apart from what may be derived from the lignite deposits of younger Tertiary or Post-tertiary age. The facts in connection with the sinking of No. 3 bore show that the oil obtained from it is not derived from a superficial source, or from a deposit comparatively near the surface. No oil was found in the upper sands, or volcanic agglomerate, and more than 600 ft. of papa-rock had been pierced before the first indications of oil were met with. Below this first oil-bearing stratum, at 915 ft. from the surface, no oil-bearing beds were met with till a depth of 1,900 ft. was reached, and a much stronger flow of oil was obtained from that depth than from 900 ft.

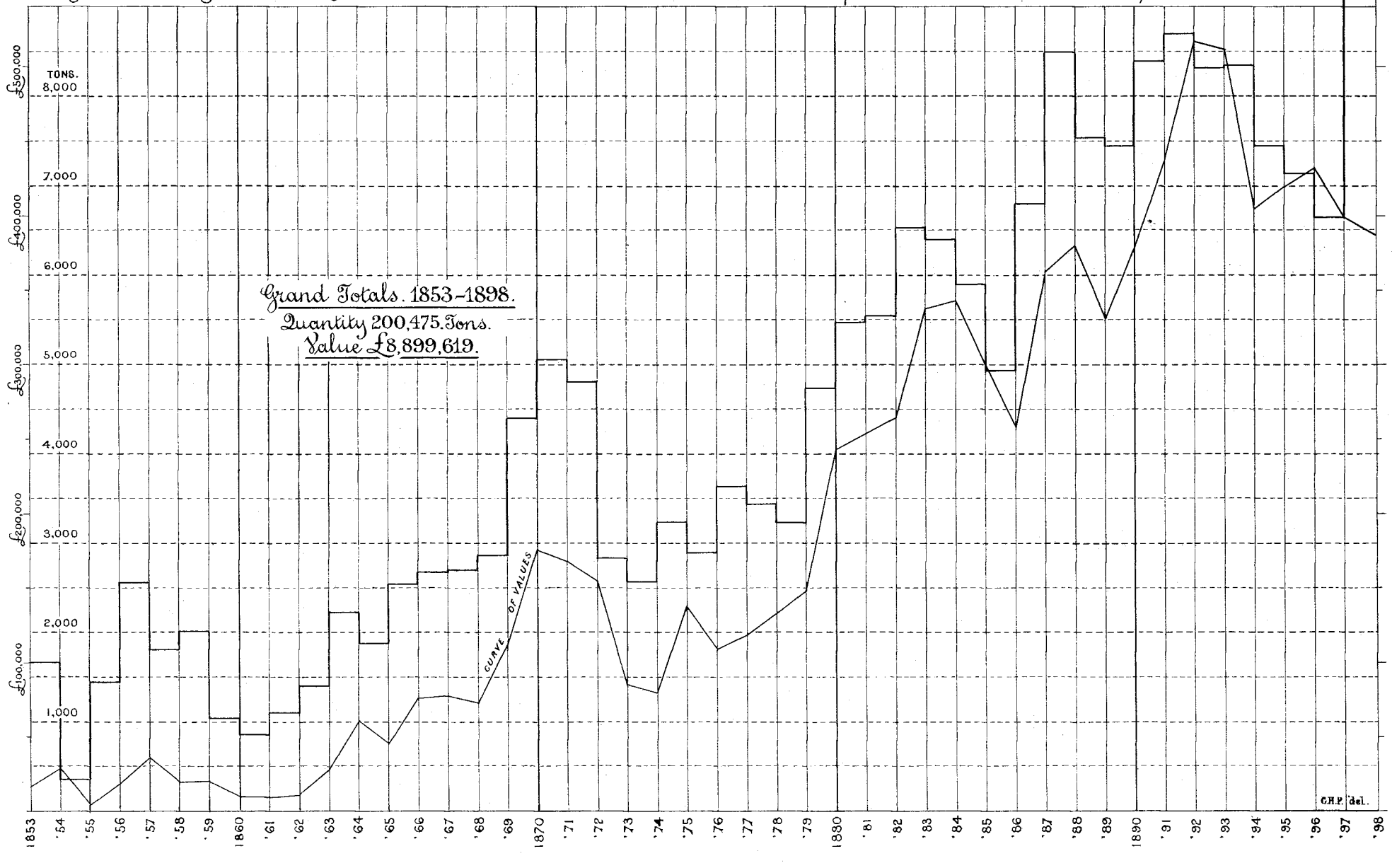
"The primary source of the oil lies at a greater depth than has been yet reached, or at a distance from any of the wells yet bored. At 900 ft. and 1,900 ft. the oil exists merely stored in the strata, since to a depth of 2,000 ft. there are no beds that, in the first instance, could have given off the oil, and it does appear that a further 1,000 ft. might be bored without reaching carbonaceous beds likely to or capable of affording the oil stored at higher levels.

"But it is hardly a question of reaching the carbonaceous strata from which the oil has been derived; much more is it to determine an abundant supply in the storage-levels at 1,900 ft. and 900 ft., or at other lesser or intermediate depths. The supply has not proved overabundant, and the

* Abstract Report of the Progress of the Geological Survey of New Zealand during 1866–67.
† Geological Explorations. C.–9, 1898.

(9,905 tons).

Diagram showing TOTAL QUANTITY & VALUE of KAURI GUM exported from N.Z. for the years 1853 to 1898.



temporary abandonment of the different localities and particular bores are certainlydiscouraging facts. Meantime the New Plymouth Petroleum Company have located, and are proceeding with, their No. 6 bore, at a moderate distance from their former bores, Nos. 3 and 4, and it is to be hoped they will be able in this to reach the stratum equal to 915 ft. in No. 3 bore—at which depth, should oil not be struck, it might be matter for consideration whether boring should be continued."

SULPHUR.

Mr. John Chambers, of Auckland, has furnished the following return of quantity and value of sulphur shipped from Auckland during the year ending 31st March, 1899. This refers to the ore as dug, and which averages 75 per cent. of sulphur. Most of this came from Tikitere, near Rotorua. A much larger export business could be done if a more secure tenure to the land could be obtained, so that a refinery plant might be put down with safety. If a lease could be granted, Mr. Chambers thinks a large export business might be worked up.

RETURN showing EXPORT of SULPHUR from PORT of AUCKLAND from 10th April, 1898, to 31st March, 1899.

Export Entry.	Date.	Ship.	Quantity.	Value.	Destination.
			Tons cwt.	£	
483	10/4/98	Empreza ...	308 0	692	Sydney.
1,088	17/6/98	St. Kilda ...	261 5	588	"
323	11/7/98	Empreza ...	320 0	799	"
473	21/6/98	Mararoa ...	10 0	20	Melbourne.
199	11/10/98	Waihora ...	3 0	1	Sydney.
536	14/11/98	Westralia ...	1 7	3	"
904	20/12/98	Jasper ...	434 0	1,085	"
70	5/1/99	Volador ...	293 0	733	"
252	25/1/99	Cloud ...	413 0	1,446	"
			2,043 12	£5,367	

HÆMATITE.

The hæmatite-works at Parapara are still being carried on successfully by Messrs. Washbourne Brothers, the output for the year being over 100 tons, and they believe, as the preserving qualities of the hæmatite become better appreciated, that the sale will be further increased.

The cost of producing this paint could be lessened by the introduction of more improved machinery, which would tend to more fully establish the industry.

The plant of the New Zealand Paint-manufacturing Company, of Thames, comprises four stamps, two Wheeler pans, two large stones for reducing the ore and two large paint-grinders, two brick furnaces, one reverberatory furnace, twenty-four small vats and other appliances for mixing the paint and varnish. During the year 106 tons of hæmatite ore and shales obtained in the Thames district were reduced and made into paint of various shades of colour. The cost of breaking and delivering this number of tons was £171. One man and three youths are employed in the factory making and mixing up the paint ready for the market.

SCHEELITE.

Messrs. Donaldson Brothers, in working a quartz reef in their claim at Macrae's, find considerable quantities of scheelite irregularly dispersed through the quartz. The scheelite is recovered by the operation of concentrating the tailings after the gold has been extracted. One Frue vanner is used, and during the year 40 tons were secured, which Mr. Donaldson says assayed 67 per cent. tungstic acid, and was worth £65 per ton.

There is no record of any other party having obtained scheelite in paying quantities.

MANGANESE.

Very little work has been done during the year in the way of manganese-mining, the counter-attraction of the goldfields having caused this kind of work to be neglected.

OPAL-MINING.

Although the land on which opals were found in the Tairua district of the Thames County is still held with a view of recovering those stones from the rhyolitic matrix in which they were first discovered, no report of the success or otherwise of the search has been made.

CINNABAR.

Some work has been carried on at Mangakirikiri, in the Kauaeranga district at Thames, but so far the treatment of any ore has not been reported. This land was first taken up by Lowrie Brothers (after the discovery of cinnabar by them in this part of the district), who did some prospecting about the surface, but for want of funds had the ground protected, and in consequence little work was done on the claim. Latterly Mr. R. R. Hunt has taken an option over the property, and has had two men employed putting in surface-drives at different places to intersect the lode. The No. 1 or upper drive is in a distance of 30 ft., and the lode cut through is about 3 ft. in width, from which some excellent cinnabar stone has been obtained. The country on the hanging-wall side of the lode is of a good solid nature, but the lode is not well defined at this level. The No. 2 drive is being driven into the spur about 100 ft. to the north of No. 1 drive, and 30 ft. lower down the hill. This drive is in 45 ft., and it is expected the lode may be met with in a few feet. The No. 3 drive is in 42 ft. on the western side of the spur, about 250 ft. from No. 2 drive, but at a deeper level.

COPPER DEPOSITS AT OMAUNU.

Some desultory work has been carried on in further prospecting the land, and I understand a company has been formed to provide capital for carrying on more extensive work in connection with this ore-deposit.

TRIBUTING.

In some of the mines on the northern goldfields where portions of the ground are let on tribute the percentage paid by tributers varies from 10 per cent. to 15 per cent., and in the Hauraki South mine at Coromandel, and Kuranui-Caledonian mine at the Thames, there is a running percentage varying from 2½ per cent. upwards.

In the Moanataiari Company's mine the surface-blocks are let at 10 per cent., and in the lower workings the ground is let at 15 per cent. for a term of twelve months. The May Queen Hauraki, Victoria, and other mines are let on similar terms to those let in the Moanataiari Company's mine. The Hauraki South Company let their ground for six months, giving the tributers the right of renewal for a similar period. No tribute is charged until the tributer has earned £1 10s. per week, but when the earnings exceed that amount, and up to £3, 2½ per cent. is the rule, and additional percentage is charged in proportion to the tributers' earnings over £3 per week till 20 per cent. is reached.

The Kuranui-Caledonian Company let their ground for a term of six months, and no percentage is charged until the tributer receives £3 per week, then it rises in proportion on the earnings obtained by the tributer above £3 per week until it reaches 50 per cent.

Sliding scale of tributes in the Kuranui-Caledonian Gold-mining Company's mine:—When the earnings of the tributer does not exceed £2 per week no percentage is paid; when the earnings are from £3 per week, 5 per cent.; £4, 10 per cent.; £5, 15 per cent; £6, 20 per cent.; £7, 25 per cent.; £8, 29·7 per cent.; £9, 33·3 per cent.; £10, 36·5 per cent.; £11, 38·6 per cent.; £12, 40·83 per cent.; £13, 43·7 per cent.; £14, 44·1 per cent.; £15, 45·25 per cent.; £16, 46·58 per cent.; £17, 47·6 per cent.; £18, 48·33 per cent.; £19, 49·3 per cent.; £20, 50 per cent.

"THE MINING ACT, 1898."

This Act, which came into operation on the 1st February, 1899, appears to have met with general approval. The regulations made with respect to special provisions as to dredges and statistics are of a very useful nature, and meet many long-desired requirements. The dredging regulations also afford ample power to Inspectors of Mines to see that due care for the preservation of life is exercised by owners of dredges. The regulations for rendering statistics enable records of the actual results arising from mining operations to be compiled by the department. Although the regulations originally issued may not have satisfied every individual of the mining community, any alterations or amendments that experience in their working may indicate as necessary or desirable can be readily effected under the ample powers conferred by the statute.

THE CYANIDE PROCESS.

The following list of licenses issued under "The Cyanide Process Gold-extraction Act, 1897," shows an increase in their number. The royalty collected up to 31st March, 1898, amounted to £676 17s. 1d., and for the present year £1,098 1s. 6d.; total, £1,774 18s. 7d.

As the number of plants that will use the process is on the increase, the amount of royalty will be augmented, and the full amount of £10,000 paid to the Cassel Gold-extracting Company for their patent rights to the process will in a few years be refunded to the Government. The conflicting judgments that continue to be given about those patent rights have already led to much vexatious litigation, incurring great cost in sending cases to the Appeal Courts. The New Zealand Government, therefore, are fortunate in having purchased the rights for such a reasonable figure, and thus being freed from law costs and expenses; and by the charge of an equitable royalty relieving the users of the process from harassing conditions. In a few years the process will be free from royalty to all who desire to take advantage of it within the colony.

LICENSES ISSUED.

District.	Name of Company or Licensee, 1897-98.	Name of Company or Licensee, 1898-99.
North Island—		
Coromandel	Kapai-Vermont Mine (new owners) ..	Kapai-Vermont Mine (new owners).
	Mariposa Gold-mining Company ..	Mariposa Gold-mining Company.
	Irene Gold-mining Company, Limited, Hauraki.	Irene Gold-mining Company, Limited, Hauraki.
	Great Mercury Mine (new owners) ..	Great Mercury Mine (new owners).
Thames	Moanataiari Gold-mining Company, Limited	Moanataiari Gold-mining Company.
	Tararu Creek Gold-mining Company ..	Tararu Creek Gold-mining Company.
		Monowai Gold-mine, Limited.
Ohinemuri	Waihi Silverton Extended Gold-mining Company	Waihi-Silverton Extended Gold-mining Company.
	New Zealand Talisman Gold-mining Company	New Zealand Talisman Gold-mining Company.
	Woodstock Gold-mining Company ..	Woodstock Gold-mining Company.
	Komata Reefs Gold-mining Company ..	Komata Reefs Gold-mining Company.
		Jubilee.
		Grace Darling.
		Waitekauri Extended.
South Island—		
West Coast District ..	E. C. Kingswell	E. C. Kingswell.
Reefton	Big River Gold-mining Company ..	Big River Gold-mining Company.
		Keep-it-Dark.
Lyell	..	E. C. Kingswell.
Otago District ..	Glenrock Consolidated..	Glenrock Consolidated.

The Kauri Gold Estates' new mill at Opitonui, the Whangamata Proprietary's new mill at Waitekauri, and the Hikutaia Syndicate and Maratoto mills at Maratoto, will soon be in operation, and, as the cyanide process is to be used, licenses for those will shortly be issued.

SUNDAY LABOUR IN MINES.

SCHEDULE OF PERMITS ISSUED BY INSPECTORS OF MINES and in force on the 30th June, 1899.

Date of issue.	Mine.	Number of Men.	Date of Expiry.
	Northern Mining District.		
9/1/99	Waihi	20	Till notified.
9/1/99	Hauraki South	6	"
9/1/99	Fortuna (Hauraki)	2	"
9/1/99	Grand Junction	6	"
9/1/99	Komata Reefs	6	"
9/1/99	New Zealand Talisman	8	"
9/1/99	New Zealand Crown	14	"
11/1/99	Waihi-Silverton	7	"
11/1/99	Big Pump	4	"
11/1/99	Waitekauri Gold-mining Company	21	"
18/1/99	Royal Oak of Hauraki	9	"
18/1/99	Scotty's Gold-mine	6	"
18/1/99	Kapanga	9	"
18/1/99	Kathleen	9	"
18/1/99	Golden Pah Hauraki (Limited)	9	"
18/1/99	Hauraki Gold-mining Company	12	"
18/1/99	Union Waihi Gold-mining Company	5	"
18/1/99	Kauri Freehold Gold Estates	14	"
18/1/99	Woodstock Gold-mining Company	7	"
18/1/99	Kathleen Crown Gold-mining Company ...	3	"
23/1/99	Kuranui Gold-mining Company	2	"
23/1/99	Waihi Gold-mining Company	10	"
23/1/99	Waitekauri Extended	4	"
23/1/99	Whangamata Proprietary (Limited)	6	"
23/1/99	Thames-Hauraki (Limited)	10	"
28/1/99	Ralph's Taupiri Coal-mine	4	"
31/1/99	Ohinemuri Syndicate Mine	5	"
31/1/99	Welcome Find Mine	2	"
10/2/99	Great Mercury Cyanide	1	"
17/2/99	Mariposa Gold-mining Company	4	"
8/6/99	Hikutaia Gold Syndicate	3	"
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SCHEDULE OF PERMITS ISSUED BY INSPECTORS OF MINES—*continued.*

Date of Issue.	Mine.	Number of Men.	Date of Expiry.
	West Coast Mining District.		
13/1/99	Crœsus (Paparoa)	4	30/6/99
21/3/99	Progress	12	30/9/99
14/4/99	Progress Mines (canvas plant)	2	30/9/99
		18	
	Southern Mining District.		
30/12/97	Kaitangata Railway and Coal Company... ...	6	Till notified.
4/1/98	Shag Point Colliery	4	"
8/1/98	Fernhill Coal-mine	2	"
25/1/98	Moonlight Sluicing Company	1	"
24/1/98	Barewood Quartz-mining Company	3	"
3/2/98	Morning Star Mine (Preservation Inlet) ...	5	"
8/2/98	Allendale Coal-mine	1	"
16/2/98	Round Hill Mining Company	15	"
2/3/98	Golden Site Extended Gold-mining Company ...	4	"
2/3/98	Achilles Goldfields (Limited)	2	"
1/4/98	Kildare Hill, St. Bathan's (J. Ewing)	3	"
1/4/98	Vinegar Hill " "	1	"
1/4/98	Shepherd's Flat " "	2	"
1/4/98	Cambrian's " "	2	"
1/4/98	Matakanui	1	"
1/4/98	Bald Hill Flat	1	"
1/4/98	Hercules (Roxburgh)	3	"
13/4/98	Freeman's Coal Company	2	"
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PROVISIONAL WARRANTS.

Those warrants issued under the Amendment Act, 1896, having expired on the 31st December, 1898, the Board of Examiners, in accordance with the provisions of the Act, issued forty-four first-class and eighteen second-class mine-managers' certificates of competency to those whose service in the management of mines by virtue of a warrant has been satisfactory.

TESTING PLANTS FOR QUARTZ-PROSPECTORS.

Specifications have been prepared and steps taken for the erection of a battery at Mahakirau, consisting of three heads of stamps and berdan driven by steam-power, the plant to be managed and worked in compliance with the following regulations :—

REGULATIONS FOR THE ERECTION AND WORKING OF SMALL TESTING PLANTS FOR THE USE OF PROSPECTING ASSOCIATIONS.

1. When the plant has been erected by the Mines Department it will be handed over to a responsible prospecting association, to be approved by the Minister of Mines, to be held in trust for the Government.

2. The person to be appointed by the prospecting association to take charge of the plant must be approved by the Inspector of Mines of the district.

3. The charges for crushing will be fixed by the Minister of Mines, after consultation with the prospecting association, at such rates as will merely cover the wages of the man in charge and provide for working-expenses and keeping the plant in repair.

4. Should the amounts received for crushing at any time not be sufficient to keep the plant in repair and pay the wages of the man employed, any deficiency must be paid by the prospecting association.

5. The cost of obtaining quicksilver, and anything of a kindred nature required for the treatment of the ores, must be borne by the association; but a reasonable percentage of loss will be considered a fair charge on working-expenses.

6. No "cleaning-up" will be allowed to take place except in the presence of representatives of the persons or companies for whom crushing is done unless they first give their written consent to the contrary.

7. Payment for crushing must be made before the gold and silver obtained is handed over, otherwise the cost will be deducted from such gold and silver.

8. The man in charge will be required to furnish a weekly report to the Inspector of Mines of the district, showing—

(*a.*) Number of hours the battery has been employed.
(*b.*) Total number of tons of ore crushed.
(*c.*) Names of persons for whom ore has been crushed, and the number of tons for each person.
(*d.*) Names of claims or licensed holdings for which crushing has been done.
(*e.*) Breakage or damage (if any) done to plant.
(*f.*) Estimated cost of repairing the same.

9. The man in charge will also be required to furnish a monthly or quarterly return of receipts and expenditure in connection with the plant.

10. The Inspector of Mines must report quarterly on the condition of the plant.

11. Arrangements must be made between the association and the Inspector of Mines whereby the battery cannot be monopolized for too long a period by any one party of prospectors.

12. Should any dispute arise under these regulations it shall be decided by the Inspector of Mines for the district.

WATER-CONSERVATION.

Since the last annual report the Engineer, Mr. T. Perham, A.M.Inst. C.E., has examined and reported on the following:—

Gimmerburn Irrigation and Garibaldi Sluicing Claims.—With a view to deciding if water could be conserved in the vicinity to supply the gold-workings and be available to irrigate the farms in that locality on the Maniototo Plains. The elevation of the proposed reservoir was found to be 1,950 ft. above the plain, the drainage area limited, and water insufficient, besides involving an expensive race in rock-cutting out of the gorge, and too high for general purposes of irrigation, and much too low for pressure on the goldfield for sluicing. There were two sites proposed, but neither was considered suitable, and could not be recommended.

For Irrigation Only.—Two very favourable sites are again also recommended at Wedderburn, 200 ft. above that locality, suitable on account of elevation for irrigation purposes only.

For irrigating the south end of the plain, it is suggested that examination should be made of the Upper Taieri, but as yet nothing has been done in that direction.

On Mr. Perham's last visit of inspection to the Eweburn Dam construction-works an opportunity was taken to re-examine an excellent proposed reservoir-site in the North Ida Valley, just beyond the Ida Valley Railway-station of the Otago Central Railway. It will be necessary to deviate the railway-line about 3 chains to the westward, and raise it 60 ft. for about two miles and a quarter to clear the water-line, and negotiations are now proceeding with the Public Works Department on the subject. The site is a valuable one, and would irrigate from 10,000 to 12,000 acres, as far as the Poolburn Gorge. At present the line is laid out right across the bed of the proposed reservoir, and it is considered advisable to make the deviation now the railway-works are in progress.

A final examination has been made of the waterworks constructed by the Ohinemuri County Council at Karangahake, Waitekauri, and Waihi for domestic purposes, and recommendation made that if certain additions and modifications are carried out by the Council subsidies may be granted in the two former cases only.

In January last a heavy flood came down Donelly's Creek, Ross, and threatened the road-bridge dangerously. After an examination, plans and estimate were made, and a pound-for-pound subsidy has been granted the Borough Council to construct the necessary protective works recommended.

THE MINING BUREAU.

The monthly publication of the *New Zealand Mines Record* has been regularly continued by the Secretary of the Mining Bureau since August, 1897. The *Record* is circulated not only in New Zealand and the Australian Colonies, but in England, France, Germany, Canada, the United States, Transvaal Republic, Zululand, and Abyssinia.

The reports of the Government Geologist which appear in its pages are generally printed separately and circulated through the Agent-General; while papers, such as "Explosives in Coal-mines Orders," issued by the Secretary of State for the Home Department in England, and "Mine-timbering and Accidents in Mines," by Mr. A. H. Stokes, H.M. Inspector of Mines, have been printed in a handy form and circulated through the Inspectors in this colony. Most of the principal business transacted by the department which is deemed of public interest is chronicled month by month, and the decisions of the Wardens on important mining matters are printed. Papers read before the various mining institutes and chemical and metallurgical societies in New Zealand, the Australian Colonies, America, Great Britain, and the Transvaal, setting forth the latest developments for more efficient and economical working of gold- and coal-mines, are published. Special attention is paid to papers dealing with the cyanide process and treatment of slimes, electrical traction, haulage, and pumping, air-compressors, rock-drills, and other improved methods, the mining and technical journals being diligently searched for any information that may be of assistance to those who are engaged in mining in this colony.

The *Record* is frequently referred to by the mining journals of Great Britain and the United States, and there is reason to think that the departmental journal, while it does not aim at entering into competition with other mining journals or that section of the newspaper press which devotes a large share of attention to mining, yet furnishes useful information at regular intervals which could not well be supplied in any other way, owing to the geographical position of New Zealand and the very wide distribution of its metals and minerals.

AID TO DEEP-LEVEL MINING.

No new works towards deep-level prospecting have been undertaken during the year. The balance, amounting to £1,135 13s. 11d., has been paid to the Thames-Hauraki Company, which completes the payment of the full grant of £25,000 made on condition that the company would sink a shaft to a depth of 2,000 ft., and provide pumps capable of drawing 2,000 gallons of water per minute from that depth. In order to drain the deep levels of Ross Flat, a promise was made to the Ross United Company of a subsidy of £10,000, on condition that sufficient capital would be found for the erection of pumping machinery capable of draining Ross Flat. The offer has, however, not yet been availed of. The Government in the meantime have taken steps to obtain the cost of a plant to be worked by electricity, for the production of which the water-power at Mikonui River is to be utilised.

GEOLOGICAL EXPLORATIONS.

During the winter a large collection of rocks and minerals, illustrating geology and mining in the Cape Colville Peninsula (Hauraki Mining District), was prepared, and later formed an important Government exhibit at the Auckland Industrial and Mining Exhibition, held in that city during the past year.

During the month of August the Government Geologist visited New Plymouth for the purpose of reporting on the prospects of finding petroleum in quantity at that place. The resulting report is not of the most favourable character. The primal source of the oil has not been ascertained, and the oil hitherto obtained comes from storage-beds which, owing to their soft nature, tend to block the flow, and a continuous supply is thus interrupted. The deepest wells have reached a depth of 2,000 ft., and are still in arenaceous rocks not likely to have yielded the oil in the first instance.

Prospecting from time to time has for a long period been carried on in the Patua Range, on the west flanks of Mount Egmont, where traces of gold, and greater prospects of silver and copper—not, however, payable—have been obtained. Two claims were visited, but the specimens obtained and tested did not afford a sufficiency of the precious metals.

Rhodochrosite, or carbonate of manganese, has for some years past been known as occurring in the neighbourhood of Wellington, and at the time of its discovery this mineral commanded a good price in the market. In December last the lode at Paraparaumu was traced and proved of workable thickness over a distance of nearly half a mile. The present price of the mineral does not admit of the ore being worked for export.

The early part of 1899 was employed in various examinations in the Taupo and Hot Lakes district, and special examinations for gold were made in the district east of Lake Taupo. Alluvial gold was found on the banks of the Hinemaiaia and some of its tributaries. This seemed to have been derived from volcanic rocks of an acid type. The prospects obtained were not payable. Several samples of the harder varieties of siliceous sinter from the neighbourhood—active or extinct puias—were obtained for comparison with the reef deposits of Karangahake, Waihi, and Te Puke, and for the purpose of being tested for gold.

The cement deposit at Te Puke was examined and shown to consist mainly of rhyolitic gravel, occurring in patches in a formation of pumice sand. This cement is to some extent gold-bearing, but the report of the Geologist holds out little hope of its being found payable. The same gravels, under precisely similar conditions, are found over a large area between Rotorua and the shores of the Bay of Plenty.

The vicinity of Wade and Dairy Flat was examined for gold. The formation examined was not promising, and no gold was seen.

A special examination of the beds around Riverhead, Auckland, was made for gem stones, diamonds and other stones of value being reported found near Henderson and Riverhead. The rocks examined are mainly the proceeds of quartz, trachytes and rhyolites porphyritic with crystals, and small pellets of amorphous quartz, fragments of chalcedony and agate. Despite persistent reports to the contrary, no stones of greater value than these forms of quartz were seen or have been forwarded to the Laboratory at Wellington.

The discovery of a carbonaceous deposit in the hills to the south-west of the Waihi Plain, as being in the vicinity of an important mining district, is of consequence. The locality was examined, and two seams of workable thickness were noted. The material is lignite, but will yet prove a valuable fuel, local tests made showing that its steam-raising power is as 2 to 1 compared with good rata firewood.

During the season an examination was made of the east shore of Pelorus Sound, near the entrance from Cook Strait; also a survey of the Trooper Range and the district on the coast between the Wharehama and Pahau Rivers, on the east coast of Wellington.

ACCIDENTS ON GOLDFIELDS.

In the North Island six fatalities have occurred in connection with quartz-mining. In the Middle Island (West Coast district) seven fatal accidents occurred, three of which were connected with quartz-mines, and the others with alluvial mining. In the Otago and Southland Districts eight fatalities occurred, one in connection with dredging and seven in alluvial workings.

Other accidents occurred in which twenty-four men were injured, a few more or less seriously, in the North Island. On the West Coast, one in quartz and three in alluvial mining, none of which were of a serious character. In Otago a few accidents were reported, all being of a slight nature.

Full inquiries were made into the cause of all the accidents, and in each case the officials in charge of the mine were exonerated from blame.

SLUDGE-CHANNELS.

The following list shows the rivers throughout the various mining districts which have been proclaimed as watercourses into which tailings and mining *débris* may be discharged, and the dates from which the Proclamations have taken effect. The supplementary schedule shows those rivers and creeks concerning which the required notice of intention to proclaim has been gazetted, but in respect to which, owing to various causes, Proclamations have not as yet been issued:—

SCHEDULE OF RIVERS PROCLAIMED AS WATERCOURSES FOR THE DISCHARGE OF TAILINGS.

Name of River.	Date from which Proclamation takes Effect.	Name of River.	Date from which Proclamation takes Effect.
Maerewhenua	June 24, 1891	Okuru	June 1, 1895
Teremakau	Aug. 2, 1888	Turnbull	" 1, 1895
Arahura	" 2, 1888	Hapuka	" 1, 1895
Nelson Creek	Oct. 10, 1894	Waiototo	" 1, 1895
Parapara	June 1, 1894	Arawata	" 1, 1895
Little Wanganui, Karamea ...	" 1, 1894	Smoothwater	" 1, 1895
Granity Creek, Oparara ...	" 1, 1894	Humming Cove Creek ...	" 1, 1895
Karamea	" 1, 1894	Dandy Creek	" 1, 1895
Little Wanganui	" 1, 1894	Stafford	" 1, 1895
Oparara	" 1, 1894	Cascade	" 1, 1895
Granity Creek	" 1, 1894	Hope	" 1, 1895
Duffer's Creek	Mar. 18, 1895	Spoon Creek	" 1, 1895
Donnelly's Creek	July 1, 1895	Fork Creek	" 1, 1895
Kanieri River	Oct. 10, 1894	Gorge Creek	" 1, 1995
Totara (Ross)	July 1, 1895	Longridge Creek	" 1, 1895
Matakitaki	June 1, 1895	Hacket Creek	" 1, 1895
Half-ounce Creek	July 1, 1895	Waihou, or Thames	July 10, 1895
Black Ball Creek	June 1, 1895	Ohinemuri	" 10, 1895
Brandy Jack's Creek	July 1, 1895	Kuaotunu Creek	" 10, 1895
Ford's Creek	June 1, 1895	Doctor's Creek	" 10, 1895
Duffer's Creek (Ross)	July 1, 1895	Kaituna Staunton's Creek } Aorere River	Sept. 23, 1897
Bradshaw's Creek	June 1, 1896	Aorere	Dec. 23, 1897
Red Jack's Creek	May 10, 1897	Moonlight Creek	Mar. 1, 1896
No Town Creek	" 10, 1897	Baxter's Creek	" 1, 1896
New River	" 10, 1897	Caledonian Creek	" 1, 1896
Mikonui	June 1, 1895	Deep Creek	June 1, 1897
Waitaha	" 1, 1895	Wangapeka River	April 7, 1898
Wanganui	" 1, 1895	Nile, or Waitakere	Dec. 23, 1897
Poerua	" 1, 1895	Four-mile, or Tikipihi ...	" 23, 1897
Wataroa	" 1, 1895	Hauhau, or Three-mile ...	" 23, 1897
Waitangitaona	" 1, 1895	Wakamarina	" 23, 1897
Waitangiroto	" 1, 1895	Wareatea	Aug. 1, 1898
Okarito	" 1, 1895	Waimea	" 1, 1898
Waiho	" 1, 1895	Maruia	" 1, 1898
Totarakaitorea	" 1, 1895	Whaririki	" 1, 1898
Totara	" 1, 1895	Mangamangarakau	" 1, 1898
Alpine Creek	" 1, 1895	Big River	" 1, 1898
Omoera	" 1, 1895	Kahurangi	" 1, 1898
Waikukupa	" 1, 1895	Seal Creek	" 1, 1898
Waihapi Creek	" 1, 1895	Waimori	" 1, 1898
Hauraki Creek	" 1, 1895	Waterfall Creek	" 1, 1898
Waikohai Creek	" 1, 1895	Heaphy	" 1, 1898
Weheka (or Cook's)	" 1, 1895	Kararoa	" 1, 1898
Oinetamatea	" 1, 1895	Wekakura	" 1, 1898
Karangarua	" 1, 1895	Kohai-hai	" 1, 1898
Manakaiau	" 1, 1895	Blackwater Creek	" 1, 1898
Makawihu	" 1, 1895	Ngakawhau	" 1, 1898
Mahitahi	" 1, 1895	Dee Creek	" 1, 1898
Oinemaka	" 1, 1895	Coal Creek	" 1, 1898
Paringa	" 1, 1895	Pelorus	Jan. 18, 1899
Moeraki	" 1, 1895	Okari	" 18, 1899
Wakapohia	" 1, 1895	Saltwater Creek	Mar. 3, 1899
Kotokakorakota	" 1, 1895	Mokihinui	" 30, 1899
Tauperikaka	" 1, 1895	Deadman's Creek	May 4, 1899
Waita	" 1, 1895		
Haast	" 1, 1895		

SUPPLEMENTARY SCHEDULE OF RIVERS, NOTICE OF INTENTION TO PROCLAIM WHICH HAS BEEN GIVEN, BUT NOT FINALLY DEALT WITH.

Waipori	Hokitika	Turinawiwi
Noble's	Stillwater Creek	Anaweka
Orwell	Liverpool Davy's Creek	Raukawa
Doctor's Creek	Orowaiti	Rough, or Brown's, Creek
Coal Creek	Te Hapu Creek	Landing Creek
German Gully Creek	Waitaki Creek	Soldier's Creek
Callaghan's Creek	Ngutuhi Creek	Walker's Creek
Totara River, Charleston	Paturau	Black-sand Creek
Boatman's Creek	Blow-hole Creek	Big Kapitea Creek
Baton River	Punipawa Creek	Little Kapitea Creek
Ahaura River	Sandhills Creek	Grey River
Main Totara River	Slaty Creek	Waikaia
Branch Totara River	Malone's Creek	Ourawera
Anatoki	Anatori	Spring Creek.
Takaka		

THE APPLICATION OF ELECTRICITY TO MINING.

The production and application of electric power to the various requirements of mining is a subject which possesses great interest, and is of importance to those engaged in the mining industry of New Zealand. Owing to its greater economy (as compared with steam-power), adaptability to varying circumstances and situations met with in dredging, pumping, winding, milling, lighting, &c., where source of power and site of plant may be far distant from the scene of operations, electrically-actuated machinery will, in the near future, no doubt be very universally adopted.

In this connection a contribution by Mr. Ernest J. Fenn, associate of the Institute of Electrical Engineers (of Messrs. John Chambers and Son, Auckland) will be found in the paper on "Electricity and Mining" included in this report.

COAL-MINING.

NORTH ISLAND.

There has been a general increase in the output of coal from the Auckland District. The total increase from the mines north of Auckland has been 3,406 tons, chiefly from Hikurangi, the coal-mines in the other districts showing a decreased output. South of Auckland there has been an increase of 4,072 tons in the Waikato, and 904 tons in the Mokau districts, making altogether a total increase of 8,383 tons for the whole of the northern collieries.

The expansion of the output of coal is chiefly due to a more extensive demand throughout the district. In the Waikato mines it is anticipated that, consequent upon the completion of the railway to the Thames, there will be a greater consumption, as the price of coal will be lessened owing to the reduced cost of carriage.

Kawakawa District.

In the Kawakawa district the coal-seams, which have been worked for a large number of years, are nearly exhausted. The parties working the present mine estimate that there is only a month's further supply; therefore a very small output may be expected for 1899. Several boreholes have been put down to the northward, proving the seam further towards the dip; but it is not probable that the coal met with will induce any company to open a new mine for the purpose of working the comparatively thin seam which was discovered.

Hikurangi District.

Hikurangi Coal Company's Mine.—In the Hikurangi Company's colliery works have been prosecuted in order to get at the coal lying towards the dip, from which direction it is anticipated a large quantity will be obtained. The coal raised from this colliery is of good quality, and finds a ready market. The output for the year was 32,973 tons, being an increase of 2,310 tons on last year's return.

Hikurangi Collieries.—The operations in this mine have been confined to opening up and working near the outcrop. The seam is from 6 ft. to 12 ft. in thickness, and is occasionally divided by fireclay from 1 in. to 18 in. in thickness, which occurs near the middle, necessitating the upper and lower portions being worked separately. The output for the year was 11,937 tons, compared with 4,484 tons in 1897. This coal is of a quality that finds a ready market.

Phœnix Mine.—Operations in this mine were not carried on with much vigour, and it was closed down on the 4th November. The total output for the year was 1,800 tons.

West Bryan's Mine.—No work has been done in this mine during the year, with the exception of what was taken from the outcrop for the use of the owner.

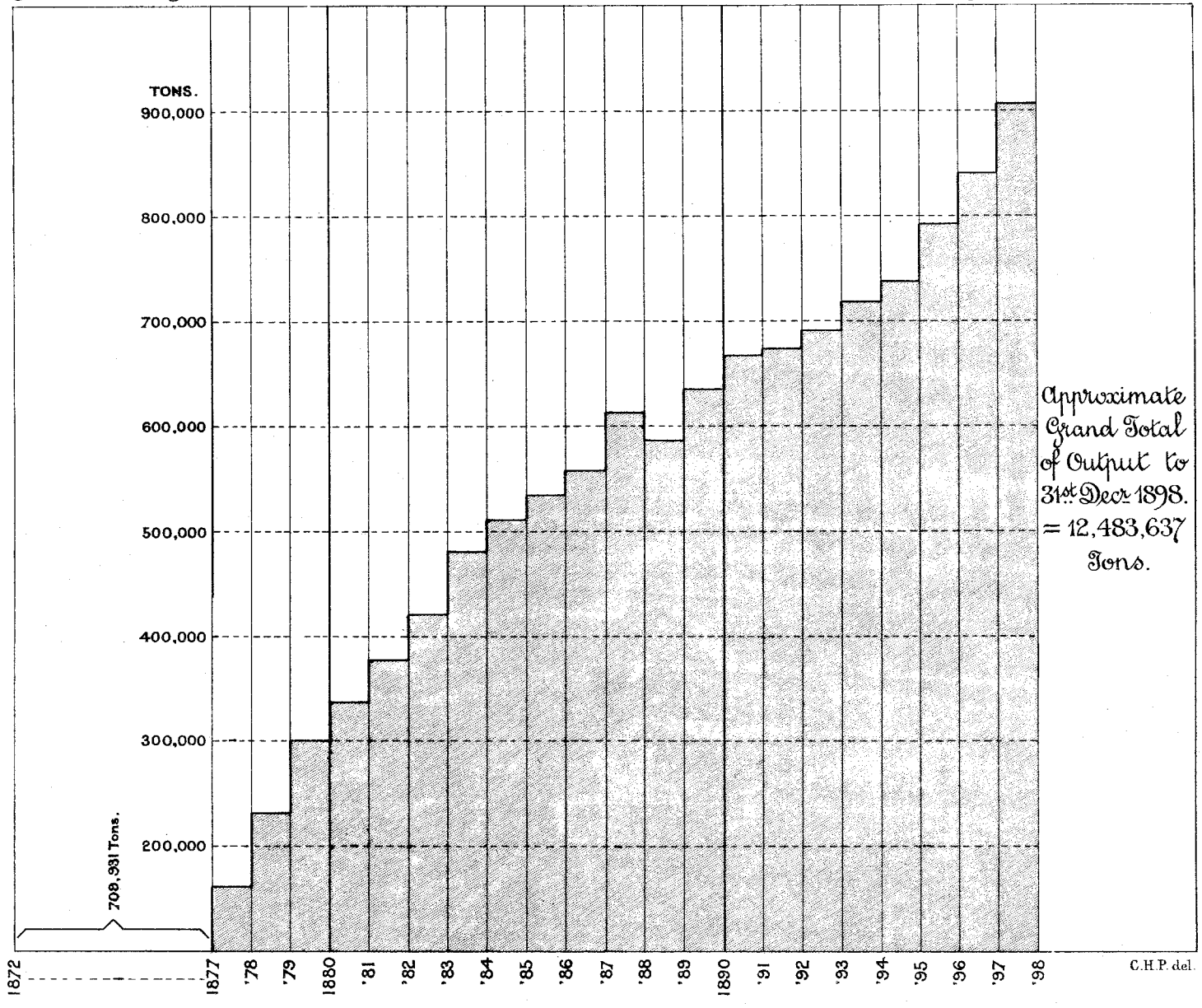
Whangarei District.

Kamo Mine.—Work in Kamo Mine is confined to winning coal from old pillars near the outcrop. The output for the year was 968 tons.

Ngunguru District.

Kiripaka Colliery.—This company's operations have chiefly been directed towards the dip, at which place the seam is proved to be 6 ft. in thickness, and has produced a considerable portion of the output, 15,840 tons being this year's product, against 16,248 tons for the preceding twelve months.

Diagram showing TOTAL OUTPUT of COAL from N.Z. MINES for the years 1872 to 1898.



Callaghan's Mine.—Operations have been commenced by Messrs. John and William Callaghan and George Climo to open up a mine on the opposite side of the river to the Kiripaka Colliery. At the end of their drive a seam 6 ft. in thickness has been met, but no output of coal is recorded.

Waikato District.

Waikato Mine.—During the year a section of the mine to the eastward has been opened by continuing a bord from the main heading in the old working. The coal in this district of the mine is of excellent quality, and several bords have been commenced. Much of the coal obtained during the year has been from drawing the pillars. The total output was 12,871 tons, being a decrease of 446 tons on last year's production.

Taupiri Extended.—In this colliery operations have been continuously carried on, and the mine is being further extended by driving a heading to the northward. Boring has been conducted to explore the seam to the north of No. 2 shaft, and has resulted in showing that a large area can be profitably worked and a considerable output from the mine maintained for several years. The total quantity for the year was 28,721 tons, being 5,192 tons less than the output of last year.

Taupiri Reserve.—Operations in this mine continue to be directed to getting coal under Lake Kimihia, where the seam is worked to a thickness of from 8 ft. to 16 ft. The heading, which is being driven from the lowest point in a south-westerly direction, is producing coal of a fairly good marketable quality, and that now being pierced appears to be of favourable character. The ouput for the year was 15,874 tons, being a decrease of 2,996 tons compared with last year.

Ralph's Taupiri Coal-mine.—This colliery, after being closed down for five years, was in May last reopened. Operations were conducted towards and under the Waikato River, where the coal is of great thickness. Boreholes have proved that the seam is in some places 65 ft. through. Only a portion is taken out, the bords being from 7 ft. to 20 ft. in height, and not less than 9 ft. of solid coal is left for the roof. This field of coal extends for a considerable distance to the southward of the river, and there is a probability that a large output from this mine may for a long time be kept up. The output of coal for the half-year was 12,725 tons, and it is evident that the new company have acquired a considerable share of the trade.

Bombay Mine.—This mine was closed down last April, the output up to that time being only 6½ tons.

Mokau District.

Mokau Mine.—The company who owned this mine in the early part of the year were unable to carry on operations with profit. After an interval of three months, during which the mine was closed, another company resumed operations, and work is being carried on in a more successful manner. A small steamboat, carrying from 70 to 90 tons, makes four to six trips a month, and enables the company to keep up a regular supply for the market. The output for the year was 3,395 tons, being an increase of 247 tons compared with the previous year.

Fernside Mine.—This is a new mine which has been opened during the year under the management of Mr. Joseph Lobb, who for a considerable time was manager of the Mokau Mine. The workings are situated on the opposite side of the river, and about half a mile further up than those of the Mokau Company. A seam from 3 ft. to 5 ft. 6 in. in thickness has been driven on about 400 ft. The output of coal last year was 657½ tons, but latterly about 150 tons per month have been shipped.

COMPARATIVE STATEMENT showing Increase or Decrease of Output of Coal in the Auckland District for Years 1897–98.

Name of Mine.	Output of Coal, 1897.	Output of Coal, 1898.	Increase.	Decrease.
Northern district—	Tons.	Tons.	Tons.	Tons.
New Bay of Islands	11,134	10,622	...	512
West Bryan's	2,142	...	...	2,142
Hikurangi Coal Company	30,663	32,973	2,310	...
Phœnix	5,026	1,800	...	3,226
Hikurangi Colliery	4,484	11,937	7,453	...
Kamo New	1,037	968	...	69
Kiripaka	16,248	15,840	...	408
Southern district—				
Waikato	13,317	12,871	...	446
Taupiri Extended	33,913	28,721	...	5,192
Taupiri Reserve	18,870	15,874	...	2,996
Ralph's Taupiri	...	12,725	12,725	...
Bombay	25	6½	...	18½
Mokau	3,148	3,395	247	...
Fernside	...	657½	657½	...
Totals	140,007	148,390	8,383	...

MIDDLE ISLAND.

Nelson and Collingwood District.

The Pakawau Mine continues to produce a fair amount of coal. The output for the year was 702 tons, being 461 tons in excess of the previous year's production.

The Enner Glynn Mine was worked during the first half of the year, but in consequence of a fire in the workings the mine was shut down in the month of June last, and has not been reopened. The output during 1898 amounted to 508 tons.

COMPARATIVE STATEMENT showing Increase or Decrease of Output of Coal in the Collingwood District for the Years 1897–98.

Name of Mine.	Output of Coal, 1897.	Output of Coal, 1898.	Increase.	Decrease.
	Tons.	Tons.	Tons.	Tons.
Pakawau	241	702	461	...
Enner Glynn	667	508	...	159
Motupipi	...	20	20	...
Totals	908	1,230	322	...

West Coast District.

In this district there has been a material increase in the production of coal. The total output was 465,253 tons, being an increase of 34,253 tons on the preceding year's return.

The Westport Coal Company's mines at Granity Creek and Denniston, which supply the largest proportion of bituminous coals, the output for the year being 280,119 tons, are being further developed and workings extended, so that an increasing output can readily be maintained.

The Westport-Cardiff Mine produced 60,101 tons, being an increase of 5,821 tons in excess of the output for 1897. The extension of the workings beyond Chasm Creek, over which a bridge is erected, will enable an increased output to be maintained. The bridge over Chasm Creek, erected by Mr. G. H. Broome, the company's engineer, is of the inverted bow-string type, supported by four steel-wire cables, manufactured by John Shaw (Limited), Sheffield. The ropes are 5 in. in circumference, and are made solid, no hemp being used; forty-nine wires in rope. The guaranteed breaking-strain is 84 tons each. Some of the individual wires tested at Christchurch testing-works gave an average load per square inch of over 76 tons, equal to an aggregate breaking-strain for wires of 92 tons. The total weight of bridge on rope is 56 tons, and average travelling-load 10 tons. The ropes are fastened at each end by eye straining-bolts built into the solid rock. The ropes are well coated with tar, and at terminals wrapped in canvas and serving. Quickness of delivery being of importance, it is worth noting that the ropes were manufactured, shipped, and arrived in Wellington in less than eight weeks from date of order being cabled to England.

The accompanying illustration will explain the general design of the bridge.

The Blackball Colliery is also in a position to still further increase their output. The output for the year was 52,835 tons, being 9,751 tons in excess of the previous year's return.

At the Brunner Mines there was a decrease of 10,050 tons compared with the output for 1897.

The capabilities of the mines throughout the district point out that the output will be of such an extent that large shipments from the ports of Greymouth and Westport can be maintained.

Westport District.

Westport–Cardiff Mine.—Mining operations have been continuously carried on in the eastern block, but towards the end of the year it was found necessary to extend the workings across Chasm Creek to the western block, which necessitated the construction of a bridge with a span of 200 ft. The construction of this bridge will complete the connection for haulage purposes, which are here conducted on the endless-rope principle. A considerable amount of work has been done in exploring, £500 having been expended in putting down boreholes, trenching, and headings in various parts of the field, and a large area of coal of good quality has been discovered. The output of coal for the year was 60,101 tons, being an increase of 5,821 tons compared with output for the previous year.

The Mokihinui Mine, which had lain idle for some time, has not yet been reopened, as the business of the company had proved of an unsatisfactory nature, and the capital had become exhausted. On the winding-up of this company the title to the mine was sold to the Government. This action will probably lead to a resumption of operations if satisfactory arrangements are concluded.

Westport Coal Company's Granity Creek Mine.—The output for the year was 87,269 tons, being an increase of 28,029 tons on the previous year's return. During the year developments have been directed to open out the large coal-basin in the neighbourhood of Mine Creek. The situation of this part of the mine is at a considerable elevation above the present workings. It was decided to convey the coal down a heading having a gradient of 1 in 3, which will connect the new mine with the present haulage. This new heading when completed will be 30 chains or more in length. A large proportion of the coal raised from this mine is produced by the use of six coal-cutting machines driven by compressed air from a plant by Leyner, Denver, Colorado, consisting of two separate engines of equal volume, each having seventeen 5 in. diameter steam- and air-cylinders with 12 in. diameter compound air-cylinder. The haulage system is endless rope and double line of rails.

Coalbrookdale Colliery.—This group of mines comprise the Cascade, New Mine, Munsie's, and Big Dip. The three latter are pillar districts. In the Cascade section a 12 ft. downthrow fault that traverses the whole area was met, together with the thinning of the coal-seam, which terminates the workings westward. The faults have done much to retard the progress of the extensive coal area. With the object of cutting and winning the coal at the most central position from the deeper basin behind this downthrow fault, it was found necessary to extend the haulage-road on a deviation from the original line. The formation of this haulage-road has been completed, and a connection also made with the drainage-channel. In the Munsie and New Mine district operations were confined to getting coal by drawing the pillars. The extraction of pillars is safely carried on consequent on the firm nature of the roof. The coal in the Big Dip is now all removed, and this portion of the mine abandoned.

Iron Bridge Mine.—After all the pillars were extracted in the flat seam and Gentle Annie operations were confined to the workings in the solid coal in the Cedar seam. The whole of the coal from this seam is produced by the use of Morgan Gardiner's electric coal-cutting machinery of the percussion type.

The deliveries of coal from the Westport Coal Company's collieries for 1898 are as follows: Wanganui and New Plymouth, 9,687 tons; Auckland, 17,935 tons; Napier, 4,744 tons; Gisborne, 912 tons; Wellington, 67,194 tons; Christchurch, 35,125 tons; Timaru, 8,227 tons; Oamaru, 1,746 tons; Dunedin, 13,354 tons; Invercargill, 6,915 tons; Nelson, 7,699 tons; Foxton, 1,714 tons; Westport, 7,349 tons; foreign export, 12,690 tons; sold f.o.b. Westport to local steamers, 84,334 tons: total deliveries, 279,625 tons.

COMPARATIVE STATEMENT showing Increase or Decrease of Output of Coal in the Westport District for Years 1897–98.

Name of Mine.	Output of Coal, 1897.	Output of Coal, 1898.	Increase.	Decrease.
	Tons.	Tons.	Tons.	Tons.
Westport-Cardiff	54,280	60,101	5,821	...
Millerton, Granity Creek	59,240	87,269	28,029	...
Coalbrookdale	184,376	192,851	8,475	...
Iron Bridge				
Waitakere	100	100	...	...
Totals	297,996	340,321	42,325	...

Denniston New Road.

In order to afford better communication between Denniston plateau and Waimangaroa, a road, to be 12 ft. wide and 5¾ miles in length, has been partly laid off. Up to the 31st March £1,301 was expended on the work. 2 miles 37 chains is finished to a width of 7 ft. In order to complete the whole length of the road the Engineer estimates that an additional £4,000 will be required. This will leave the cost of the road when completed to be £6,000. Additional grants will be required to be made in order to complete the 7 ft. wide track. The want of a road suitable for vehicle traffic is very much felt by the residents on Denniston Hill.

Reefton District.

The mines in this district still continue to afford quantities of coal sufficient for local requirements. The chief production was from the Phœnix Mine, which gave 1,400 tons; the Murray Creek, 701 tons; the Golden Treasure, 689 tons; and Burke's Creek, 688 tons. The total output from all the mines shows an increase of 1,656 tons compared with that of 1897.

COMPARATIVE STATEMENT showing Increase or Decrease of Output of Coal in the Reefton District for Years 1897–98.

Name of Mine.	Output of Coal, 1897.	Output of Coal, 1898.	Increase.	Decrease.
	Tons.	Tons.	Tons.	Tons.
Longford	500	400	...	100
Burke's Creek	...	688	688	...
Murray Creek	525	701	176	...
Phœnix	1,200	1,400	200	...
Inkerman Gold-mining Company ...	240	355	115	...
Golden Treasure	400	689	289	...
Lankey's Gully	500	275	...	225
Devil's Creek	...	40	40	...
Progress New Mine	...	100	100	...
Breen's	...	416	416	...
Coal Creek	55	12	...	43
Totals	3,420	5,076	1,656	...

Greymouth District.

The Blackball Mine continues to maintain a large output. 52,835 tons was produced during the year, being 9,751 tons in excess of the output of 1897. The mine is worked in a most systematic manner. The greatest care and attention is exercised in the maintenance of good roadways, and securing the roof, which in many places is not of a sound nature.

This field is, however, of an unbroken character, and free from irregularities caused by faults. The entrance of the mine is from an adit-level, and efficient ventilation is secured, the air-currents being directed to an upcast which does not necessitate a return. The aerial tram over which the haulage from the mine to the railway-station is carried on has a capacity of only 263 tons per day of eight hours, and the daily output is thus limited.

The Greymouth-Point Elizabeth Coal Company continue to carry on operations in the Brunner Rise and Brunner Mines. Mining operations at Coal Creek are not yet commenced. The bridge

across the Grey River, a portion of which was destroyed by a flood, will shortly be completed, and will thus enable the company to carry on operations more vigorously in the Coal Creek district. In the old mine the coal produced was from the extraction of pillars, and preparations were made by extending headings to the extremity of the Barrier coal, that was left to prevent flooding dip-workings. A considerable output may be anticipated from the Barrier workings, and a supply kept up from this part of the mine until such time as the new mine is opened up and developed.

COMPARATIVE STATEMENT showing Increase or Decrease of Output of Coal in the Greymouth District for Years 1897–98.

Name of Mine.	Output of Coal, 1897.	Output of Coal, 1898.	Increase.	Decrease.
	Tons.	Tons.	Tons.	Tons.
Blackball	43,084	52,835	9,751	...
Brunner ... ... }	85,592	65,791	...	19,801
Brunner Rise ... ... }				
Totals...	128,676	118,626	...	10,050

Canterbury District.

In this district the output of coal was 13,347 tons, being a slight decrease compared with that of 1897. Of the sixteen mines in this district the chief production was from the Homebush, 3,983 tons; Mount Somers, 2,677 tons; Sheffield, 2,310 tons; and Springfield, 2,123 tons; the balance of the output being from the other mines.

COMPARATIVE STATEMENT showing Increase or Decrease of Output of Coal in the Canterbury District for Years 1897–98.

Name of Mine.	Output of Coal, 1897.	Output of Coal, 1898.	Increase.	Decrease.
	Tons.	Tons.	Tons.	Tons.
Homebush	3,718	3,983	265	...
Mount Somers	2,818	2,677	...	141
Springfield	2,357	2,123	..	234
Sheffield	2,305	2,310	5	...
Other mines	2,512	2,254	...	258
Totals...	13,710	13,347	...	363

North Otago District.

In the North Otago district the output of coal for the year was 39,765 tons, being an increase of 750 tons compared with the returns of 1897.

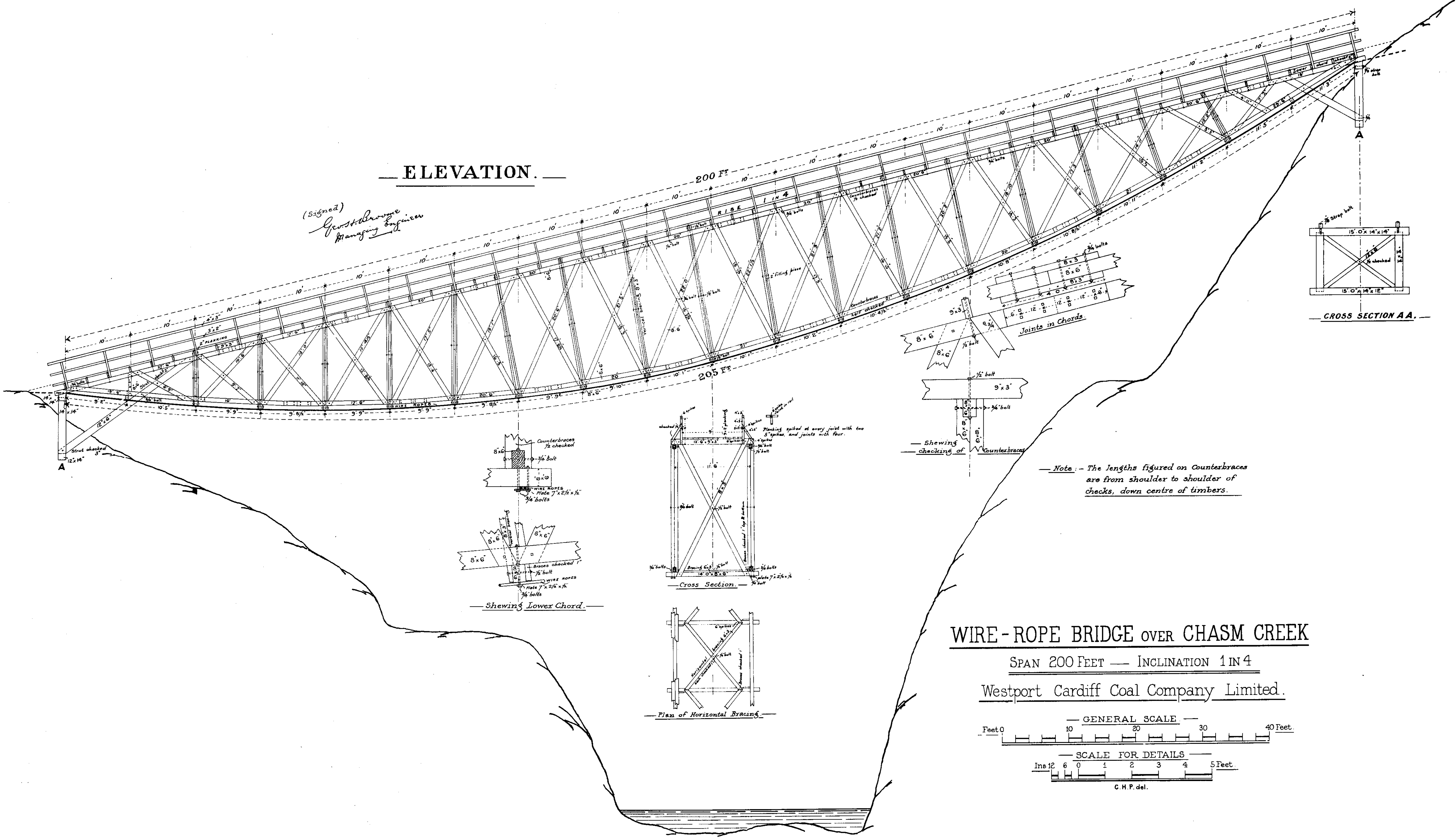
COMPARATIVE STATEMENT showing Increase or Decrease of Output of Coal in the North Otago District for Years 1897–98.

Name of Mine.	Output of Coal, 1897.	Output of Coal, 1898.	Increase.	Decrease.
	Tons.	Tons.	Tons.	Tons.
St. Andrew's	1,232	1,344	112	...
Prince Alfred	1,276	970	...	306
Shag Point	23,334	23,097	...	237
Allandale	11,635	13,234	1,599	...
Other mines	1,538	1,120	...	418
Totals...	39,015	39,765	750	...

The Allandale output was 13,234 tons, showing an increase of 1,599 tons on the previous year's output. At this colliery the new incline tunnel was connected with the dip-workings from the old tunnel, the hauling plant has been moved to this incline, sidings laid down, and screens erected near the mouth. The whole of the output is drawn through this incline tunnel, the old tunnel now only being used for ventilation purposes. In the new underground workings to the southward the seam maintains the average thickness, but gets thinner in the opposite direction.

The Prince Alfred yielded 970 tons, being a decrease of 306 tons on the previous year's output.

The Shag Point Mine produced 23,097 tons, being 237 tons less than the output for 1897. The coal from this mine was chiefly obtained from No. 5 seam, which does not average more than 2 ft. 9 in. in thickness, and the available area to the rise will be exhausted in the course of a year or two. The coal from No. 5 seam is of good quality, but work cannot further be profitably carried on until the shaft has been sunk to a further depth of 300 ft., and the coal taken out from a level instead of being hauled up an incline to the present bottom of the shaft. If this work is carried out, a certain area of the workings will be submarine. Nothing, however, is yet settled in respect to this proposed development.



ELEVATION.
(Signed) Geo. H. Broome Managing Engineer
200 FT
RISE 1 IN 4
205 FT
WIRE ROPES
A
Counterbraces ½ checked
Shewing Lowex Chord.
Cross Section.
Plan of Horizontal Bracing.
Joints in Chords
Shewing checking of Counterbraces
CROSS SECTION A A.
Note: - The Lengths figured on Counterbraces are from shoulder to shoulder of checks, down centre of timbers.
GENERAL SCALE
Feet 0 10 20 30 40 Feet.
SCALE FOR DETAILS
Ins 12 6 0 1 2 3 4 5 Feet
C.H.P. del.

WIRE-ROPE BRIDGE OVER CHASM CREEK

SPAN 200 FEET — INCLINATION 1 IN 4

Westport Cardiff Coal Company Limited.

South Otago District.

The output in this district shows an increase of 15,972 tons on the previous year's production, as shown by the following statement:—

COMPARATIVE STATEMENT showing Increase or Decrease of Output of Coal in the South Otago District for Years 1897–98.

Name of Mine.	Output of Coal, 1897.	Output of Coal, 1898.	Increase.	Decrease.
	Tons.	Tons.	Tons.	Tons.
Fernhill	7,191	4,287	...	2,904
Freeman's...	7,804	8,291	487	...
Walton Park	11,554	11,910	356	...
Saddle Hill	3,005	4,161	1,156	...
Burnwell	1,607	2,530	923	...
Glenochiel...	1,991	2,039	48	...
Mosgiel	5,098	5,545	447	...
Burnweil	7,213	11,227	4,014	...
Benhar	2,892	2,821	...	71
Kaitangata	92,914	100,750	7,836	...
Conical Hills	2,206	2,500	294	...
Other mines	4,584	7,970	3,386	...
Totals...	148,059	164,031	15,972	...

Fernhill Mine.—From this mine the output for the year was 4,287 tons, being a decrease of 2,904 tons compared with that of the previous year. Considerable difficulties were experienced through fire rising in the workings, resulting from the leakage of an overhead water-race. This part of the mine had to be walled off, and there has since been difficulty in maintaining adequate ventilation.

Freeman's Mine.—The output of coal for the year was 8,291 tons, being 487 tons more than that of 1897. The seam-work consists of good solid coal 6 ft. to 8 ft. in thickness. A new pumping-engine is in use, a compound condensing Tangye with steam-cylinders, the steam to which is conveyed in well-covered pipes down the main incline. An extra boiler and new brick chimney has been erected at surface.

Walton Park Colliery.—A line of railway runs through the property, necessitating an area of pillar coal to be left on either side. A road is now being constructed from the first tunnel entrance to the further end of the workings, and preparations made to remove the pillars in a systematic manner. The output for the year was 11,910 tons, an increase of 356 tons on the return for the previous year.

A considerable output has also been maintained at the Saddle Hill, Jubilee, Burnwell, Glenochiel, and Mosgiel Collieries. Satisfactory returns have also been made from Real Mackay and McGilp's Collieries.

Fortification Coal-mine.—This is a new mine opened on lands belonging to Mr. W. Noble. The coal appears to be about 10 ft. thick, of which 7 ft. is being worked. The mine is opened up from the outcrop by a drive which has a very gentle dip to the eastward. The coal is at present hauled by a hand-winch, but a portable engine has recently been placed at the mine-mouth for drainage purposes, and will also be utilised for hauling. The output for the year was 1,441 tons.

Burnweil Colliery.—In this mine a considerable output was maintained in the early part of the year, amounting to 11,227 tons, being an increase of 4,014 tons over the output for 1897. The mine was visited by Mr. Hayes, the Inspector, on the 27th November, 1898. The manager at that time informed him that the roadway to connect the two shafts has still 5 chains to go, and that its continuation has recently been stopped owing to the fact that the coal has become absolutely worthless in this direction, and the seam as a whole not taking the market. The proprietors have decided to stop getting coal at the end of the year, and sink the shaft another 300 ft. or thereabouts, in expectation of getting a better seam. A borehole has been put down 280 ft. below the seam. At this depth some trouble was experienced in consequence of some of the ground running; but the proprietors have stated that the indications were such as to give them every encouragement to sink the shaft.

Kaitangata Colliery.—The coal from this colliery continues to be in great demand. The output for last year was 100,750 tons, being 7,836 tons in excess of the yield for 1897. The workings in the mine are very extensive. The deeper portions are reached from the shaft, and an incline tunnel is used for working the mine at a higher level. New ground is being opened out in the main seam east of No. 4 fault. The north level in this section is standing, owing to its being ahead of the ventilating current, and has cut and crossed a small fault, beyond which the coal is giving off firedamp. The place has been properly fenced off, and a parallel roadway is being driven for ventilation. Between Nos. 3 and 4 faults top-coal is being dropped in the bords, and the old north main level at the foot of the engine-plane is being reopened to take out the remaining pillars. Pillar-working is still in hand south of the foot of the engine-plane, and also in the north section of the shaft-workings. Work has been continued in the lower seam through the prospecting-tunnel driven from the shaft section. The coal being worked shows a thickness of some 8 ft. only, and it is possible that at this place the seam may be divided. A small blower of gas and water is met with in the floor of the main heading, and this may be from coal below.

So far as the driving in coal has gone the seam is patchy in quality, but appears to be improving. This portion of the mine is at present ventilated by brattice-work assisted by jets of compressed air; but headings are being cut to the rise, to establish a connection with the long tunnel from the engine-plane workings. Safety-lamps are used, and the coal gives off a little gas. Ventilation on the whole is very fair, but it may become desirable at no distant date to sink a new upcast shaft, and adopt fan-ventilation in lieu of the present furnace.

Record Reign Mine.—This is a small mine that has been opened on Landell's Estate, on the crown of the hills crossed by the new coast-road. It is adjacent to the small pits formerly worked by M. Carson and G. Cormack, and works the same seam. Two men and a boy are employed. Workings are in good order, and ventilation adequate.

Wangaroa Mine.—A small output, amounting to 70 tons, has been produced from this mine. The seam is from 10 ft. to 12 ft. in thickness, and the mine is of small area.

Central Otago.

In this district thirty-three different coal-pits have been worked. The total output for 1897 (25,218 tons) and for 1898 (29,207 tons) shows an increase of 3,989 tons. The principal mines worked were: Pryde's, Coal Creek, McPherson's, Alexandra, McQueenville, Parcell and Gibson's, and Welshman's Gully, the output from which furnished a supply of fuel for the dredges on the Molyneux and its branches.

The following table gives a comparative statement for the years 1897–98:—

COMPARATIVE STATEMENT showing Increase or Decrease of Output of Coal in the Central Otago District for Years 1897–98.

Name of Mine.	Output of Coal, 1897.	Output of Coal, 1898.	Increase.	Decrease.
	Tons.	Tons.	Tons.	Tons.
Alexandra	3,394	3,532	138	...
Coal Creek	2,737	1,875	...	862
McPherson's	2,118	2,277	159	...
McQueenville	3,959	5,591	1,632	...
Parcell and Gibson's	931	1,836	905	...
Pryde's	805	1,523	718	...
Welshman's Gully	1,189	1,714	525	...
Other mines	10,085	10,859	774	...
Totals...	25,218	29,207	3,989	...

The lignite-mines in the Roxburgh district still preserve a considerable output. Jones's mine, Coal Creek, produced 1,875 tons; McPherson's pit had an output of 2,277 tons; Craig's Perseverance Mine, 1,099 tons; and McLoughlin's Black Diamond, Shingle Creek, 76 tons.

The Alexandra Mine, situated near the Manorburn, had an output of 3,532 tons, the coal being chiefly for the use of the dredges.

The McQueenville Coal-mine produced 5,591 tons, being an increase of 1,632 tons.

Bruce's Mine.—This mine is situated on the banks of the Manuherikia, and is now being opened up.

There has been a very small output from the coal-pits near Cambrian's.

At Blackston Hill there was an output of 458 tons; and from McLean's pit, at Idaburn, 321 tons; Beck's, 842 tons; and White's, 695 tons.

Doherty's mine, at Gimmerburn, yielded 132 tons; the Commercial Coal-mine, Kyeburn Diggings, 852 tons; and McCreedy and Coomber's pit, at Kyeburn Diggings, is now closed down.

In the Clyde district, the Mavis, Dairy Creek, Pit produced 678 tons.

In the Cromwell district, the Cromwell Coal-mine produced 448 tons, and Cooper's mine 100 tons.

In the Bannockburn district, the return from Pryde's pit was 1,523 tons. The incline-drive, from which the pit is worked, has fallen into disrepair, and water found its way to the workings. A deviation has been made by forming a new road through the pillars for haulage purposes, but no steps have been taken to remove the water. This mine cannot be profitably worked until a better system is adopted, and the water removed by suitable pumping machinery.

The output of Parcell and Gibson's mine was 1,836 tons, being an increase of 905 tons on that of the previous year. A tunnel dipping 1 in 3, and against the rise of the measures, intersects a seam 5 ft. 6 in. in thickness, which is being worked on the pillar-and-stall system. The coal is strong, but works freely. Ventilation excellent, and the pit in first-class order. Coal hauled by horse-power.

The output from Wilson's mine only amounted to 58 tons.

Southland District.

There are a number of lignite-seams in this district, chiefly worked on the opencast principle, and a considerable output is maintained, the fuel being suitable for steaming and household purposes. There are also several seams of brown coal, the principal of which is that worked at the Nightcaps Colliery, from which last year there was an output of 23,713 tons, being an increase of 951 tons compared with that of 1897. The output for the district was—lignite, 19,355 tons; and brown coal, 27,685 tons; making a total of 47,040 tons.

COMPARATIVE STATEMENT showing Increase or Decrease of Output of Coal in the Southland District for Years 1897–98.

Name of Mine.	Output of Coal, 1897.	Output of Coal, 1898.	Increase.	Decrease.
	Tons.	Tons.	Tons.	Tons.
Beattie and Coster's	1,308	878	...	430
Bogside	134	581	447	..
Green's	1,439	1,768	329	...
Munro's	938	912	...	26
Nightcaps	22,762	23,713	951	...
Ota Creek	408	640	232	...
Pukerau	1,012	943	...	69
Pyramid	354	547	193	...
Reed and Morley	2,478	2,395	..	83
McKinnon's	...	450	450	...
Heffernan's	837	1,000	163	...
Knapdale	692	748	56	...
Pyramid	354	547	193	...
Waimumu	3,303	4,462	1,159	...
Carr's	...	518	518	...
Other mines	7,685	6,938	...	747
Totals...	43,704	47,040	3,336	...

STATEMENT showing the NUMBER of MINES at Work, NUMBER of MEN employed, and DESCRIPTION of COAL obtained in the different Districts; also showing the TOTAL INCREASE or DECREASE for the Years 1897 and 1898.

District.	Number of Mines producing.	Number of Men employed.	Brown Coal.	Bituminous Coal.	Glance Coal.	Lignite Coal.
			Tons.	Tons.	Tons.	Tons.
Auckland	12	319	74,250	74,140	...	...
Collingwood and Westport	22	932	740	463,537	775	100
Canterbury	16	50	13,322	...	...	...
Otago districts	67	589	182,368	...	...	14,304
Southland	60	113	27,685	...	...	19,355
Totals	177	2,003	298,365	537,677	775	33,759

District.	Pitch Coal.	Anthracite Coal.	Output for 1897.	Output for 1898.	Increase.	Decrease.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Auckland	...	...	140,007	148,390	8,383	...
Collingwood and Westport	101	...	431,000	465,253	34,253	...
Canterbury	...	25	13,710	13,347	...	363
Otago districts	36,331	...	212,292	233,003	20,711	...
Southland	...	...	43,704	47,040	3,336	...
Totals	36,432	25	840,713	907,033	66,320	...

ACCIDENTS IN COAL-MINES.

During the year only one fatality occurred in connection with the coal-mining industry. On the 8th of February a shot-firer named Alexander Nichol was fatally injured at the Coalbrookdale Mine by an explosion of blasting-powder which he was carrying loose in a tamping-box.

The death of Thomas Wilson, jun., who was engaged in a coal-pit at Bannockburn, occurred whilst on his way from his work on the 11th January, when crossing the Kawarau River by means of a wire rope. It is surmised that he missed his hold of the cage, and fell into the river and was drowned.

In the northern coal-mining district twenty-six minor accidents occurred, none of them being attended with serious results. In the West Coast district four accidents, two which happened to one man, named McLuskie, were reported, but neither was of a serious nature.

In the southern district five accidents took place, and in one case proceedings were taken against a trucker, whose carelessness was the cause of an explosion of gas, but the offender eluded service by leaving the district. The immunity of the miners from serious accidents is a matter for congratulation, and goes to show that the regulations are carefully observed.

The total number of persons employed in coal-mining amounted to 2,003, consequently the proportion of fatal accidents is at the rate of 0·5 per thousand.

SOME FURTHER NOTES ABOUT THE PRINCIPAL COLLIERIES IN THE NORTH AND MIDDLE ISLANDS SPECIALLY SUPPLIED BY THE MANAGERS.

Hikurangi Coal Company's Mine.

This company (of which Mr. T. P. Moody, M.E., M.I.M.E., who claims to have a record of forty years' experience, and has never lost by fatal accident a single person, is manager) was formed about five years ago to work the coal deposits at Hikurangi, thirteen miles north of Whangarei, and holds an area of nearly 1,000 acres, freehold and leasehold. The freehold land has been extensively proved by boring, so far, to be coal-bearing over an extent of nearly 500 acres. The bulk of this can be worked level free as regards drainage. The coal in the leasehold portion is excellent in quality and of good thickness. The mine is worked on the pillar-and-stall system. The first working consists in taking out only one-third from the solid, leaving two-thirds in pillars. The object of narrow working-places is primarily safety to life and property, the non-requirement of timbering, reducing liability to accidents to a minimum, and, when pillars are extracted, a better quality of coal is mined. The roof is not good, being in some portions of the mine of fireclay, in others soft greensand stone. Specially is this the case where the cover is thin. Under a thick cover a heavy bed of greensand is met with, and then the coal beneath is hard, so much so that recourse has to be had to blasting. In the existing mine the seam of coal varies from 8 ft. to 14 ft. in thickness. The coal is quite clean, there being no bands of impure matter of any kind. The ventilation is natural, no artificial means being used or required. The quantity of air circulating is about 30,000 ft. per minute for the fifty-five men and boys employed.

The following is a report by Mr. W. Skey, on Hikurangi Coal:—

"*Five Samples of Coal.*—Nos. 1 and 2, top and bottom of new dip-seam; thickness, 9 ft. to 14 ft. No. 3, from near dip-fault. No. 4, from splint-seam. No. 5, from the fault (iridescent coal). All these coals are almost precisely the same character, and belong to the class of semi-bituminous coals, as they do not form a compact, lustrous coke like a bituminous coal. In purity and usefulness as fuel they are equal to the average West Coast coal, and superior to the coal first mined at Hikurangi, and also to the Kawakawa coal. The following are the results of analyses:—

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
"Fixed carbon	53·29	53·28	54·03	54·26	57·16
Gas and oil	41·82	41·89	39·94	38·91	35·70
Water	3·62	3·60	3·82	3·01	4·01
Ash	1·27	1·23	2·21	3·82	3·13
	100·00	100·00	100·00	100·00	100·00

"Evaporative powers:—

No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
6·90 or 11·68	6·90 or 11·68	7·00 or 11·91	7·05 or 11·93	7·43 or 12·62

"The first entry of evaporative power gives the pounds of boiling water which the coal will evaporate, as computed on the old formula, and the second is the result computed by the formula now used in New South Wales.

"Nos. 1, 2, 3, and 5 are compact, laminated coals, with bright lustre and black shining streak. The colour of the ash is light reddish-brown. The brilliant iridescence, or 'peacock coal-bloom,' on No. 5 is caused by thin films of silica on the joints of the coal. No. 4 (a splint coal) is very compact and hard, so that it would stand handling well. It has a bright, pitchy lustre, is without lamination, but is cut by joints coated with lime and films of pyrites. Its ash is light-grey, and the streak is dull-brown."

Waikato Coal-mines.

At the end of last year there were four coal companies carrying on coal-mining operations in the Waikato district—namely, the Taupiri Extended, the Taupiri Reserve, Ralph's Company, and the Waikato Coal Company. During the five previous years there were only three companies working coal, as two of them—namely, the Taupiri Extended and Taupiri Reserve—entered into an arrangement with Messrs. Ralph Brothers to pay them a yearly rental of about £500 to close their mine for a stated period. That period expired in May last, and a company was formed to work Ralph Brothers' mine. This brought another company into competition with the others, with the result that the price of coal was lowered to such an extent that it left no margin of profit on working. Ralph's Company and the Taupiri Extended Company, being the only ones who had capital available, decided to amalgamate the two mines, which adjoin each other, and having done this a new company was formed, called the Taupiri Coal Company (Limited), having a capital of £85,000, of which £72,000 is fully paid-up, and the remaining £13,000 in reserve shares not issued, the shares in the company being £1 each. This company has purchased the Waikato and the Taupiri Reserve Coal-mines, and are at present working three of the mines. The Waikato Mine, which contains an inferior quality of coal to that in the other mines, has been closed. This combination has reduced the cost of getting the coal considerably, as it is now under one management—one office, instead of being under four different managements, and having four different offices in Auckland, while the same number of miners are employed in the mines.

It may be stated that the Waikato coal is only suitable for household purposes and local consumption, it being a good class of brown coal, which burns to an ash without leaving any clinker, as is the case with bituminous and semibituminous coal. It is nevertheless a good coal for local industries, where it can be delivered at a cheap rate. The Thames-Hauraki Company use it at its

large pumping-plant, and having furnaces in the boilers specially adapted for burning slack coal, which is procurable at the mines at 1s. 3d. per ton, while the steam coal unscreened is supplied to this company under contract at reduced rates.

Several bores have been put down by both Ralph's and the Taupiri Extended Companies, which prove there is a very large field of coal in their properties, which now comprises an area of nearly 3,000 acres of partially freehold and partially leasehold; the thickness of the coal being over 60 ft. in places, while none of the bores show less than about 20 ft. of coal.

The Westport Coal Company (Limited) Mines, Granity Creek.

The company are rapidly developing an area of their extensive lease at the Millerton Mine. The base of operations is at Granity. The coal-screening and trucking appliances are of the most modern type, comprising fixed and "shaking" screens, tipplers, hoists, automatic weighbridges, also large storage-bins for the mineral. The mechanical appliances are automatically operated by water-power. Large and commodious workshops, complete with powerful and efficient plant, are erected, wherein the whole ordinary requirements of the mine are executed. Capacious stores and other necessary buildings are constructed. Extensive railway-siding accommodation is laid, and every means adopted to facilitate the receipt and despatch of coal-trucks.

The Millerton Mine is situated some distance up the mountain, consequently the conveyance of the mineral to base for screening and trucking is by a system of endless-rope traction, controlled by powerful hydraulic brakes. The lower section of said haulage has a length of 48 chains; gradient of incline, 1 in 3·75; and size of special rope, 4½ in., with breaking-strain of 101 tons. The capacity of mine-tubs conveying mineral is 1 ton.

The whole of above arrangements in detail have been designed and laid down with a maximum degree of strength and permanency, and with a view of effectually dealing with a large output of coal.

The system of working the seam is by bord and pillar, the pillars being designedly left in large blocks to prevent deterioration and for subsequent extraction. The actual winning of the coal is done mechanically, a comprehensive system of compressed air driving the coal-cutting machines, pumps, and haulage-engines used in dip-workings. The ventilation is produced mechanically by Schiele's fan, and the air coursed round face of working-places by bratticing. The whole appliances, &c., connected with operations at the mine have been designed for safely and economically dealing with a large output and to meet rapidly growing trade requirements.

The Westport Coal Company Mines at Denniston.

The Westport Coal Company's mines at Denniston are situated some twelve miles north of Westport, at an elevation of 2,000 ft. above sea-level. The character and quality of the coal are well known throughout Australasia, so there is no occasion to revert to them here. The coal-measures at Denniston contain two seams of coal, called the top and bottom seams; these are sometimes found together, but as a rule are two separate working-seams, with a thickness of from 4 ft. to 20 ft. in each seam, or an aggregate thickness of the two seams of 25 ft. Where the top seam is thick the bottom seam is generally thin, and *vice versâ*. The dip of the coal is variable—at times nearly horizontal, at others dipping as much as 1 in 4, but with a general tendency to dip in an easterly direction. For purposes of management the mines are divided into two sections—viz., Coalbrookdale, three miles in a southerly direction, and Iron Bridge, two miles in an easterly direction, from Denniston; but all the coal from both places is brought to Denniston in mine-tubs by endless-rope haulage, where it is screened and loaded into railway-wagons. Coalbrookdale comprises the Munsie's and Cascade areas.

System of Working: The coal is worked on the pillar-and-bord system, the bords being driven 18 ft. wide, and laid off in squares every 66 ft., leaving a pillar of coal 16 yards square, which is found the best dimensions for safety, and well adapted for taking out the pillars. The method of taking out the pillars is by taking a lift of the coal off the pillars on the side nearest the goaf, and then falling back and taking out another until the whole is extracted. In other cases the pillar is split, and the inside portion nearest the goaf taken out first. The cover over the seam of coal is sandstone-rock, and is only from 50 ft. to 300 ft. in thickness. When the pillars are taken out the ground subsides, and fissures extend to the surface, and, there being innumerable little creeks on the surface, the water finds its way into the mine.

Owing to the elevated position of the coalfield, water-levels can in most cases be driven, and the water drained away. In the Cascade district a water-drive has been driven 65 chains in length, thus enabling a large number of pillars to be worked; and it is doubtful if any pumping-plant could have successfully coped with the water coming into the mine in wet weather from the fissures on the surface.

The mine is ventilated by a Schiele fan 7 ft. 6 in. in diameter, driven by steam-power, and capable of producing 60,000 cubic feet of air per minute.

Haulage: The system of haulage is the endless rope, with two lines of rails—one for empty and the other for full tubs. The rope passes underneath the tubs, and travels at the rate of two miles an hour. As the works extend the rope-road is extended. The gauge of the line is 2 ft.; the empty tubs weigh a little over 5 cwt., and the average weight of coal in tubs is 11 cwt. After the empty tubs are taken off the rope they are conveyed by horses to convenient sidings, where the truckers take them to the working-faces to be filled with coal, and they are then returned by the same means to the rope-road, where they are attached to the rope by means of short sling-chains; and this after repeated trials has been found to be best suited for the haulage system at Denniston, with the varying dips and curves. At Coalbrookdale there are two endless-rope planes. The Cascade, which hauls the coal out of that section, is 60 chains in length, with a rise against the load of 260 ft.; and there are three curves in this length. The ropes in use on all the endless-rope planes are 3½ in. in circumference, best plough steel, and are worked by a pair of vertical Tangye

engines, 12 in. cylinder, 14 in. stroke, geared 20 to 1, the surging-drum being 9 ft. in diameter, and the rope having three turns and a half round the drum. The output from this section is some 300 tons per day. After traversing the Cascade rope-road the tubs are transferred to the Coalbrookdale endless rope, as also are those from Munsie's section, which produces some 150 tons of coal per day. The Coalbrookdale rope-road is 90 chains in length, with a fall in favour of the lode of 60 ft., the hauling-power in this case being a pair of vertical engines, 8 in. cylinders and 9 in. stroke. This section of rope-haulage is on the surface, and runs alongside the south branch of the Waimangaroa River, and terminates at the wooden bridge, where the coal is all taken off and put on to the main haulage-rope to be conveyed to Denniston. The Iron Bridge section of haulage intersects the main haulage-rope road 30 chains from the wooden bridge. This section of rope-road crosses the south branch of the Waimangaroa River by a lattice-girder iron bridge, 200 ft. in length, with one 40 ft. and two 80 ft. spans, at an elevation above the river-bed of 90 ft. The length of the rope-haulage road is 60 chains, with a rise against the load of 270 ft.; the dip is variable, the steepest grade being 1 in 4. The hauling-engines, which are a pair of Tangye's vertical engines—8 in. cylinders, 9 in. stroke—are placed underground alongside the main haulage-rope road, where the coal is transferred from the Iron Bridge rope-road to the main haulage-road, to be taken to Denniston. The main haulage-engine is situated at Denniston, and deals with all the output from Coalbrookdale and Iron Bridge sections. The length of the main rope-road is 130 chains, and the grade is variable throughout, there being a rise against the load of 60 ft., and also four curves. The mine-tubs are attached to the rope, about 11 yards apart, and the total output delivered at Denniston is from 750 to 800 tons per day. The engine is a single horizontal 20 in. cylinder, 4 ft. stroke, geared 4 to 1. Steam is generated by three Lancashire steel boilers, 5 ft. diameter, 27 ft. long. The ropes on all the endless-rope sections are 3½ in. circumference, and are of the best plough-steel. The seam of coal now being worked in the Iron Bridge section is the top seam, which is over 20 ft. thick; the lower seam has been proven 90 ft. below this seam, and is 9 ft. thick. All the workings are in the solid, and are worked on the same system as that described at Coalbrookdale. The whole output from this section—300 to 350 tons per day—is mined by pick-machines, thus doing away with the most dangerous and arduous work of the miners. The pick-machines in use are worked by electric power generated at Coalbrookdale, some two miles and a half away, and is transmitted over the surface by bare copper cables. The electric installation consists of a compound dynamo wound to 400 volts and 110 amperes, and is driven by a pair of horizontal steam-engines, 12½ in. cylinders and 18 in. stroke. The percussion pick-machines in use are made by Morgan, Gardner, and Co., and have an 8 in. stroke, and strike 180 to 200 blows per minute. The dynamo, in addition to supplying power for driving pick-machines, also supplies power for the following: One 10-horse-power motor for hauling out of dip-workings; one 5-horse-power motor for working a 3-throw pump, with 6 in. rams and 7 in. stroke, for forcing water 150 ft., and also for lighting the main roads and various working-places in the mine. Water-power is also utilised, driving a 5 ft. Pelton which works a 3-throw pump, same as described above, to force water 30 ft.: a 4 ft. Pelton wheel is also used to drive a self-contained Schiele fan 4 ft. 6 in. in diameter (capable of producing 30,000 cubic feet of air per minute), which ventilates the mine. In addition to this there is a duplicate fan, should repairs be required at any time.

Denniston: The company's workshops are situated here, consisting of blacksmith's and fitter's shops (containing four fires, drilling-machines, steam-hammer, punching- and shearing-press, screwing-machine, and lathes), carpenter's shop, and stores; also the office and manager's residence. The coal, after being taken off the endless rope at Denniston, is automatically weighed, and is then screened. The screens in use have self-acting tipplers with bar-screens and jigger-screens, and travelling-belt, by means of which the coal is placed into railway-wagons with a minimum of breakage. The storage-accommodation for unscreened coal is 1,000 tons; and there are three lines of railway under the bins, the doors of which are opened and shut by hydraulic power working at a pressure of 400 lb. per square inch. The coal, after being loaded into railway-wagons at Denniston, is lowered to Conn's Creek by means of hydraulic brakes—a distance of 83 chains, with a fall of 1,671 ft. This is divided into two sections—viz., the upper and lower inclines. The upper incline is 34 chains in length, with a fall of 801 ft.; the grade is variable, the steepest grade being 1 in 1·34. The full wagons descending pull up the empties, and the speed is controlled by a pair of hydraulic engines with 13 in. cylinders, 3 ft. stroke, with a drum 9 ft. 6 in. in diameter. Pass-pipes are connected from each end of the cylinders, with pass-cock in middle of pipe, and the speed is regulated by opening or closing it. The weight of the full wagon is nearly 11 tons, and the empty wagon 4 tons 10 cwt. The ropes are 4 in. circumference. The lower incline is 49 chains in length, and the fall 870 ft.; the grade is also variable, the steepest grade being 1 in 2·02. The hydraulic brakes are the same as on the upper incline, except that the drum is 10 ft. in diameter, and the ropes are 3½ in. circumference.

At Conn's Creek the company have stores for receiving goods, and extensive railway-sidings, also a branch railway-line, one mile and a half in length, which connects with the Government railway at Waimangaroa Junction.

The mines at Denniston afford employment for about 350 men and boys.

Brunner Colliery.

The Brunner Mine, which is the property of the Greymouth-Point Elizabeth Railway and Coal Company (Limited), is situated on the banks of the Grey River, distant about seven miles from Greymouth, the port of shipment for coal and other products. The leasehold in which this property of the company is situated has an area of 1,280 acres, and is part of the Grey District Coal Reserve. At Brunnerton the colliery consists of what may be termed two separate mines or sections, as there is no connection underground. These mines are called respectively the "rise" and the "dip" mines. There are also coke-ovens and brickworks in connection with mines.

The coal is raised to and prepared for market at one loading-stage which is common to both mines. The coal when brought to pit-bank is first weighed, the miner being paid on the gross weight he fills. The tub is then emptied on to a vibrating screen, where the round coal is separated from the small, the round coal passing on to a picking-table, 20 ft. in length, where all stone and impurities are picked out. The round coal passes direct from picking-table to railway-wagon. The small coal passing through vibrating screen (which consists of wire netting with meshes $\frac{3}{4}$ in. square), drops on to a set of scrapers which convey the coal to a pit; from this pit it is raised by means of two sets of bucket elevators to two revolving riddles or screens, where it is separated into two sizes of coal, called "nuts" and "slack." These two classes of coal are passed into storage-bins until such times as required for shipment. The total capacity of these bins is about 1,000 tons. For use in the coke-ovens, and some special requirements, part of the slack coal is passed through a trough-washer to remove the fine impurities.

The engine driving all the pit-bank machinery consists of a single horizontal engine, 12 in. cylinder, 18 in. stroke. The workings in these mines were originally formed on what is known as the "bord and pillar" system, and the coal is now almost exclusively obtained by the extraction of these pillars.

The Rise Section: In this section no mechanical power is required for haulage, the loaded tubs bringing up the empty ones. The coal in this section is all obtained from extraction of pillars. The average rise and dip of seam is 1 in 4. Below the coal in this seam is obtained the fireclay used in the brickyard. The adit-level in this mine is driven into face of hill at a height of over 400 ft. above river-level. The coal is lowered from level to pit-bank by a self-acting incline 35 chains in length, partly in the open and partly tunnel. In the tunnel portion the bank passes through old workings. A drive has been put into workings here, the object being to prove existence of coal and also to connect with rise workings, so far as the roads are in. The existence of 50,000 tons of coal has been proved, and it is expected much more will be obtained, as there is to the dip side of the adit-level solid coal which cannot be worked from the level, but could be in time by means of this drive. In the rise section there still remains over 60,000 tons of coal to work. The method of ventilation in the rise section, which is completely free from gas, is natural means.

The Dip Section: The coal in this section at present is all obtained inside a large downthrow fault. Two-thirds of the output is from extraction of pillars, the remainder from splitting into pillars a block of solid coal left in first working. At present operations are in progress for extracting coal-pillars left in to the rise, as the number of working-places in dip are becoming limited. This mine is worked with a double shift of men. The workings being to dip, mechanical power is a necessity. The adit-level, which is about three-quarters of a mile in length, is worked by endless haulage. The engine driving the haulage, being a single horizontal hauling-engine, 20 in. cylinder, 3 ft. stroke, and geared 4 to 1, is placed at mine-mouth. The coal is brought from head of dip-incline to pit-bank by this haulage, the tubs being affixed to rope by means of a chain, and are hung on three at a time. The main dip-incline is worked by a pair of coupled horizontal hauling-engines, 10 in. cylinder, 18 in. stroke, with 8 ft. drum. This engine is also placed on surface, and hauls six tubs up each race. The empty tubs take back the rope. Inside this fault-line there are not less than 100,000 tons of coal to be worked out. The water in the dip-workings is pumped out by a 3-throw pump, with rams 8 in. in diameter and 16 in. stroke. The pump is worked by a rope driven by a dynamo placed at head of dip. The electricity to drive this motor is generated on the surface, the generator being driven by a Robinson and Williams central-valve engine, the current being conveyed to motor underground by lead-covered specially insulated cable, 17/16 gauge.

The ventilation for this mine is produced by means of a Scheile fan, 9 ft. 6 in. diameter, belt driven by a horizontal engine, 10 in. cylinder., 20 in. stroke. The miners in this mine work with Marsaut safety-lamps, which are supplied, cleaned, filled, and trimmed by the company.

Between fault-line and mine-mouth there are a number of coal-pillars standing, and as the coal in these pillars is very high, being from 10 ft. to 15 ft. in thickness, there should be not less than 200,000 tons to win out. In the present position of the dip-mine it is not expedient to work on the outside of the fault, but in the course of a year or eighteen months a start could be made.

The steam required for all engines is obtained from two Lancashire boilers, 30 ft. long, $7\frac{1}{2}$ ft. diameter, and a double battery of Babcock and Wilcox tubed boilers. The surface is lit up by electricity.

The mine has a blacksmith's shop, with three fires, punching-, shearing-, and boring-machines; also a carpenter's shop, with Tangye lathe and circular-saw.

Coke-ovens: There are at mine twenty-four coke-ovens of the Beehive pattern. This number, however, is more than sufficient for the present requirements of the colony. The number at work varies from eight to sixteen, as trade demands. The coal used in ovens is slack coal, which has been washed in trough-washer.

Brickyard: The works consist of a grinding- and pugging-mill, two drying-sheds, and four kilns. All kinds of fireclay goods are manufactured, including gas-retorts, locomotive fire-blocks, bakers' and maltsters' tiles, boiler-blocks, all sizes and shapes of tiles, and ordinary sizes of fire-bricks. There is also manufactured for local consumption common clay bricks, the clay for which is obtained on surface and mixed with a small proportion of fireclay.

The Blackball Mine.

The Blackball Coal Company's mine is situated at Blackball, on the west side of the Grey River, and three miles from Ngahere, the nearest railway-station on the Midland Railway Company's line to Reefton. It was opened for the output of coal on the 23rd October, 1893.

Two seams of coal are being worked, the one lying on top of the other, separated only by a band of stone varying in thickness from 3 ft. to 7 ft. The average thickness of the bottom seam is 12 ft., and of the top seam 5 ft. The bord-and-pillar system is the one adopted in working the mine. A tunnel, some 1,200 ft. long, driven in the side of the hill connects the workings with the surface,

and at the point where this cuts the coal levels are turned away east and west in the bottom seam. Parallel levels are driven at a point 150 yards to the rise of the first, and out of these levels at intervals of 100 yards headings are driven to the full rise of the seam. These are continued till they reach the upper levels. Bords are driven at right angles to the headings every 22 yards (from centre to centre), thus forming pillars 100 by 16 yards. These bords are driven 50 yards from each side, and when completed the rails are lifted and the timber drawn. The stone roof then falls, and the rails are again laid on this floor and the top coal taken down. The roof over the bottom seam requires a great deal of support, and a large quantity of timber is used in this way. The levels and headings are secured with sets placed 2 ft. 6 in. apart. In the bords the roof is generally supported with props only, but where it is very soft sets are put in, and 2 ft. or 3 ft. of coal is left next the roof to help support it. The roof of the top seam requires very little support, it being composed of hard sandstone. The props used in the headings and levels are from 8 in. to 10 in. in diameter, and those in the bords 5 in. to 8 in. The inclination of the seams varies from 1 in 6 to 1 in 10.

Ventilation is produced by a furnace placed near the outcrop and connected with the surface by a 70 ft. shaft, on top of which is built a brick stack 35 ft. high. The air is carried to the working-faces by brattice, which is so placed in the levels and headings as to form an intake of 7 ft. and a return of 3 ft. In the bords it is nailed to the props on the low side of the road to form an intake of 8 ft. and a return of 10 ft. The volume of air passing is 16,500 cubic feet per minute.

The workings are connected with the surface by an endless rope, driven by a Tangye 10-horse-power vertical engine. This rope carries the empty tubs in and the full ones out. Jig-wheels and ropes are used to connect the endless rope with the working-places, the lowering of the full tubs bringing the empty ones in. Horses are also used in some of the levels.

An aërial tram is the means adopted for carrying the coal from the mine to the screens at Ngahere. Thence it is conveyed by Government railway in trucks to Greymouth. Bins are erected at Ngahere to hold 600 tons of coal, and a siding is put down for purposes of loading and shunting. The length of the aërial tram is 2 miles 70 chains, and it crosses Blackball Creek, the Grey River, and half a mile of swamp. It was erected by Messrs. Bleichart and Co., a German firm, and is known as "the standing wire-rope system." The carrying ropes or cables consist of solid twisted wires, the one carrying the full buckets being $1\frac{3}{8}$ in. in diameter, and the one carrying the empty buckets 1 in. in diameter. The hauling-rope, to which the hangers carrying the tubs are attached, is $\frac{3}{4}$ in. in diameter, and it travels at a speed of three miles per hour. The tubs carry 8 cwt. each, and there are 130 on the line at a time.

The cables are carried on standards, fitted with a shoe in which they ride. Each standard is also fitted with a roller on each side for carrying the hauling-rope. The total number of standards is seventy-three, and the height of the highest is 81 ft. The length of the ropeway is divided into three sections, and at the end of each section is placed a terminal station. This consists of an anchorage for one set of cables, and also a counterbalance for the other set. The whole is driven by a horizontal engine of 20-horse power. When the full tubs arrive from the mine they are detached from the wooden trollies on which they run, and attached to the hangers on the aërial tram. On arrival at Ngahere they are emptied either over the screens into railway-wagons or into the bins, and returned to the mine, where they are once more detached and sent into the mine. Total number of tubs in use, about 340.

The average output per day of eight hours is 240 tons. The output for last year was 52,835 tons, or a little over 1,000 tons per week; and the total output since the opening of the mine is 227,063 tons.

The property is freehold, and is owned by Sir Edwyn Dawes.

Kaitangata Colliery, Otago.

In 1890 an English company was formed to acquire the leasehold of the Castle Hill property at Kaitangata, and was registered under the title of "The Castle Hill Coal Company (Limited)," Mr. R. Lee, of Dunedin, being managing director. The company opened out a mine and commenced business in competition with the other coal-mines of the district; but after working for some time it was found that the Castle Hill leasehold was troubled with faults and other difficulties, and that the demand for brown coal was not sufficient to warrant the existence of two large competing companies. Mr. Lee subsequently went to England, and whilst there was instrumental in forming a syndicate which has taken over the Kaitangata Colliery and railway, the Castle Hill Colliery, and the shale deposits at Orepuki in Southland. At this latter place it is intended to manufacture oils from the shale, and preparatory works have already begun. The new company will be known as "The New Zealand Collieries, Railway, and Oil-works Company (Limited)."

ELECTRICITY AND MINING.

[Paper contributed by ERNEST J. FENN, A.I.E.E.]

Cheap power is in mining, as indeed in all industries, one of the most vital necessities. Steam has revolutionised the industrial world, and in most countries, especially in England, manufactories have sprung up round the coalfields. The work has been brought to the power, and not the power to the work. In mining, however, the work cannot be brought to the power, and in many cases the cost of bringing fuel to the mines is so great that, although otherwise the mines may be of great value, the cost of power absorbs all margin of profit. This especially applies to low-grade mines, of which we have so many examples in New Zealand.

Water-power, which was utilised long before the advent of the steam-engine, and which is far cheaper than the latter, has done an immense deal for mining; but in spite of the amount of natural water-power available in almost all the mining districts of New Zealand, in many cases it is running

to waste and steam-engines are being used, and that in places where coal is expensive. Again, in how many cases have long and expensive tramways been constructed to convey ore to the power.

It is only within the last few years that electricity has been proved to be capable of transmitting power from the point where available to where required. Other means of transmission have been used, but their lack of efficiency and the small distances through which they can act have greatly limited their use. In electric transmission these difficulties have entirely disappeared. An efficiency of 70 per cent. can easily be obtained in most cases of transmission of power by electricity, and for short distances, and where the power to be transmitted is large, this figure can often be greatly exceeded. The ease and rapidity with which the connecting-wires can be carried over mountains and gullies is now well known. The small attention the plant requires, and the freedom from breakdown of machinery as now constructed, all tend to show that electricity is an ideal transmitter of power.

In the early days of electrical work many difficulties were met with, but the fascination of the subject attracted the foremost scientific men, and the improvements in electrical machinery have followed one another so fast that, although the industry is yet young, it is hardly an exaggeration to say that the science of electrical engineering is at the present time as far advanced as any other science.

The system of electrical transmission may broadly be divided into two classes—namely, continuous or direct current, and alternating current. The latter may again be divided into single-phase and two- and three-phase alternating current; the two latter being usually classed together as polyphased currents.

In the earlier days the continuous current was the only system employed, and for short distances and for several classes of work—notably tramways—it still holds its own. In New Zealand a continuous-current transmission plant was supplied to the Phœnix Mine, Skipper's Creek, Otago, and though erected in the earliest days of electrical work, has worked and is still working economically and efficiently.

For general transmission purposes alternating currents are now rapidly superseding continuous currents. The ordinary single-phase alternating current has not proved suitable for large transmission plants, for, although single-phase motors can be constructed to work both well and efficiently, they are difficult to start, some types having to be run up to their normal speeds by extraneous means before the current is switched on. Other types constructed to work on the lines of the polyphased motor are self-starting, but on no load only. The question of self-starting under a load has been solved by the polyphase alternating-current motor.

Professor Galileo Ferraris was the first to demonstrate the use of polyphased or rotary currents. Mr. Nikola Tesla, the well-known American electrician, working on the same lines, simultaneously but independently of Professor Ferraris, was the first to show polyphase motors in actual work.

Without attempting in this article to describe the polyphase-motor, a few reasons may be given for its superiority over the continuous-current motor for long-distance work. In the continuous-current motor the current is led to the armature or revolving part by brushes which make contact with the commutator. The voltage at which the continuous-current can be used is thereby greatly limited, as the commutators give a great deal of trouble at the higher voltage. Two thousand volts may be considered the extreme practical limit for power work, although arc-light machines have been made to work satisfactorily at much higher voltages. In the polyphased motor the current is led to the stationary portion of the machine, or "stator," as it is called. The revolving part or rotor has no connection with the circuit. The rotor usually consists of a drum made up of sheet-iron stampings, and is very similar in appearance to the armature of a continuous-current machine. The windings of the rotor consist of copper rods passed through longitudinal holes near the periphery; these rods are short-circuited with one another at the ends of the rotor, and the only current which flows through them is that induced by the variation of the current in the coils of the stator.

When power has to be transmitted great distances it is necessary, in order to keep the loss in the line low and to reduce the amount of copper required, that high voltages and small currents should be used. The alternating-current transformer gives us the power of transforming the current from a low to a high voltage and *vice versâ* without appreciable loss of power. We can therefore generate the current at a low tension and transform it in stationary transformers to whatever voltage is required. At the motor end of the line it can again be transformed by stepdown transformers to a low voltage.

The system to be used and the most economical voltage for any transmission scheme needs careful consideration in each case. The following will give a rough idea of the best practice:—

Up to one mile; voltage, 250 to 500. System: Continuous current.

From one to five miles; voltage, 1,000 to 3,000. System: Polyphased alternating current, the current being generated at full voltage, but transformed down to low voltage (say, 200 volts) for small motors, and used at full voltage for large motors (50 horse-power and upwards).

From five to fifty miles; voltage, 5,000 to 30,000. System: Polyphased alternating current; current generated at a medium voltage (500 to 1,000 volts), transformer up to necessary high voltage; at motor end transformed down to low voltage before being led to motors.

To sum up, the polyphased system gives us the power to transmit power from any point where available to, say, fifty miles distant, and, for very large powers, even greater distances, the dynamos used having no commutators, the current being generated at low pressure, transmitted at high pressure by small overhead wires, and utilised at the motors at such a low pressure as to permit of the wires being handled with impunity, the motors themselves being one of the most simple

machines known, and requiring almost no attendance. With these capabilities, and with the vast amount of water-power running to waste in New Zealand, what a large field is opened up for future work, and how many mines that are now languishing for want of power can be economically worked.

Winding, pumping, and, indeed, any work that can be done with a steam-engine can be done equally well, and in some cases at one-tenth of the cost, by electro-motors. For mine-haulage electricity can be used in places where want of space and the difficulty of ventilation entirely precludes the use of the steam-engine.

Even where water-power is not available, great economies may be effected by the use of electricity. In large mining properties power is required in many different places, and it is not uncommon to see half a dozen steam-raising plants scattered over a quarter of a square mile, each plant with its own stoker, small simple engines, long lengths of steam-pipe, every foot of which means extra coal to supply the steam lost by condensation. By using electricity one large generating-plant can be erected in the most suitable site, triple-expansion engines giving high efficiency can be used direct, coupled to large dynamos, one battery of boilers to furnish the steam, with one-half, or even one-third, of the number of attendants that would be required by isolated plants.

The larger boilers in many instances can produce 50 per cent. more steam per pound of coal than small separate ones, and the engines produce from two to three times the power per pound of steam. The little waste—say, 20 to 30 per cent.—occurring in transmission is vastly outweighed by these economies. In some of the large shipbuilding yards in England the cost of power has been reduced by 50 to 60 per cent. by the adoption of electrical power, and there is no reason why mining companies should not be able to effect the same economies.

Electrical coal-cutting machines have been adopted by many of the largest collieries, and indeed in few of the coal-mines of the world is electricity not now used in some way or other. The Westport Coal Company were the first in New Zealand to carry on coal-cutting by machinery. In the Denniston mines of that company almost all the coal-cutting is done by the electric pick-machines (or "electric iron men"). The current is generated by a steam-engine driving a dynamo outside the mine, and is led into the mine by overhead cables. Flexible wires are led from the main cables to each machine, so that these can be moved about at will, and connected to or disconnected from the mains at a moment's notice. The voltage used in this case is only 250 volts, so that no harm can be done to any person making accidental contact with the wires. Each machine is doing the work of six men, and can be operated by one man and a boy. The amount of slack made is considerably less than by hand-cutting. The Westport Company have now over thirty of these machines at work, and six tons of copper wire are employed in carrying the current through the mine.

Other examples of electrical power other than those mentioned may be seen in New Zealand. The New Sandhills dredge is driven by electric motors, the current being generated by water-power, and led across from the river-bank to the dredge by flexible wires. An electric pumping-plant has been for many years and is still successfully working in the Brunner Mine. The Talisman Gold-mining Company drive all their berdans, cyanide and vacuum pumps with an electro-motor, which receives current from the same dynamo which lights the battery and reduction-works. A winding-plant has just been erected underground for the Waitekauri Cross Gold-mining Company, the power for this being obtained from Pelton wheels driving a dynamo two milesdistant.

These are the chief electric-power plants in New Zealand. Many very much larger schemes are being projected, and it is to be hoped that in a few years the mining engineers of New Zealand will take advantage of electricity in the way that it is being used in other countries, especially America. In that country, so firmly is the electrical industry established that no mining engineer will purchase a steam-engine until he is thoroughly satisfied that there is no water-power near that could be utilised for generating electricity.

Whilst the progress of electric power has been slow here, electric lighting has come to the fore amongst mining men. Every large battery that has been erected in New Zealand within the last three years has been equipped with an electric-lighting plant. So great has been the economy effected by this mode of lighting that from actual records taken of the cost of lighting all the batteries in the Upper Thames Goldfields it was found that the average saving by electricity as against kerosene amounted in thirteen months to the whole cost of the electric plant, including the Pelton wheels or turbines used to drive the dynamos. During the last four years, which covers the writer's knowledge of the Thames Goldfields, not a single case of a burnt armature has occurred, nor has any dynamo required other repairs than a new pair of brushes or the occasional turning-up of the commutator.

Though not directly connected with mining, it may be of interest to many to know that two of the Northern Steamship Company's steamboats trading with the Auckland goldfields have been equipped with searchlights to facilitate the navigation of the narrow and tortuous River Thames by night.

THE WHEREABOUTS OF THE TITANIUM THAT IS CONTAINED IN THE SO-CALLED "IRONSAND" OF TARANAKI.

[By WILLIAM SKEY, Analyst to the Mines Department, Colonial and Government Analyst.]

It has been, and is now, generally supposed by those people who have thought about it that our so-called "ironsands" of the Taranaki coast contain their titanium as associated with iron in the mineralogical form known as "menaccanite," or titaniferous iron—that, in fact, the magnetite of these sands, or that part which rises freely to a magnet of moderate power, is practically free from this element (titanium)—and this opinion has recently been supported by Mr. Purser, a member of the Wellington Philosophical Society, at a meeting thereof, as also by certain comments upon the paper read by him.

These opinions do not, however, appear to be correct according to the evidence which I here adduce. It was during some analyses and experiments that I was making in connection with the sifting of this ironsand on behalf of Mr. Coubrough, for testing the value of this process for metallurgical purposes, that I began to suspect the titanium of this sand to be in larger part present in the magnetite thereof, and I therefore at once proceeded to test the matter. By the aid of a magnet of rather low power, operated with at a little, but a fixed, distance over the sand, I separated it into two parts—(*a*) that easily affected by the magnet (magnetite), and (*b*) that not affected under the circumstances (the siliceous part, &c.); and I analysed each part separately for the metal titanium.

In the following table the proportions of each are given as on the normal sand, and also the proportion of titanium therein respectively:—

		Titanic Acid per Cent.
(*a*) Magnetite per cent.	72·16	5·49
(*b*) Siliceous part and menaccanite	27·84	·44
	100·00	5·93

It is thus shown that the titanium of this sand is for all practical purposes present as a part of the magnetite itself—that is, of the mineral that is the first to be separated by the magnet.

Two other samples of this sand, as taken from different parts of the coast, when qualitatively tested gave results that proved their chemical constitution to be practically similar to that of the sand thus analysed. These results appear to have an important bearing upon at least two of the processes projected for purifying these sands from titanium. The absolute worthlessness of the electro-magnetic, also the sifting, process for this object is so plainly manifested here as to be incontrovertible. Besides this, in regard to the sifting process, it should be stated here that the sand, as sifted by Mr. Coubrough, did not practically differ in this respect from the normal sand, as shown by the results of Messrs. Pond and McLaurin, also by those of myself.

TREATMENT OF GOLD-ORES IN THE HAURAKI PENINSULA.

[By Mr. A. H. Bromley, in the *Engineering and Mining Journal*, New York.]

The Hauraki, or Coromandel, Peninsula forms the extreme north-east corner of the North Island of New Zealand, the City of Auckland lying forty miles to the west across the intervening Hauraki Gulf. The various gold-mining centres are scattered and in some cases difficult to cross-country access, but the whole peninsula is, roughly speaking, auriferous. Productive belts and areas alternate with barren, but, taking the district as a whole, the mines and camps are quite uniformly distributed. The characteristics of the ore-bodies and their contents, however, differ considerably, according to locality.

The reefs of the Lower Thames and Coromandel are mainly free milling at surface, although, owing to the gold being finely divided, cyaniding of tailings is requisite and practicable. The distinguishing features of these districts are rich shoots and patches of comparatively free-milling ore. On the other hand, the reefs of the Upper Thames have proved generally difficult of treatment by the ordinary methods, and after much failure and experiment dry crushing and cyaniding have been adopted. Here the reefs are frequently large, present evidences of comparatively recent hydro-thermal origin, and carry the gold extremely fine and more uniformly distributed through the quartz. In spite of the successful results of this treatment, efforts are being made, owing to its cost, to return to wet crushing, and several plants are in course of conversion. Probably dry crushing will before long almost entirely cease to be practised.

Before considering some typical plants, it should be said that all through the peninsula the payable reefs occur almost entirely in andesite. The geology of the fields shows a complex volcanic formation resting upon slate, into which it is not intended to here enter at length, as elaborate reports have been published upon the same.

Waihi Gold-mining Company.

This company's mine is situated in the Township of Waihi, Upper Thames. The principal reef, known as the Martha, has been worked for many years, being a powerful lode widening out at parts to close upon 40 ft. It has been extensively opened up, the present workings attaining a depth of 300 ft. In the course of exploitation the Welcome and other reefs have been discovered. The ore is a close, hard, white quartz, in parts of a flinty appearance, and carries its value very finely disseminated, visible gold being rarely seen. Very fine crushing is necessary, it being found that pulp above 40-mesh retains gold that cyanide fails to reach. In consequence of this fine reduction, and also owing to the presence of clay, the pulp is very slimy, and with wet crushing packs in the vats so as to be unleachable. Various methods of treatment were tried, with indifferent results, prior to the adoption of the present system of dry crushing and cyaniding, by which an extraction of 90 to 92 per cent. is obtained. The difficulty is entirely mechanical, due to the fine state of the gold, and not in any sense a chemical one. The ore is first roasted in kilns with wood fuel—burned is really a better term—to dry and render it more friable for crushing. The company possesses two plants: the old mill at Waihi and the new Victoria battery at Waikino, started up in March of this year (1898). The old mill consists of ninety stamps, 900 lb. weight, which at ninety-two drops per minute crush 125 tons (of 2,240 lb.) per twenty-four hours through 40-mesh wire screens. The pulp is elevated into storage-hoppers, whence it is trammed and dumped into the cyanide vats. This system of filling prevents either packing or the formation of layers of clayey slime, and enables leaching to proceed satisfactorily. The details of cyaniding call for no special comment, special precipitation being used. The tailings are finally sluiced out, there being no amalgamation.

Through the courtesy of the Waihi Company the following details of cost are available, being calculated upon the tonnage stamped of dry ore. As the ore mined and transported is somewhat more before than after burning, the cost per ton for these two items is rather less than is given:—

		Per Ton.
Mining		$2·673
Transport of ore to kilns		0·045
Roasting ores		0·516
Crushing through rock-breakers		0·184
Stamping		0·753
Extraction of bullion—		
Cyanide and zinc	$0·654	
Royalty, proportion written off	0·116	
Steam-power, wages, and sundries	0·232	
		1·002
Assaying and melting		0·182
Repairs and renewals		0·314
Mine officers' salaries		0·256
Rent of Auckland office, and salaries		$0·058
Insurance, taxes, law, surveying, reports, telegrams, &c.		0·238
Rent of licensed holdings		0·014
Government duty on gold		0·434
Freight, insurance, and realising bullion		0·187
Directors' fees, including local board in New Zealand		0·238
London auditor's fee		0·004
Offices, secretary, and clerks		0·094
Sundry London expenses		0·056
Total, per ton, upon 40,764 tons		$7·291

In 1897 there were treated in this mill 40,764 tons ore, for a bullion yield worth $687,348, equivalent to a value of $16·86 per ton. As the extraction averages about 90 per cent., the gross value of the ore was therefore $18·72. The total expense per ton of mining, milling, London, and all other charges was $7·28.

The new Victoria battery contains several features of interest, and is situated five or six miles from the mine, at Waikino, upon the Ohinemuri River. The kilns and rock-breakers are situated upon rising ground at the back of the battery, which latter, with the vat-house, occupies a level site.

The ore is brought by a ground-tram from the mine to the kilns. After burning, it passes through a gyratory breaker of the Gates type in a separate building, and thence is trucked to the stamps. The battery consists of a hundred stamps, of 960 lb. weight, arranged in a single line. Water-power is used, there being two Gilkie's turbines of the vortex type. The drive from the motors is situated in the middle of the battery, with fifty stamps on either hand. The mortars have back and front discharge, and two corresponding lines of worm conveyors. Automatic feeders are provided. Crushing through 40-mesh wire screens, the duty at ninety drops is 1·5 tons per stamp per twenty-four hours, the bulk of the product passing 80-mesh.

The battery contains a feature common to many New Zealand mills — cast-iron guides. They are made very deep, about 18 in., with recess for lubricant at the top. For dry crushing they are simply bored out, and for wet crushing are frequently run in with white metal. The universal opinion is that they are unequalled, especially for dry crushing, and do not wear the stem appreciably. It also appears that the wear-and-tear of shoes and dies is less with these dry-crushing mills than with wet. Probably they are run with a deeper bed of ore upon the dies, and, judging from the noise, this would appear to be the case.

The worms discharge the pulp to the conveyor, which delivers to the vat-house, some 225 ft. distant. This conveyor is a steel-tube way, 15 in. in diameter, mounted upon anti-friction rollers, and fitted with an internal fixed spiral. The whole rotates, being driven by an independent Pelton wheel.

The vat-house contains ten concrete rectangular vats, five on each side. Each vat is 50 ft. by 40 ft., and, filled to a depth of 2 ft., contains 150 tons, or one day's supply. The pulp is delivered from the main conveyor to a rubber-belt elevator, discharging into a cross conveyor in the roof at right angles to main axis of the building. This again supplies two conveyors, one in each roof-truss, running the length of the house and central with each row of five vats. These three conveyors are of the same type as the main one connecting battery-shed and vat-house, and driven by the same motor. Over each line of vats is a traveller fitted with traversing gear and hopper. The pulp spouted down from the overhead conveyor is thus evenly distributed in the vats, and, being gently dropped in, does not pack. The filter-cloth is laid over a wooden-slat grating and caulked down with rope. No storage-hoppers exist, as, owing to ample vat-capacity, the vats themselves fulfil the same object. Down the centre of the house is an alley-way for pipes, floored with cement, drains being provided to catch any leakage. The pipes are laid with running joints at intervals, for disconnection and removal of internal deposits.

Zinc precipitation is used, in wooden boxes. The remainder of the plant consists of two Tangye pumps with interchangeable connections, vacuum pump, two steel vacuum cylinders, two wood vats for waste liquors, and one iron mixing-tank. The tailings are sluiced out with water, and all mixing and running-on of liquors is done in the day-time, to reduce night-work to a minimum.

The adoption of such large vats of concrete is a bold experiment, especially as the district is by no means free from earth tremors. Great care was taken with the foundations, and the concrete-work well tied in with wire. In March, 1898, the plant had only just gone into operation, but no trouble had been experienced. In spite of this new installation the company is experimenting with a view to the possibility of wet crushing. The adoption of this would mean increased output from the plant, and dispense with the expensive burning of the ore.

Waitekauri Gold-mining Company.

This company's battery is situated in the Township of Waitekauri, ore being brought from the mine a distance of four miles by ground-tram. The ore is very similar in appearance to the Waihi, the better grade being marked by wavy chalcedonic-like bands. From the kilns the stone is

trammed to the mill. The battery consists of forty heads of 1,000 lb. stamps, with rock-breakers and automatic feeders. With a 6 in. drop, ninety-five per minute, the duty through 40-wire mesh is about 1·6 tons per stamp in twenty-four hours. Both steam- and water-power are provided. At the centre of the battery an elevator delivers the pulp to bins standing parallel at the back. From these the sand is trucked and filled by hand into twenty-nine vats. The tailings are sluiced out, and formerly were passed over amalgamated plates, which are not now in use. Zinc precipitation is used in five boxes. Two of these are of cement, but are not lined. The solution strength is 0·5 per cent. The ore has proved difficult to treat. It carries copper, which, going into solution, precipitates upon the zinc shavings with the gold. The zinc thus becomes copper- and gold-plated, and no slimes are formed. At the clean-up, therefore, all the zinc has to be smelted, yielding a bullion about 0·230 fine. The burning of the ore is also probably prejudicial, as the sulphides, not being properly oxidized, become converted into sulphates. In 1897 the yield from 23,146 tons was $252,431, or, say, $10·76 per ton, and, as the extraction averages 80 per cent., the gross value of the ore is therefore about $13·44. This also includes the output from a small ten-stamp mill and cyanide plant at the Golden Cross Mine. As these are old light stamps, it should be an economy of labour to relegate them to the scrap-heap and add more stamps to the main battery.

An interesting fact in connection with dry crushing was discovered during experiments with a Krupp ball-mill, the pulp from same when crushing through 60-wire mesh being coarser than the battery pulp crushes through the 40-mesh. The company is constantly experimenting in the effort to attain improved results, which may probably be found by changing to wet crushing.

At the Komato Reefs a conversion of plant has recently taken place from dry to wet. The vats have been fitted with an internal ring-launder for the overflow, and the water reaches the same by filtering through a screen of filter-cloth. This has proved successful in retaining all the sands and slimes. By using a special form of revolving distributor and filling into water-full vats satisfactory percolation is attained, and extraction is claimed to be 93 per cent., or slightly higher than previously.

The Woodstock is also experimenting with similar modifications. In one case at least cyanide solution is used in mortar-boxes. The writer has no personal knowledge of details, but presumably the solution is circulated and periodically passed through the extractor-boxes.

Moanataiari Gold-mining Company.

Numerous wet-crushing mills exist calling for no special description, but the new mill of the Moanataiari Company at the Thames, in addition to being one of the most complete, possesses several features of interest, especially in view of the differences of opinion as to the respective merits of flat and benched sites.

After passing over the usual grizzlies, the ore is crushed by two 16 in. by 10 in. Blake-Marsden rock-breakers into a bin, and thence filled into trucks. These are raised by a hydraulic lift and the contents dumped into the battery hoppers. The stamps are sixty in number, 1,060 lb., dropping ninety-five per minute, with an independent cam-shaft to each five heads—an innovation in these fields. Automatic feeders are supplied, and the duty is expected to be 4 tons per stamp per twenty-four hours. The tables are fitted with Muntz-metal plates 10 in. in length, and each five stamps has two vanners. Twelve of the latter are Frues and twelve Union. The concentrates are trucked to the vat-house, hoisted in a hydraulic lift, and dumped into three steel vats, 20 ft. in diameter by 7 ft. deep, for cyaniding. These vats are carried upon trestle-work, and the solutions gravitate to two extraction-boxes for zinc precipitation. The mill is also provided with twenty-one berdan pans, which formed part of a previous plant. If found advisable, it is intended to buddle the vanner tailings and treat the heads in the berdans. Both water- and steam-power are provided for use, according to circumstances, the engine being 250-horse power. The hydraulic-power plant consists of nine Pelton wheels, each section having its own motor—a distinctly good feature. The mill is lighted by electricity, and contains a single stamp for crushing specimen stone.

When the writer visited this plant, in March, it had scarcely got into working order, but late accounts indicate difficulties in cyaniding the raw concentrates. Although the site is practically flat, the battery is, of course, raised sufficiently to enable the pulp to flow by gravity to the vanners. A convenient hillside exists, and doubtless those responsible adopted the present arrangement with due consideration. Nevertheless, the plant has a cramped appearance, and the writer, speaking from a visitor's point of view, prefers the ordinary gravity mill. Everything appears to have been thoroughly well built, and the mill is certainly the most up-to-date wet-crushing plant in the peninsula.

Most of the free-milling surface ores having been exhausted, attention is now turned towards treating ores that are either pyritic, refractory owing to associated elements, or owing to extreme fineness of gold contents call for more elaborate methods of treatment. Owing to diversity of ores, no one method standard to the district has been adopted. The cyanide method has undoubtedly done a good deal towards improved extraction. As previously stated, in certain districts the system of roasting in kilns, dry crushing with stamps, and cyaniding, enabled ores to be treated that had defied previous efforts. Now this system appears about to be superseded by a return to wet crushing, with improved methods of cyaniding. Apparently the capacity of stamps crushing dry as against wet is about forty to fifty, but allowance has to be made for the friability of the stone after roasting. It seems to be established that where very fine reduction is required stamps are difficult to beat.

MINE-TIMBERING AND ACCIDENTS IN MINES.

[By Mr. A. H. Stokes, H.M. Inspector of Mines.]

It is difficult to offer suggestions of any definite rule as to timbering, for the varying conditions of a mine and the different natures of roofs to be supported render a hard-and-fast rule impracticable of universal application. Nevertheless, a few suggestions of a general character may be of practical value, and may form the ground-work of workable and practicable rules for general application, and help us to successfully grasp the difficulties that daily occur in mining operations.

Falls of roof and side have always been, and probably will be, the most productive source of accidents and deaths in the mine. It is a danger common to all mines; every person who works underground is more or less exposed to the danger of a fall of roof or side. The methods employed to prevent such accidents are various, but all have one common object—namely, the supporting of the roof by supports sufficiently strong to bear the superincumbent weight until the abandonment of such roof for a newer roof. The security lies not in the recognised method of supporting a roadway or working-place, but in the efficient application of such recognised method.

Timbering of Roadways.

The taking out of broken bars and erection of new bars in their place is occasionally a dangerous and difficult operation. In many cases the bars have not only to be taken out, but the newer ones have to be fixed higher than those replaced. This necessitates the removal of the covering, and probably the fall of a quantity of either loose or hard material above the covering. It should never be forgotten that in taking out broken bars in a roadway the workmen are more or less obliged to work under the very roof that has weighted and caused the bar to break, and if there be a case in general working of a mine where extra precautionary measures for safety should be adopted it is when renewing one or more broken bars in a roadway. We have to consider the renewal of two descriptions of timber—namely, props and bars.

Renewal of a Broken Prop in a Roadway.

If the prop is standing alone with a lid over it, there may be little difficulty in withdrawing the same by the use of a ringer and chain; but care should be taken that such withdrawal does not mean a heavy fall of roof, or the good intention of the replacement may become a serious danger. I am afraid that the rule of the ringer and chain is originally understood to apply to working-stalls only; but it is equally necessary that broken timber, or any description of timber under heavy roofs, should be withdrawn by the use of a ringer and chain, and if there be no prop to which the ringer can be fixed within easy reach of the prop required to be withdrawn, then one can be temporarily set for the purpose; it would act for the use of the ringer and at the same time secure the safety of the workman. This is no doubt a little trouble, and some men would prefer to run the risk on their own judgment as to safety and knock it out with a hammer. Such action is not only a violation of rule, but it is occasionally accompanied by injury or fatal results.

Bar or top pieces should, if possible, be lined up, or the new bar erected before the old one is removed. This cannot always be done if the new bar is to be set at a higher level, therefore measures must be taken to protect the bars on either side of the broken bar from receiving additional or sudden weight when the broken bar is released, and for this purpose catch or middle props should be set under the bars on either side. Such catch-props must be set as near the middle of the roadway as possible, and by so doing give the permanent bars the greatest strength until the work is completed. The application of catch-props is still more important if two or more bars are to be removed, or if the road be of unusual width, or a pass-by. The fixing of catch-props under bars is a matter which should be invariably followed, and the investigation of many accidents has clearly shown that if one or more catch-props had been used it is probable that serious injury and loss of life would have been prevented.

It occasionally occurs that without warning, and suddenly, a short length of timbered roadway gives way, and heavy falls take place which at the time cannot be explained. To what, then, are such falls due? It is often found that they occur at a place which has previously been timbered either after former falls or because the roof has wasted away from small pieces occasionally falling. In many cases there can be little doubt that the accident was due to the leaving of a cavity above the covering on the bars across the roadway. The timbering of a roadway requires to be covered with lagging or slabs of wood, and stowed up to the top with bind or old timber, until the cavity is filled up. Thus as the sides and roof of the cavity give way they squeeze together the bind or timber above the bars, and the roof receives support, thus preventing any fall of side or roof in such cavity, which might crush over or fall with sufficient force to break down the timbering of the roadway and cause an accident. If the cavity is high it might be advisable to put timber stretches across from side to side before stowing up.

The timbering of a roadway after a heavy fall, if not properly and effectively done, may be the cause of an unexpected accident. In such cases, after the bars and props are fixed, and the lagging or covering from bar to bar placed in position, the whole of the empty space above should be filled up with either material from the fall or old timber, and if such cavity above the bars be of considerable height, then stretchers should be fixed at intervals from side to side to prevent the sides giving way. The absence of packing or stowing-up of such cavities has been the cause of considerable loss of life. There is another reason why such cavities should be stowed up, for if left empty they may become reservoirs of gas, only waiting to be released by another fall, when the gas would be forced into the roadway, and, if a naked light be near, probably explode with extending effect throughout the mine.

Setting Bars in Roadways.

Many bars are set in roadways by stamping a hole in the side and resting each end of the bar upon the solid strata. No props are used, and the entire strength of the setting is equal to the strength of the strata to support the bar. It will require little foresight to see that the description of the strata upon which the ends of the bars rest is the primary factor of safety. If such strata be rock, the roof may be supported; but if it be coal or shale there may be danger of one or both sides giving way, and the bar, with its superincumbent weight, falling. Whether it be coal or shale bearing, it is important to note the direction of the cleavage of the strata, for if the cleavage runs parallel to the roadway the ends of the bar may be resting on a slab which would easily give way and cause a fall; whereas, if resting upon strata which is "end on" of right-angle cleavage to the roadway, the bar end has a better chance of supporting the weight.

Working-face.

The object of setting timber in a working-stall is to support the roof whilst holing, getting, and loading is in progress. Such timber in a few days becomes back timber in goaf or waste, and requires withdrawing; but timber which has been for some days supporting a slowly subsiding roof must necessarily have considerable weight upon it, and usually a broken and heavy roof. It therefore becomes necessary that due precautionary measures should be adopted for withdrawing the same with safety. It is generally safe to stand under a new roof and knock a prop up with a hammer, but the reverse is the case where the prop has been set for some days, and may support a broken and heavy roof. To stand under such roof and knock the prop out with a hammer is to court disaster, and such mode of withdrawing timber is both unnecessary and directly against the special rules of the mine, as the ringer and chain should invariably be used when the prop is easy or tight; but before a stroke is struck, the chain should be put round the prop to be withdrawn, the end of the chain drawn back to the pulling-prop, and the ringer placed ready for use. These preparations being complete, an attempt should be first made to see if the prop will give way without easement, but if found too light for pulling out, the lid or cap over the prop may be slightly eased by the use of a pick, and then another attempt made to pull out with the ringer.

It is no doubt frequently necessary to keep wastes open, and let timber lie back longer than usual, so that room may be had for stowing away rubbish brought in from falls on the roadways; but it probably has not occurred to many what a large quantity of rubbish there is in a mine which might with advantage be buried.

Accidents and System of Work.

It will scarcely be anticipated that the long-wall system of work could be carried on as to indirectly cause an accident from falls. The essential condition of safety in long-wall work is the packs and timbering, and the working of the face in such a way that the loading of the coal should be done under the newest roof. The loading of coal with the roadways too far away from the face, or the loading of two webs of coal upon one row of rails, has occasionally been the cause of an accident. Such work leaves the tub-road under the old roof, and prevents the gate-end packs being built at the proper time. It can scarcely be doubted that a roof only recently exposed is far safer than one which has been standing weighting for days, and supported by timber which on one side forms the third road from the face; but it will be argued that such work is necessary in consequence of the cleat or grain of the coal, and, whilst managers admit that a newly-exposed and supported roof is the best, they contend that the cleat or grain of the coal necessitates one part of the stall being worked back over, and that such a stall could not be worked in the proper long-wall method of breaking in at the stall-gate end, and taking a buttock forward both right and left, and loading under the new roof. There are, however, three ways of dealing with such cases: (1) Shorten the side in which the difficulty occurs, so that each web may be quickly worked and the gate-pack built; (2) insist upon the roof being barred and well timbered for the whole length of the roadway; (3) swing the face round until the cleat or cleavage suits the working-face.

Setting Props in the Stalls.

The setting of props and lids in working-places in sufficient quantity to protect the workmen is probably the most important branch of timbering to be found in the mine. It is certainly the most important as to quantity, and should receive the constant care and attention of both officials and workmen. It is advisable that a maximum distance for the setting of the props in the working-face should be fixed for every mine. But one distance will not be suitable for all mines. It must in a great measure depend upon the nature of the roof and floor and the inclination of the seam, and may at times require to be varied in the same mine. No one law as to distance can be laid down. It must be sufficient to prevent falls. So also will a similar rule apply to lids; the size of a lid or cap should vary with the nature of the roof: with a hard roof a soft lid sufficient to cover the top of the prop may answer, but with a short-bind roof the lid should be hard, and not less than the width of the top of the prop, and long enough to give a good support to the roof. A hard rock or a stone-bind roof may be effectively supported with a much smaller lid than what would insure safety with a bind roof. The size and quality of the lid is of extreme importance when securing the safety of a working-place, and under no condition should a prop be set without a lid over it. To set a prop without a lid is not only a waste of timber, but it does not give the security which might be obtained by the use of a good lid. The question naturally arises, How often can a prop be set? but I doubt if that is the proper question to ask. Should it not be, When is it unfit to reset? And, that being so, it becomes a matter of judgment to be decided on the spot; but there are a few general rules that may be strictly adhered to.

Gate-packs.

A gate-pack may be termed the front door of the house. It should be the cleanest and best-kept part of the stall. A front door should not be left open; equally so a gate-pack should not be left down when there is room to pin it up. A front door should be strong and well-fitting; so also a gate-pack should be strong and well formed. A front door should not be jerry built; neither should a gate-pack. It should be the rule of every mine that a gate-pack should be built directly the coal is loaded up and the roadway laid across the front of the pack. The footing of the pack should be upon the floor, and it should never be forgotten that a half-built pack is no use for supporting the roof. It must be built to the top and pinned to the roof. The lip of the ripping should never be advanced beyond the front of the last pack, for if carried beyond the pack we get two loose ends, and the ripping then becomes dangerous. It is of extreme importance that gate-packs and gate-ripping should receive the daily attention of every official, to have them put up when necessary, and not when convenient. Many accidents occur at gate-ends, and more frequently than otherwise the accident is due to, or accelerated by, neglect of one of the points I have just named.

NATURAL GAS IN COLORADO.

[Written for "Mines and Minerals," by Prof. ARTHUR LAKES.]

To write about natural gas is almost the same as to write about petroleum, the two being often, though not always, inseparable, both having a like origin. Moreover, to begin with, natural gas is rather like putting the cart before the horse, for petroleum, in many places, gives rise to natural gas. Natural gas, petroleum, semi-fluid naphtha, and solid asphaltum are all closely related, have much the same history, are found under much the same conditions, and pass into one another, as, for instance, petroleum into asphalt.

ORIGIN OF NATURAL GAS AND PETROLEUM.

These products of the earth's crust are known as bitumens, or hydrocarbons, composed of hydrogen and carbon, the former composing 15 per cent., the latter 85 per cent. Their existence and use is older than history, but they have not been used extensively until within twenty-five years. They probably result from the partial decomposition of animal or vegetable substances stored up in the rocks. Compounds very similar to petroleum and natural gas can be obtained artificially by destructive distillation from both vegetable and animal substances, such as wood, peat, or bones. Artificial gas is, as we know, commonly so distilled from bituminous coal, and dark-coloured bituminous shale was used before the great oil-wells were discovered for distilling both petroleum and gas.

Decay of vegetation at ordinary temperature produces light carburetted hydrogen or marsh-gas, if the air is excluded, as it is in a muddy marsh when leaves are buried in it, or at the bottom of ponds. Peat-bogs yield inflammable gas, and some even petroleum and asphaltum. Hence there can be little doubt as to the organic origin of these substances, and it is generally conceded now by geologists that organic matter, such as that found in fossil plants, fossil bones, corals, and seaweeds, has been partially transformed and held in the rocks as hydrocarbons, from which oil and gas have been gradually distilled, especially from bituminous shales and limestones.

THEIR MODE OF OCCURRENCE.

This gas and oil have, by hydrostatic force, been carried upward from these shales till they have found a porous stratum such as a loose-grained sandstone, which they have saturated, forming a spongy reservoir. A certain amount of heat also doubtless assisted in the distillation, for we not unfrequently find such products associated with volcanic regions; but in regions where there are no such volcanic signs the natural heat of the earth, increasing at the rate of one degree for every 50 ft. or 60 ft. as we descend, may have been quite sufficient at the great depth at which the shales and "oil-sands" must once have been buried, before erosion removed the surface rocks and brought them within available reach of our drills.

The porous reservoir in which both rock-oil and gas are usually found is generally a porous sandstone, "oil-sand," packed deeply between two very thick beds of impervious bituminous shale. These belts of sandstone are often quite local and thin, and cannot be relied upon continuously over a large area; sometimes they are in disconnected patches, which perhaps accounts for a well at one point being productive, and another, but a short distance away, bored to the same depth, yielding nothing. In some cases, again, the "oil-sand rock" is continuous under a large area, and more or less productive throughout, though even in this case in spots it may be quite "dry," as it does not always follow that the reservoirs or "oil-pockets" are connected.

PLACES WHERE THEY ARE FOUND.

Oil and gas are not necessarily confined to the bottom of a valley, but may be found on the gentle slopes of hills; in fact, in the eastern States it has been noticed by Professor Orton and others that the oil, and more especially the gas, is frequently to be found on the crests of low, broad arches of strata, to which point it was probably forced by hydrostatic pressure in the process of crumpling or folding up these strata. Hence there is quite as much chance of finding oil, and particularly gas, on the top and slopes of a low broad hill formed by the arching-up of the underlying strata, as in a valley or depression of the strata. In the latter it is common to find salt water. The gas, oil, and water are sometimes at different levels, arranged according to their specific gravity, the gas being on top, next comes the oil, and last the water; hence these products are often struck in similar successive order.

GEOLOGICAL PERIODS AND ROCKS IN WHICH THEY ARE FOUND.

As regards the geological periods in which oil and gas are found, there is a singular and erroneous idea that it is mainly to be found in the great coal-bearing strata, such as the Carboniferous period, and that petroleum has a distinct connection with coal and coal-beds. On the contrary, it is rather singular that most of the oil and gas throughout the world does not come from great coal-bearing rocks or periods, still less from the Carboniferous proper. They are mostly from rocks and periods in which little or no coal is to be found, and on geological and natural history grounds could not have existed. Even in Ohio and Pennsylvania, the great coal States, it is a curious fact that the oil and gas do not come from the coal-bearing beds or period, but from essentially non-coal-bearing rocks and periods beneath the coal, such as the marine sub-Carboniferous, Devonian, and Silurian, characterized by marine coral-formed limestones, shales, and sandstones full of the fossil remains of sea-shells and sea-weeds. And so in other parts of the world the Carboniferous is by no means the favourite oil period, but all the periods in the geological scale, from the Silurian at the base to the Tertiary at the top, have been found oil or gas-bearing in different regions.

In Colorado, at Florence, the oil and some gas is found in "oil-sands," buried in an enormous thickness of several thousands of feet of cretaceous bituminous shales, full of marine shells,

representing an old sea-bottom, in which, of course, the land plants forming coal could not have grown. On Oil Creek, near Cañon, oil oozes from Jurassic rocks, characterized by remains of great saurians, but not by any signs of coal. At Morrison, twenty miles west of Denver, it oozes from uplifted sandstones of the Dakotah group, of the Lower Cretaceous, characterized, it is true, by many remains of fossil leaves, but not by any coal at all.

So we may expect to find both oil and gas in the rocks of any fossil-bearing geological period represented in Colorado, except the Archœan granites of our main range, the great heat to which the latter rocks have been exposed having long ago driven out all these volatile substances, if they ever existed in them. Nor is oil or gas confined necessarily to any particular kind of rock; limestones, sandstones, conglomerates, shales, may all be found locally containing it; limestones, sandstones, and conglomerates well packed beneath shales may form the reservoirs for oil or gas, having received their supplies from the shales, which are doubtless the original source.

The White River Gas-field.

We hear from time to time through the newspapers of "natural gas" being discovered in various parts of Colorado. The accounts are no doubt true, but somehow, after a time, we hear no more about them, owing either to the flow of gas having ceased, or to lack of persistent prospecting for it.

A few summers ago I had occasion to visit the White River district, about thirty miles west of Meeker, in north-western Colorado. This is a singular region of numberless plateaux or table-lands, intersected by ravines and dry watercourses. The White River flows sluggishly through the heart of this country. The table-lands are composed of thick beds of impervious clay-shale, alternating with thinner beds of porous sandstone. Erosion often whitens these rocks into those quaint monuments we are familiar with near the Garden of the Gods at Manitou or Monument Park. The variegated colours of the shales—maroon, gray, green, and pink—add to their picturesqueness. These shales are highly bituminous, and contain a great variety of buried fossil organisms, such as the remains of land plants, fresh-water fishes and shells, and represent the beds of enormous fresh-water lakes and marshes of the Tertiary period. The character of the shale and porous sandstones give two of the necessary conditions for oil and gas—viz., a porous reservoir packed between thick, impervious, bituminous beds. At a point near the mouth of Piceance Creek, on the border of White River, we came to a spot where the usually horizontal strata had been crumpled up into a broad arch or dome, the centre of which had been hollowed out into a rather deep basin, covering a few square miles. Here was a second likely condition for oil or gas, as we have explained, in the arched-up character of the rocky strata. Nor were we disappointed, for along a nearly dry watercourse, or arroya, within this fold, we found two powerful gas springs, about 500 ft. apart. Both of them were bubbling up through a pond of dark alkaline water, emitting a strong smell of sulphuretted hydrogen. In one pond a great number of little springs were bubbling up fiercely at different points. In the other pond, which was about 12 ft. in diameter, the water was in a violent state of commotion, caused by a constant rising and surging upwards of great bubbles of gas from the central orifice, which raised the surface of the pond nearly 2 ft. above its level, and kept the surrounding water churning like a cauldron. The spring sent off at the same time a strong smell of petroleum, though none of that substance could be seen floating on the water issuing from it. From a safe distance we applied a light to the surface of the water, and instantly the whole pond was covered by a sheet of flame rising 6 ft. above it, and giving out an intense heat. Satisfied with the experiment we left this spring, still burning, which, when not on fire, reminded us of some of the phases of a geyser.

These springs were discovered by a cowboy nearly two years before my visit. While riding by the side of the arroya his horse shied at something at the bottom, and at the same time he heard a low hissing sound. Thinking it was a rattlesnake he returned to the spot to investigate, and there, in the little shallow rivulet at the bottom of the arroya, he saw that the sound came from a little spring bubbling up fiercely. Guessing what it might be, he lit a match and applied it to the bubble, which immediately flashed fire and continued burning for a few seconds. Staking the ground out as a claim, he got a company to undertake the boring, and two wells were put down, one at each point, to a depth of about 500 ft. A large cattle "round up" happening to be in the neighbourhood, the operator told them he would give them an illumination, and incautiously set fire to the well. The result was more than he anticipated. A column of fire 12 ft. in diameter and 60 ft. in height rushed up with a roar into the midnight sky. The operator was seriously burned and all the machinery destroyed, while for several nights in succession this improvised volcano illuminated the region for miles around to such a degree that a man told me he could see to read small print by the light of it at his home, nearly three miles away. How long it took to subside I did not learn, but eventually it was overcome by the water. The company and the operator appear to have had enough from their experience and the wells were left idle, but had continued ever since to pour out the same volumes of gas that I found at my visit.

At the head of Piceance Creek, about three miles from this, I found similar springs issuing from an intensely alkaline pond, on the dry bank of the stream. These little springs, some five or six in number, also readily ignited with a match and burned for a few seconds.

Bituminous Shale and Asphaltum.

The shales in the canyon of Piceance Creek are for a considerable thickness so highly bituminized or charged with hydrocarbons that they burn readily when ignited, and it is customary for campers to keep up their fires over night by simply piling on a little of this shale. The same shales occur on the Book Cliffs, along the Rio Grande and Midland Railways, from Newcastle to Grand Junction, and at Parachute Station long belts of asphaltum appear between the strata, which is doubtless an old residuum from petroleum and other hydrocarbons distilled out of the shales Similar asphaltic beds are found at various points over this region and continue into Utah.

This, then, is the first true and available gas region that I have so far met in Colorado, in which gas in commercial quantities is proved to flow. And now what is to be done with it? At present it is wasting its volumes on the sage brush desert. The nearest town is little Meeker, thirty miles distant, and greater Glenwood, seventy miles. To pipe it to either of these places and establish large smelting, glass, and other manufactories for which this best and purest of fuels is specially adapted, would not be thought an impossible undertaking in the Eastern States.

I must add that it is highly probable that this gas indicates oil in the same region also, and it would not be too much to predict the White River region as the coming oil and gas country of Colorado. I have since heard from Professor Sadtler, of the School of Mines, that similar gas springs were discovered the same summer on Buzzard Creek, about twenty miles from Aspen, and the same distance also from Glenwood.

It is evident then that we have the long desired "natural gas" in commercial quantities in Colorado. Future prospecting or accidental discovery may yet reveal its presence still nearer Denver.—*Quien sabe?*

LOSSES OF GOLD IN MILL-WATER ON THE WITWATERSRAND.

In a memorandum presented to the Chemical and Metallurgical Society of South Africa at its January meeting, Mr. A. von Gernet said that conversation on the subject of losses of gold, not generally recognised in the treatment of ore, led to a series of experiments, which gave results of sufficient importance and interest to be placed before this society.

As is well known, all mine water-dams on the Rand, and water used in milling, contain gold in solution, in quantities which vary from traces up to 12 gr. or more per ton. Naturally this gold represents an accumulation, and usually attains a maximum on mines returning their mill-water direct from the slimes (*spitzkasten*) to the mill, without mixing it with the bulk of water in the main water-dam. The question arose whether this solution of gold is due only to cyanide in the water or to other salts, for instance, per-salts of iron, which dissolve minute quantities of gold. To determine this, 50 tons of ore were crushed in a three-stamp battery, the same water being used over and over again. The result was that at the end of the trial only traces of dissolved gold were found in the water; consequently the dissolving of gold in practice may be considered due to cyanide only.

There are four or more places where cyanide may get into the mill-water, and sufficient care cannot be taken to prevent this happening. The fact that tailings and slimes have become lower in value since the introduction of the cyanide process, and especially since slimes treatment has been generally adopted, may in some measure be due to the contamination with cyanide, accidental or otherwise, of the mill-water, and not wholly to a change in the value of the ore. Before the general use of lime in mills the presence of acid sulphates of iron in the water passing over the plates served to convert any small traces of cyanide into innocuous Prussian blue; but with an alkaline mill-pulp the danger to be apprehended from cyanide contamination is considerably greater. It would have been interesting to have learned the assay-value of the water leaving the plates immediately after the carrying-out of the practice, which has occasionally been followed in the past, of periodically feeding solid lumps of cyanide into the mortar-boxes. Should such an accident have ever occurred as the contents of a cyanide storage-vat finding its way into a small water-dam supplying the mill, it is probable that the rate of solution of the gold, not only in the ore being crushed, but also of the amalgam in the boxes and on the plates, would be remarkably rapid; the effects of such an accident differ but in degree from the results which necessarily followed from the practice already indicated, of crushing periodically for a while with dilute cyanide solution. The plan of regularly sampling and assaying the water entering mortar-boxes and leaving slimes (*spitzkasten*) is a good one, and serves as a check, the number of tons of water used per ton of ore crushed being taken into account in considering the results.

The four sources of danger of cyanide contamination are:—

1. *The Battery.*—In dressing plates cyanide is frequently used. Care should be taken not to run this solution into the main tailings launder, but into a separate sump. I could mention a mine on which, some years ago, more cyanide was used during the month in the battery than in the cyanide-works; the consequence naturally was extremely low-grade tailings. This is of course an exceptionally bad case, and could hardly occur nowadays; however, all millmen do not seem to realise that not only is gold in amalgam of value but in other forms as well, and that it is not to the profit of the company to win a pennyweight more on the plates if, in so doing, an ounce of gold is lost which might otherwise have been recovered. In other words, the reduction or gold-winning plant on a mine should be regarded as a whole and not one portion only.

2. *Double Treatment in Sand Plants.*—This is no doubt a great improvement on former methods, but very great care has to be taken that slat-gates and pulp outlet-doors are tight during the cyanide treatment in the upper vat. After transferring the charge from the upper vat the filter is saturated with strong solution, and should be washed out thoroughly before refilling commences.

3. *Slimes Plant.*—The condensed spitzkasten pulp is delivered into, and settled in, slime collecting vats, from which, after settling, all the water possible is decanted off. In many plants the collecting-vat is used for treatment also, cyanide solution being introduced into it previous to transfer, by means of a pump, to another vat. In such a case the collecting-vat should be washed out thoroughly with water and thus freed from all solution before refilling. However, to reduce the responsibility of shiftmen and avoid all danger of loss, it is preferable to use collecting-vats for collecting only, and to arrange the plant in a way that allows of the removal of the pulp from the collecting-vat to the treatment-vats without introducing cyanide solution into the former. This can

be done either by placing the collecting-vat on a higher level and gravitating the slime pulp therefrom to the treatment-vat, or by gravitating the pulp into a sump and pumping it with solution into the treatment-vats.

4. It is one of the principal rules in the cyanide-works that no solution should be run to waste. More attention might with advantage be paid to carrying out this rule, as, besides the gold actually lost in the solution, the danger of contamination of the mill-water supply must be obvious.

BENDING WIRE ROPES.

The Effect which the Size of Sheaves and the Angle of Curvature have upon the Life of the Rope.

In a paper read before the United States Engineering Association, Mr. William Hewitt says:—

I am frequently asked how long a certain wire rope will last. This is a difficult question to reply to with any satisfaction, as the life of a wire rope may be affected in various ways, as, for instance, by the duty performed, the care taken of it, the amount and degree of bending it is subjected to, its exposure to water, and more especially water containing salts, and acids, &c., all of which, excepting perhaps the first, are more or less uncertain factors upon which to base any kind of calculations. The principal causes of wear are abrasion and excessive bending-strains. Abrasion results in the flattening or tearing apart of the wires, while undue bending is manifested in the fracturing of the outer wires at the wearing points. More wire ropes are probably worn out from undue bending than from abrasion, owing to the fact that space very often forbids the use of sheaves of proper size, and the additional cost of large sheaves, especially in mining plants, is frequently a serious objection to their use. For good results, of course, the bending-strain added to the direct tension due to the load, should not exceed the elastic limit of the wires. The strain due to the bending is very often considerably greater than that due to the useful effort or load, and the importance of the size and proper disposition of the sheaves used is a matter that should be carefully considered in any wire-rope installation.

The following table gives the stress per square inch of wire section in ropes due to bending for different ratios, R, between the diameters of the wires and sheaves, the ratios selected being those most commonly occurring in practice. The figures are taken from an article on wire rope by L. Lindsley, read before the Illinois Mining Institute, 14th September, 1893.

R.	Lb.	R.	Lb.	R.	Lb.
648	40,500	1,036·8	25,940	1,440	19,000
691·2	38,000	1,080	24,800	1,512	17,960
720	36,480	1,152	23,370	1,536	17,670
768	34,200	1,200	22,230	1,552·2	17,390
864	30,780	1,209·6	22,200	1,584	17,100
921·6	28,500	1,296	20,800	1,612·8	16,820
960	27,670	1,344	19,950	1,680	15,960
1,008	26,500	1,382·4	19,380	1,728	15,680

"In ordinary wire ropes the ratios between the diameters of the rope and the individual wires are approximately as follows:—

7 wires to the strand	$\frac{1}{9}$
12 wires to the strand	$\frac{1}{12}$
17 wires to the strand	$\frac{1}{15}$

The transmission of power by wire ropes is effected under most favourable conditions when the most useful effort is one-third and the bending-stress two-thirds of the elastic limit of the material. Taking the elastic limit of tempered steel, such as is used in the best rope, at 57,000 lb., and that of Swedish iron at one-half this, or 28,500 lb., the corresponding diameters of sheaves in inches are given in the following table:—

Diameter of Rope.	Steel.			Iron.		
	7-wire.	12-wire.	19-wire.	7-wire.	12-wire.	19-wire.
$\frac{1}{4}$	19	14	12	40	30	24
$\frac{5}{16}$	24	18	14	50	38	30
$\frac{3}{8}$	29	22	17	60	45	36
$\frac{7}{16}$	34	25	20	70	53	42
$\frac{1}{2}$	38	29	23	80	60	48
$\frac{9}{16}$	43	32	26	90	68	54
$\frac{5}{8}$	48	36	29	100	75	60
$\frac{11}{16}$	53	40	32	110	83	66
$\frac{3}{4}$	58	43	35	120	90	72
$\frac{7}{8}$	67	50	40	140	105	84
1	77	57	46	160	120	96

It appears from this, contrary to the ordinary belief, that iron rope requires larger sheaves than steel rope does. This is due to the fact that iron wire, while having the same modulus of elasticity as steel, possesses but half the ultimate strength. There are practical reasons, however, for advocating the use of larger sheaves for steel rope than given in the above table, as, for instance, the recoil when suddenly released of tension, which might cause the rope to jump off the sheaves, but this will seldom apply to the transmission of power, and it is curious to note that iron rope is still recommended by some for this purpose. It is to be explained by the fact that objections have heretofore been used against the use of steel on account of its lack of homogeneity, which causes it to become brittle under continuous bending, while iron, owing to its great ductility, will simply elongate for a considerable period without having its strength seriously impaired. On the other hand, this process of elongation requires frequent taking up or resplicing, which is very objectionable. The Trenton Iron Company is manufacturing rope of a special homogeneous grade of tempered steel wire, possessing high tensile strength with great ductility, that practice has demonstrated to be superior to iron for the transmission of power, and admitting of the use of smaller sheaves; it is to be recommended, since the saving in the cost of the sheaves will much more than offset the additional cost of the rope itself.

The angle that a wire rope makes in bending is also a matter to be taken into consideration. It has been stated that the degree of bending makes no difference; in other words, that the tension due to the bending will be the same whether the rope merely touches the sheaves or wraps all the way round it, which would be so under the assumption that the rope bends to the curvature of the sheave; but the fact is, the curvature is dependent on the tension, and with certain relative proportions between the tension and bending angle the curvature is not always the same as the sheave in contact, but something greater, which explains how it is that large ropes are frequently run round comparatively small sheaves without detriment, since it is possible to place these so close that the bending-angle on each will be so small that the resulting curvature will not overstrain the wires.

EXPLOSIVES IN COAL-MINES.

Order made by the Secretary of State for the Home Department under Section 6 of "The Coal-mines Regulation Act, 1896."

[The Order of July 11, 1898, is in substitution for the Order dated February 4, 1898, being a reissue thereof with the addition of eight explosives to the permitted list in the schedule. The explanation of the Order contained in the memorandum dated the 20th December, 1897, applies to this Order.]

Whereas by section 6 of "The Coal-mines Regulation Act, 1896," it is enacted that a Secretary of State, on being satisfied that any explosive is, or is likely to become, dangerous, may by Order prohibit the use thereof in any mine, or in any class of mines, either absolutely or subject to conditions:—

I hereby, in pursuance of the power conferred on me by the aforesaid section, make the following Order:—

1. (1.) In all coal-mines in which inflammable gas has been found within the previous three months in such quantity as to be indicative of danger, the use of any explosive, other than a permitted explosive, as hereinafter defined, is absolutely prohibited in the seam or seams in which the gas has been found.

(2.) In all coal-mines which are not naturally wet throughout, the use of any explosive, other than a permitted explosive, as hereinafter defined, is absolutely prohibited in all roads, and in every dry and dusty part of the mine.

2. In all such coal-mines, or parts thereof as aforesaid, the use of permitted explosives is prohibited unless the following conditions are observed:—

(*a.*) Every charge of the explosive shall be placed in a properly drilled shot-hole, and shall have sufficient stemming.

(*b.*) Every charge shall be fired by an efficient electrical apparatus, or by some other means equally secure against the ignition of inflammable gas or coal-dust.

(*c.*) Every charge shall be fired by a competent person appointed in writing for this duty by the owner, agent, or manager of the mine, and not being a person whose wages depend on the amount of mineral to be gotten.

(*d.*) Each explosive shall be used in the manner and subject to the conditions prescribed in the schedule hereto:

Provided that nothing in this Order shall prohibit the use of a safety fuse in any mine in which inflammable gas has not been found within the previous three months in such quantity as to be indicative of danger.

3. In every coal-mine the use of any explosive is prohibited in the main haulage roads and in the intakes unless all workmen have been removed from the seam in which the shot is to be fired, and from all seams communicating with the shaft on the same level, except the men engaged in firing the shot, and, in addition, such other persons, not exceeding ten in number, as are necessarily employed in attending to the ventilating-furnaces, steam-boilers, engines, machinery, winding apparatus, signals, or horses, or in inspecting the mine; or unless a permitted explosive is used, and every part of the roof, floor, and sides of the main haulage road or intake, within a distance of 20 yards from the place where it is used is, at the time of firing, thoroughly wet, either naturally or from the application of water thereto. This section shall not apply to such portions of the main haulage roads and intakes as are within 100 yards of the coal face. This section shall not authorise the use of any explosive in any case where the use of such explosive is prohibited by section 1 or 2 of this Order.

4. This Order shall not apply to mines of clay, or stratified or nodular ironstone, nor shall it apply to shafts in course of being sunk from the surface or deepened, or to drifts and other outlets being driven from the surface, if such shafts, drifts, or outlets are not ventilated by return air.

Where a mine contains several separate seams this Order shall apply to each seam as if it were a separate mine.

5. In this Order the term "permitted explosives" means such explosives as are named and defined in the schedule hereto: Provided that where the composition, quality, or character of any explosive is defined in such schedule, any article alleged to be such explosive which differs therefrom in composition, quality, or character, whether by reason of deterioration or otherwise, shall not be deemed to be the explosive so defined; provided further, that an owner, agent, or manager shall not be responsible for the composition, quality, or character of an explosive, if he shows that he has in good faith obtained a written certificate from the maker of the explosive that it complies with the terms of the schedule, and that he has taken all reasonable means to prevent deterioration of the explosive while stored.

The term "road" includes all roads of any description extending from the shaft or outlet to within 10 yards of the coal face.

The term "main haulage road" means a road which has been, or for the time being is, in use for moving trams by gravity or by steam or other mechanical power.

6. This Order shall come into force on the 18th July, 1898, from which date the Explosives in Coal-mines Order of the 4th February, 1898, is revoked.

7. This Order may be cited as "The Explosives in Coal-mines Order of 11th July, 1898."

M. W. Ridley,
One of Her Majesty's Principal Secretaries of State.

Home Office, Whitehall, 11th July, 1898.

The list of permitted explosives is as follows*:—

Ammonite.	Elephant brand gunpowder.	Nobel gelignite.
Amvis.	Faversham powder.	Oxalate blasting-powder.
Bellite No. 1.	Kynite.	Pembrite.
Bellite No. 3.	Kynoch gelignite.	Rhenish gelignite.
British gelignite.	Nahnsen's gelignite.	Roburite No. 3.
Carbo-gelatine.	National gelignite.	Sun gelignite.
Carbonite.	Nobel Ardeer powder.	Westfalite No. 1.
Dahmenite A.	Nobel carbonate.	Westfalite No. 2.
Electronite No. 2.		

* This list is subject to revision in accordance with the results of experiments made from time to time in the Government testing-station at Woolwich.

Supplementary Order made by the Secretary of State for the Home Department under Section 6 of "The Coal-mines Regulation Act, 1896."

Whereas by section 6 of "The Coal-mines Regulation Act, 1896," it is enacted that a Secretary of State, on being satisfied that any explosive is, or is likely to become, dangerous, may by Order prohibit the use thereof in any mine or in any class of mines either absolutely or subject to conditions; and whereas in pursuance of this power an Order has been made by me entitled "The Explosives in Coal-mines Order of 11th July, 1898":

I hereby, in pursuance of the power conferred on me by the said section, make the following Order amending the Order aforesaid:—

1. The Explosives in Coal-mines Order of 11th July, 1898, shall be amended, and shall take effect as if the explosives named and defined in the schedule to this Order were named and defined in the schedule to that Order, and in all respects as if the schedule to this Order formed part of the schedule to that Order.

2. So much of the schedule to that Order as relates to the explosive known as oxalate blasting-powder is hereby revoked.

3. In all other respects the Explosives in Coal-mines Order of 11th July, 1898, is confirmed.

4. This Order shall come into force on 1st January, 1899.

5. This Order may be cited as "The Explosives in Coal-mines Order of 23rd December, 1898."

M. W. Ridley,
One of Her Majesty's Principal Secretaries of State.

Whitehall, 23rd December, 1898.

Schedule.

Argus Powder, consisting in every 100 parts by weight of the finished explosive of not more than 82 parts and not less than 79 parts of pure saltpetre, with not more than 20 parts and not less than 17 parts of charcoal, and not more than one part and not less than one-half part of pure distilled sulphur, and with no other ingredient, the whole being thoroughly well incorporated, and to be of such strength as, when exploded in a lead cylinder as used at the Home Office testing-station, will give a result not inferior to that obtained with an equal weight of R.F.G.[2] gunpowder, and to be in the form of grains of a size to pass through a sieve of sixteen meshes to the linear inch, and to be retained on a sieve of forty meshes to the linear inch: Provided—

(1.) That the explosive shall not be taken into or used in a mine except when contained in a parchment-paper case or cartridge.

(2.) That when the saltpetre is washed out, the residue of charcoal after being dried at 230° Fahr., must lose not less than 30 per cent. of volatile matter other than sulphur when heated to redness in a current of coal-gas, and that when the said charcoal is burned in air the residue of mineral matter shall not be more than 10 per cent. and not less than 7 per cent.

(3.) That the explosive shall be in all other respects similar to the samples submitted for test on 19th August, 1898.

(4.) That in addition to the marking on the outer package required by an order of the Secretary of State, made under "The Explosives Act, 1875," and in force for the time being, such outer package shall bear the words "As defined in the list of permitted explosives"; and, further, that each inner package shall be clearly marked with the words "Permitted explosive," and also with the name of the manufacturer, the date of manufacture, and the nature and proportion of the ingredients.

Earthquake Powder, consisting in every 100 parts of the finished explosive of not less than 81 parts and not less than 78 parts of pure saltpetre, with not more than 22 parts and not less than 19 parts of charcoal, and with or without the addition of $\frac{1}{8}$ per cent of pure sulphur, and with no other ingredient, the whole being thoroughly well incorporated, and to be of such strength as, when exploded in a lead cylinder as used at the Home Office testing-station, will give a result not inferior to that obtained with an equal weight of R.F.G.[2] gunpowder, and to be in the form of grains of a size to pass through a sieve of eleven meshes to the linear inch, and to be retained by a sieve of forty meshes to the linear inch: Provided—

(1.) That the gunpowder shall not be taken into or used in a mine except when contained in parchment-paper case or wrapper.

(2.) That when the saltpetre is washed out, the residue of charcoal, dried at 230° Fahr., must lose not less than 56 per cent. by weight of volatile matter when heated to redness in a current of coal-gas, and, when the said charcoal is burned in air, the residue of mineral matter or ash shall not exceed 1·5 per cent. by weight.

(3.) That the explosive shall be in all other respects similar to the sample submitted for test on 15th August, 1898.

(4.) That in addition to the marking on the outer package required by an order of the Secretary of State, made under "The Explosives Act, 1875," and in force for the time being, such outer package shall bear the words "As defined in the list of permitted explosives"; and, further, that each inner package shall be clearly marked with the words "Permitted explosive," and also with the name of the explosive, the name of the manufacturer, the date of manufacture, and the nature and proportion of the ingredients.

Elephant Brand Gunpowder No. 2, consisting in every 100 parts by weight of the finished explosive of not more than 76 parts and not less than 74 parts of pure saltpetre, with not more than $15\frac{1}{8}$ parts and not less than $14\frac{1}{2}$ parts of charcoal, and not more than 11 parts and not less than 9 parts of pure distilled sulphur, and with no other ingredient, the whole to be thoroughly incorporated, and to be of such strength as, when exploded in a lead cylinder as used at the Home Office testing-station, will give a result not inferior to that obtained with an equal weight of R.F.G.[2] gunpowder, and to be in the form of grains of a size to pass through a sieve of eleven meshes to the linear inch: Provided—

(1.) That the gunpowder shall not be taken into or used in a mine except when contained, together with pure bicarbonate of sodium in the proportion of one part by weight of bicarbonate of sodium in two parts by weight of gunpowder, in a spark-proof brown-paper case or cartridge (Elephant brand) in which there shall intervene between the gunpowder and the bicarbonate of sodium a diaphragm of such strength and character as will effectually prevent any admixture of the two.

(2.) That there shall not be taken into or used in a mine any case or cartridge containing more than 9 oz. of the said gunpowder; that every case or cartridge shall be inserted intact in the hole, and that not more than one case or cartridge at a time shall be inserted.

(3.) That no shot with the said gunpowder shall be fired unless properly stemmed with an amount of stemming not less than would be sufficient for a charge of 9 oz. of ordinary gunpowder.

(4.) That the cases or cartridges shall be packed in thoroughly waterproofed wrappers, bags, or other receptacles, each containing not more than 5 lb. of gunpowder.

(5.) That in addition to the marking on the outer package required by an order of the Secretary of State, made under "The Explosives Act, 1875," and in force for the time being, such outer package shall bear the words "As defined in the list of permitted explosives"; and, further, that each cartridge shall be clearly marked with the words "Permitted explosive," and also with the name of the explosive, the name of the manufacturer, the date of manufacture, and the proportion of the ingredients.

Oxalate Blasting-powder, consisting in every 100 parts by weight of the finished explosive of not more than 73 parts and not less than 69 parts of nitrate of potassium, with not more than $15\frac{1}{2}$ parts and not less than 12 parts charcoal, with not more than $16\frac{1}{2}$ parts and not less than $13\frac{1}{2}$ parts of oxalate of ammonium, and with or without not more than 2 parts of sulphur, and with no other ingredient, the whole being thoroughly incorporated: Provided—

(1.) That the explosive shall be used only when contained in non-waterproofed wrappers of (*a*) an alloy of lead and tin, or (*b*) asbestos paper.

(2.) That in addition to the marking on the outer package required by an order of the Secretary of State, made under "The Explosives Act, 1875," and in force for the time being, such outer package shall bear the words "As defined in the list of permitted explosives"; and, further, that each inner package shall be clearly marked with the words "Permitted explosive," and also with the name of the explosive, the name of the manufacturer, the date of manufacture, and the nature and proportion of the ingredients.

COMPRESSION-VENTILATORS IN GERMAN COAL-MINES.

THE compression system of ventilation, as adopted in the Schlesien and Deutschland coal-mines in Upper Silesia, is described by Bergassessor Steinhoff in a recent paper. In the Schlesien Mine the area of the workings is 2,808,508 square metres; there are two shafts, 60 m. apart, each being 260 m. in depth, and opening up three main haulage-ways at depths of 165 m., 230 m., and 260 m. respectively, intersecting altogether six seams of workable coal.

The ventilation of these workings is effected by a down-draft through shaft No. 1, and a bore-hole reaching to the upper seam, shaft No. 2, serving as an upcast for the air-current. The temperature in the two downcasts varies with the season, &c., while the upcast is maintained at a constant temperature of 21° to 22° C. by means of steam-pipes, to facilitate the updraft from the pit.

The current is forced through the workings by a couple of compression ventilators, one of which is at the 165 m. level and the other at the 230 m. level of No. 1 shaft, from which they draw their supply of air. These fans, which were constructed by Honigmann, of Charlottenhof, Upper Silesia, differ merely in size and a few constructive details. They consist of a fan-wheel (enclosed at one side and with a circular air-inlet on the other), surrounded by a fixed diffuser. Each fan carries twelve long and twelve short vanes of sheet-metal, and the diameter of the one in the upper level is 2½ m., while that of the fan (fig. 2) in the 230 m. level is 2·5 m. on the one side, and 2·8 m. on the other, the face of the periphery being sloped. The width is the same in each case, 700 mm. at the axis and 400 mm. at the circumference. Each diffuser is composed of a cast-iron casing, in which are mounted twenty-five vanes arranged at an angle of 12° tangential to the periphery of the fan.

The ventilator at the higher level is coupled direct (fig. 3) to the shaft of a simple triple-cylinder engine, the diameter of the cylinders being 160 mm., and the throw of the piston 140 mm. The second fan is driven by belting (fig. 4) from the fly-wheel of a single-cylinder horizontal engine, diameter of cylinder 280 mm., piston stroke 400 mm., ratio of transmission 1 : 19. The smaller fan cost 13,970 marks ($3,490) and the larger one 18,823 marks ($4,700), inclusive of mounting; the average working expense, including motive-power, for both fans, amounts to 6·50 marks ($1·55) a day.

The Deutschland Mine covers 4,127,260 square metres, divided into two sections by a north-east to south-west fault. There are four workable seams, served by five shafts, of the following depths: Nos. 1 and 2, 300 metres; No. 3, 180 metres; No. 4, 196 metres; and No. 5, 120 metres. Of these only No. 1 acts as an in-draft shaft, the others all serving as upcasts, Nos. 2 and 3 being heated by steam-pipes, and No. 5 by the introduction of partially cooled blast-furnace slag, which is used for packing the worked-out seams. The average temperature of these upcasts are: No. 2, 22° to 23° C.; No. 3 and No. 5, 18° to 19° C. No. 5 shaft is not heated, and, being cooled by descending water, has a tendency to act as an in-draft shaft.

The two ventilators in use in No. 1 shaft are both mounted at the 225 m. level. One of them is a Mortier fan, 2,100 mm. in diameter and 1,400 mm. broad, and is driven by a single-cylinder horizontal condensing engine, the cylinder diameter being 580 mm. and the piston stroke 550 mm. The ratio of transmission is 1 : 3·7. The second fan is of the same type as that shown in fig. 2, the sloping periphery having a diameter of 3,400 mm. on the one side and 3,100 mm. on the other, while the vanes are 700 and 400 mm. in breadth. This is driven by belting from a single-cylinder horizontal engine, with a cylinder diameter of 400 mm. and 700 mm. piston-stroke. The ratio of transmission in this case is 1 : 2·08.

The high-level ventilator in the Schlesien pit, when working at a speed of 130 turns per minute, delivers 695 cubic metres of air, under a compression of 4 mm. water-gauge, the efficiency being 0·57-horse power, or 1·39-horse power when the natural draft (5 mm. water-guage) in the pit is taken into consideration. When the speed is increased to 150 turns the delivery is 910 cubic metres of air, the compression being 6 mm. and the efficiency 1·21 and 2·23-horse power respectively. In the case of the larger fan, when the mean speed of 133 turns is taken as a basis, the delivery is 1,300 cubic metres; compression, 14 mm. water-gauge; indicated horse-power of engine, 14; efficiency, 4·09-horse power, or in conjunction with the natural draft of the pit (6·5 mm. water-gauge), 5·92-horse power.

The Mortier fan in the Deutschland pit, when working at a mean speed of 264·2 turns, delivers 2,355 cubic metres of air per minute under a compression of 46·5 mm. water-gauge. In this case the indicated work of the engine is 91·1-horse power, and the efficiency of the fan 24·33-horse power, or 28·78-horse power, including the natural draft of the pit (8·5 mm. water-gauge).

The second fan in this pit at a mean working speed of 156 turns delivers 1,351 cubic metres of air, compression 50 mm. water-gauge, indicated horse-power of engine 34·95, efficiency of fan 15·01, and 17·1-horse power (natural pit draft 7 mm. water-gauge).

A considerable natural draft is produced in the Schlesien pit by the warming of the upcast shaft, the amount of air discharged from this shaft per minute being 1,176 cubic metres per minute when both ventilators are at a standstill, or 59 per cent. of the total volume (1,992 cubic

metres) discharged when both fans are working at mean speed. This applies when the temperature of the incoming air is — 1° C., that of the upcast being 21° C., and when the initial temperature is still lower the natural draft suffices for ventilation without resorting to the fans.

The rate of air supply is based on a minimum requirement of 2 cubic metres per man per minute, each horse being reckoned as equal to four men. Allowance is also made for the presence of choke-damp and the prevalence of high temperature in various parts of the workings; hence in the Schlesien pit a total volume of air amounting to 2,163 cubic metres per minute is supplied, which, for the 514 men and thirty-four horses employed in the pit, works out at an average of 3·3 cubic metres per head. In the Deutschland pit, where 680 men and thirty-five horses are at work, the air supply per minute is 3,204 cubic metres, or 3·6 cubic metres per head.

Previous to the introduction of these fans at the Schlesien pits the work often had to be interrupted for days on account of the great influx of carbon-dioxide into the workings, an inconvenience which has since disappeared. From various circumstances it seems probable that in the workings, both in the lower and upper seams, there is a direct communication with the external air through various fissures in the cover rock, most probably due to subsidences, since otherwise the spontaneous fires in the pits in this district would be extinguishable much more rapidly than is found to be the case. Furthermore, evolutions of choke-damp at the surface are occasionally experienced, and the fumes of a pit-fire have been distinctly detected in a cellar attached to the buildings on the colliery premises.

Whether these fissures are of sufficient magnitude to lead to a waste of air-current cannot be definitely ascertained, but observations made at the Schlesien pit appear to negative this assumption—at least, under the ordinary conditions of working the ventilators. The measurements made show that the initial compression is too small to extend throughout the workings, and that, owing to the suction exerted by the upcast, a depression zone is formed, the relative area of which varies, decreasing as the external air temperature rises, and *vice versâ*, so that in winter the ventilation is almost entirely effected by suction, while in summer the bulk is done by compression. From these conditions it follows that any important connection with the outside air by way of fissures would result in the contamination of the air within the zone of depression by choke-damp, especially in winter; whereas, actually, the composition of the air in the workings is uniformly favourable throughout the entire year. It thus follows that the compression prevailing in this pit is insufficient to lead to any waste through rock fissures; but, on the other hand, the use of exhaust fans, by increasing the degree of depression, would in all probability lead to an inrush of foul air through the crevices evidently in existence. Consequently compression ventilation is the ideal system under the prevailing local conditions.

From similar measurements made in the Deutschland pit, where the compression is higher, it appears that a loss of air through leakage into fissures occurs, some 300 to 500 cubic metres of air per minute being wasted in this manner; and, in fact, a brisk flow of air into the fire-zone of the pit is noticeable.

An objection frequently urged against compression ventilation—namely, that by partially ventilating the surrounding strata it increases the danger of pit-fires—seems to the author to apply equally to ventilation by exhaustion; and certainly the fire risk in the two pits now in question has diminished since the introduction of the former system.

Another objection raised is that the fans must usually be mounted underground; but this plea is only justified when the downcast shaft and intermediate channel leading to the intake of the fan are not themselves thoroughly fireproof. In cases, however, where all the fittings except the wooden cage guides are of iron, and consequently a shaft fire is as good as impossible, he believes no disadvantage can accrue from the ventilator being situated in the workings.

In an outbreak of fire in a pit it is of the utmost importance that the ventilator should be easy of access, since circumstances may arise that render it imperative to either stop the fan or reverse its motion. For this purpose the arrangement of the ventilators close to the winding-shafts must be regarded as the most suitable plan, since their accessibility is greatest in this situation. Exhaust fans, on the other hand, are frequently erected in air-shafts at some distance away from the winding-shafts, and therefore cannot be got at so quickly; and when fitted in winding-shafts these fans must be situated underground, unless provision be made for keeping the shaft closed. This mode of arrangement must be classed as dangerous, owing to the inaccessibility of the ventilators during an outbreak of fire.

Another advantage of the compression system is that, during rescue work and other labour carried on while a pit-fire is in progress, the rescue parties, &c., can work with a greater feeling of security, knowing that the air-supply is being maintained behind them, and that the way of escape is kept open thereby. Moreover, in pits where communication with the surface exists through cracks and fissures, compression ventilation is to be preferred to exhaust systems, the advantage increasing in proportion to the degree of compression produced.—*Engineering and Mining Journal.*

AN IMPROVED APPLIANCE FOR DRAWING TIMBER IN MINES.

PROP-DRAWING in mines has always been considered one of the most dangerous operations that the miners have to carry out in collieries; and any apparatus which is more safe and more powerful than the old gablock, or dog-and-chain, and which will assist in reducing the accidents in mines, and probably lessen the timber-cost of a colliery, should be readily welcomed. The improved appliance, known as the Sylvester pulling-jack, has been described at meetings of mining institutes by Mr. D. H. F. Mathews, and in a paper read before the Manchester Geological Society. The machine consists of a steel bar 3 ft. long, $1\frac{1}{2}$ in. deep, $\frac{5}{8}$ in. in thickness, having specially shaped notches about 1 in. apart, $\frac{7}{16}$ in. deep, along one edge. A short chain is attached to the bar for

fastening it to a firm prop. The notches of this bar form the fulcrum for a 3 ft. lever, which is made with a forked end, through which pass two $\frac{7}{16}$ in. bolts, the bolts being a little more than 1 in. apart. The bolt which turns in the notches allows the lever to describe an arc sufficient to bring the sliding-block to the next notch. The other bolt connects the lever by means of a link to the block, which slides along the notched bar. This sliding-block serves two important purposes: firstly, it is fitted with a catch bolt which falls at right angles into the notches of the bar holding the block, while the lever reaches forward into the next notch; and, secondly, the rear part of the block being formed into a jaw-shaped recess, it allows any link of the chain used for attaching it to the prop to be drawn to be connected, and securely held. This prevents to a considerable extent the loss of distance along the notched bar when taking hold of a fresh portion of chain, as the length of chain may be easily regulated. A leverage of 30 to 1 is obtained by Sylvester's pulling-jack, although only a 3 ft. lever is used, which is a great improvement on the old gablock, which on an average is only 7 to 1. The machine may appear at the first glance to be slow in action by its only moving 1 in. per stroke of the lever, but when we consider that probably one-third or more of the distance advanced by the old gablock is lost again through the springing back of the prop in consequence of having to take hold of a fresh length of chain after each movement, the improved machine has really the advantage in regard to speed as well as being much more powerful. The appliance is attached to a firm prop, which may be several feet away from the prop in the waste which requires to be withdrawn—it depends on the length of chain used, the average distance being 4 yards to 5 yards. The machine has also been found useful in taking old bars out, when they require changing in haulage roads. The machine can be attached to the haulage rope, or to one of the secure props some distance away from the bar to be withdrawn, which will be found much safer than the old method usually adopted. Sometimes labour and loss of time is caused when trams or tubs are locked together through their breaking away in jigs or endless-rope brows. The pulling-jack in these cases may be hitched to the rails, rope, or chain, and has been found to be of great service. The weight of the machine is only 28 lb., including the 3 ft. length of chain and hook attached to the notched bar, and can be easily carried by one person.—*Colliery Guardian.*

SHOULD MINE VENTILATION BE POSITIVE OR NEGATIVE?

In theory, positive or pressure fans require less power to drive than do negative or exhausting fans, for sending an equal volume of air through the mine; and the former have the advantage of contributing to keep in check gas-blowers and the smoke of underground fires, while the latter favour the invasion of the workings by deleterious gases. This argument may, however, be employed with greater reason in the contrary direction, and therefore in favour of exhaust ventilators. Indeed, it is of less importance to take precautions during normal working, when the fan speed can be increased, if required, than on an accidental stoppage occurring through breakdown or other cause. At such a time the automatic re-establishment of an equality of pressure from the outside to the inside would result, if the fan be a negative one, in causing the pressure-gauge underground to rise, which would tend in the same degree to counteract the exhalations; but, on the other hand, with a positive fan the pressure would fall, provoking at that critical moment, an increase in the disengagements.

With a falling barometer on the surface, whatever be the degree of importance attached to such influence, it favours the invasion of the working-places by fire-damp, so that one is necessarily led to increase the speed of the ventilator. With a blowing fan the result will be to increase the pressure, while correspondingly compensating the diminution of atmospheric pressure and keeping the bad air in check; but in the case of a exhaust fan, on the contrary, the result will be to increase the degree of vacuum, and consequently to intensify the effect of the fall in atmospheric pressure, the cause of this crisis, and to induce the contaminated air to issue from the old workings in greater abundance, to be afterwards swept away by the air-current. From this point of view, therefore, the pressure fan appears the more rational.

The latter also becomes less fouled than the exhaust fan, because it is only traversed by the outer air. The pressure fan is mounted on the downcast shaft, and the exhaust fan on the upcast shaft, so that it is immediate contact with the most vitiated portion of the air-current, and therefore more exposed than the former to the consequences of an explosion. Now, preservation of the ventilating apparatus is of the utmost importance in connection with a rescue, because very little can be done before ventilation is restored.

On the other hand, if the exhaust fan be provided with a water-seal, the latter may be balanced with such accuracy that the bell-valve, kept down upon its seat by the influence of the depression under normal circumstances, will rise automatically, in obedience to the action of counter-weights, so soon as the diminution of pressure is removed. With such an arrangement, if the fan should stop running, the shaft will clear itself, and the air-current may be maintained for some time, which constitutes a precious advantage.

There is, however, in favour of exhaust fans one last argument the importance of which, from a practical point of view, decides the question in their favour; and it is thus, that most mine-ventilators are of this type. The air-current naturally set up in the workings has a tendency to ascend; and, for diminishing the chances of a disturbance in the ventilation in the event of stoppage to the fan, the mechanical should act in the same direction as the natural ventilation, so that fresh air must be made to reach the foot of the widest shaft. On the other hand haulage should always tend to the lowest point, so that the winding-shaft is naturally the deepest. Now, although it is not impossible to close this shaft by a movable arrangement, which would be necessary for the installation of a pressure fan, the resulting inconvenience where the output is considerable, and the accompanying leakage of air, nearly always decide the question in favour of a pressure-fan, erected on the mouth of the upcast shaft, so as to leave the winding-shaft free.

The Austrian mine regulations of 27th October, 1895, respecting the fiery mines of the Mahrisch-Ostrau district, require that in their case the ventilation be negative or exhausting; but, on the contrary, for secondary ventilation, pressure or positive fans are to be recommended.

As to the comparative amount of power required to drive the two types of ventilator, the quantities of work to be developed are proportionate to the *vis viva* set up, and the latter to the square of the speeds, since the volume is the same in both cases. Now, the speeds that should be imparted to one and the same weight of air for passing through a given orifice are in direct ratio to the volumes furnished; and the latter are naturally less with compression than with aspiration. To express this influence by a formula, let us call H the pressure of the outside air, and h h' the depressions produced by exhaust and pressure-fans respectively. In accordance with Mariotte's law the volumes of air compressed or expanded will be in the ratio of

$$\frac{H - h}{H + h'}$$

and that of the volumes will have the value of

$$\left(\frac{H - h}{H + h'}\right)^2.$$

Supposing, for instance, that the outer atmosphere be at the normal pressure H = 10,333, and that the one and the other of the two modes of ventilation be effected with a water-gauge of 101 mm. (4 in.), which is high, this ratio will become

$$\left(\frac{10{\cdot}233}{10{,}433}\right)^2 = 0{\cdot}96.$$

It will thus be seen that the advantage in question will scarcely attain 4 per cent., so that its importance is greater from a theoretical than from a practical standpoint.

The above observations are contained in the section entitled "Refoulement ou Aspiration," of the chapter on Ventilation in the valuable "Course of Mine-working," by M. Haton de la Goupillière, Inspector-General of French Mines, Director of the Paris School of Mines, and President of the French Firedamp Commission, published by Vicq-Dunot et Cie, Paris, 1897.—*Colliery Guardian.*

THE USE OF COMPRESSED AIR IN MINES.

Its Advantages as Compared with Steam and Electricity under Various Circumstances and Situations.

[By Professor Robert Peele.]

Of late years compressed air has gained greatly in prominence as means for the transmission of power, and now occupies a broad field of usefulness. In addition to its value and convenience as a power transmitter for engineering purposes it possesses also characteristics which make it applicable to a great variety of uses in the manufacturing industries and mechanic arts, in which the element of actual transmission of power does not at all enter. A discussion of these, however, would not be appropriate here.

In connection with mining, tunnelling, shaft-sinking, and kindred operations, compressed air has found several of its most important applications. Here, for some purposes, it has made a place for itself in competition with steam, but it is in conjunction with steam and other prime movers that compressed air, acting purely as an agency for transmitting power, has frequently become indispensable for underground work. As compared with steam, the employment of compressed air for such purposes is particularly valuable and convenient for four reasons: First, its transmission loss is small; second, the troublesome question of the disposal of exhaust steam underground is avoided; third, the exhaust air is of direct assistance in the ventilation of the confined working places; and fourth, its capacity for storing power makes it well adapted for intermittent work. These points will be briefly considered.

The conveyance of steam long distances underground involves serious and unavoidable loss from radiation and consequent condensation. The loss due to friction is common to both steam and compressed air, and although not equal at the same pressure, on account of the greater density of compressed air, the one may be taken as approximately offsetting the other. In a steam-pipe of proper diameter, under given conditions, the frictional loss should be not more than one-fifth the loss from radiation. Condensation may be reduced by carefully covering the piping with good non-conducting material, but even with the best covering the effective pressure at a distant underground engine is greatly diminished, and very uneconomical working is the result. In conveying steam a distance of several thousand feet, as is by no means uncommon in extensive collieries, the pressure may be reduced to half the boiler pressure, or even less. Take, for example, a pump situated 2,000 ft. from the boiler and using 200 cubic feet of steam per minute at a boiler-pressure of 75 lb., with a mineral-wool covered pipe, 4 in. in diameter, the effective pressure at the pump would be only about 58 lb., or, with a poor covering, like some of the asbestos lagging often used, it might easily be as low as 35 lb. For compressed-air transmission the reduction of pressure for the same volume of air, size of pipe, and initial pressure, would be 9·3 lb., giving a terminal pressure of 65·7 lb. But, as the speed of flow in pipes for economical transmission is greater for steam than for air, a comparison based on piping of the same diameter cannot justly be made. If, in the above example, the diameter of pipe were smaller the gain in reduced radiation would outweigh the increased frictional loss, and the net loss would be diminished. The

frictional loss varies inversely, and the loss from radiation directly, with the diameter. Therefore, under given conditions, the diameter of the pipe can be so proportioned as to produce a minimum loss. With compressed-air transmission, however, the case is different. For if the diameter of the pipe in the above case be increased to 5 in., the loss of pressure, or head required to overcome friction, is reduced to 2·8 lb., and increasing the distance to one mile it would be only 7·4 lb. Furthermore, the increased cost of the larger air-pipe would be offset by the expense of the nonconducting covering. No account has been taken here of the loss due to leakage. Attention may be called to the fact that little or no danger is to be apprehended from the rupture of a compressed-air pipe, while the bursting of a steam-pipe in a shaft or in the mine-workings may be a serious matter.

The disposal of exhaust steam underground is often troublesome. When the workings are at no great distance below the surface the exhaust may be sometimes discharged into an upcast airway, or by putting up with a high back-pressure it may even be possible to carry a large exhaust-pipe nearly or quite to the surface through an airway, or abandoned workings. If the steam be used for pumping, a condenser is easily installed. The exhaust may be carried into the suction-pipe, or even into the water column, or an independent condenser may be resorted to. For underground engines other than pumps, however, it is frequently impossible, or at least not feasible, to employ condensers, because of the inconvenience of obtaining the necessary water-supply, and the additional space required. But, even if the exhaust-steam be thoroughly condensed, the heat radiated by the piping, and by the pumps or other engines, is usually sufficient to raise the temperature of the moist mine air in a marked degree. As a result, the deterioration of the timbering is hastened, the roof and walls of the workings are softened and slacked off, and the mine atmosphere is rendered uncomfortable and unwholesome for the miners. The presence of hot steam-pipes in ill-ventilated workings, or in the narrow compartments of shafts, is also objectionable.

The exhaust from machines driven by compressed air, on the other hand, is not only not a detriment, but is of positive benefit. Large volumes of fresh air are discharged in the working-places, just where ventilation is most needed. When exhausted, the air is cool as well as pure, and, comparatively, extremely dry. The humidity of the intake air at the compressor may be high, but as the air cools after compression, a large part of its moisture is deposited in the receiver and piping, so that the percentage of the moisture in the exhausted air—when it has expanded again and resumed its original volume—is small. This feature is made of practical utility by the miner for cleaning out drill-holes, preparatory to charging. A piece of gas-pipe is attached to the end of the air-hose, inserted in the hole, and on turning on the air the sludge is blown out and the hole quickly and thoroughly dried.

Lastly, an important characteristic of compressed air is that it is always ready to do its work, and, aside from leakage from the transmission piping—which to a great degree is preventable—suffers no loss nor diminution of power when not in actual use. For performing work intermittently, at a distance from its source, compressed air has no superior among the systems of power-transmission. The pressure is maintained unaltered during intervals of work, without further expenditure of power. With steam transmission, power is continually dissipated by radiation, whether in use or not, and a steam-engine when stopped for any length of time loses much of its normal working temperature, and becomes a receptacle for water of condensation. Electricity also, though the motor itself may be readily adapted for intermittent work, is in this respect inferior to compressed air, as the generator must be kept in operation.

Chief among the uses of compressed air for mining is the operation of machine-drills; in fact, it may be said that the air-compressor owes its modern development more to the demands of rock-drills than to any other cause. Air drills have been of vital importance in hastening the completion of long railroad and mining tunnels. Without them, together with high explosives, it may even be doubted whether some of the great tunnels through the Alps, and elsewhere, would have been at all practicable. The first of the long Alpine tunnels—the Mount Cenis—was begun by hand-drilling and black powder, at an average advance for each heading of only 8 in. per day, while for eight years' work with machine drills and dynamite the average speed was 5·75 ft. For the Arlberg, driven later under more favourable conditions, the average daily rate of advance for each heading was 14·75 ft.

Other applications of compressed air underground are found in the driving of pumps, hoists, and mine locomotives. Mechanical coal-cutters, for the mining of bituminous coal, are also frequently operated by compressed air.

In the future, for the prosecution of mining work unsuited to the use of steam transmission, engineers will often be called upon to decide under given conditions between the relative merits of compressed air and electricity. One of the first considerations might be as to whether the mine is already provided with a compressed-air or electric plant. Given the necessity for a compressed-air plant, for operating machine-drills, as is the case in most metal mines of any importance, it would be reasonable to provide the additional compressor capacity required for driving pumps and other machines as well, rather than to erect a separate and distinct plant for generating electricity. On the other hand, for collieries and other mines where compressed-air drills are little used, electric transmission would be found convenient for driving engines like pumps, which work continuously and under a constant load. Air drills, though far from being economical, considered simply as machines, fulfil their purpose admirably. Up to the present time no perfectly satisfactory electric percussion drill has been introduced, though the subject is receiving much attention from electricians both in this country and abroad, and there is every reason to anticipate a successful solution of the problem in the near future. The recent Bladray and Meissuer drills—the former lately tried in South Africa—are cases in point. Keeping in mind the incidental value of air drills as ventilating agents, however, it is extremely doubtful whether, for underground work, electric drills can ever supersede those operated by compressed air.—*Mines and Minerals.*

THE VAJEN-BADER PATENT HEAD-PROTECTOR, AND THE PNEUMATOPHOR.

THE accident which occurred in the Jubilee Mine at Waitekauri on the 23rd September last, whereby through the burning of the timbering in the mine two men were suffocated, has demonstrated the necessity of having some of the appliances to enable persons to enter an atmosphere in which smoke or dangerous gases may be present. There are various methods in use for the above purpose, notably the Vajen-Bader Patent Head-protector and the Pneumatophor. Of the former kind seven have been ordered by the Westport Coal Company for use in their mines at Granity Creek and Denniston.

The Vagen-Bader Patent Head-protector is constructed so that "by the aid of materials used, with less than a cubic foot of air under a pressure of less than 100 lb, and the peculiar construction of the helmet, perfectly enclosing the occupant's head, at the same time furnishing air 20 degrees cooler than the outside atmosphere to supply the breathing organs, we are enabled to sustain life over sixty minutes." Exception has been taken, however, to the helmet on account of the glass in the windows opposite the eyes becoming opaque through the condensing of the moisture from the breath of the wearer on its inner surface, and from the lodgment of particles from the smoke on the outer surface. Two of the Vagen-Bader helmets have been introduced by the Wellington Fire-brigade, but have not yet been subjected to a thorough test.

I have just received the 1898 edition of a pamphlet about the Pneumatophor. This is stated to be an apparatus for breathing in irrespirable atmospheres, for the use of miners, firemen, and others. The author says, "After an explosion of firedamp or coal-dust, and during underground fires, the air in the mine usually is more or less impregnated with carbonic acid and carbonic oxide. If it were possible quickly to remove the workmen out of the poisonous after-damp into the fresh air, or to restore the air-gates, which are as a rule destroyed, there would be a possibility of saving many lives otherwise sacrificed in the after-damp. Statistics prove that most of those killed in explosions in mines are suffocated. Consequently it is of the utmost importance for a rescue party as numerous as possible to descend at once after an explosion, during or after an underground fire. The apparatus hitherto in use are suitable only for persons stationary in places full of gas, and presuppose a supply of condensed air. The Pneumatophor, however, renders the user independent of condensed air, and enables those rescuers who are provided with it, immediately, without danger, to enter those parts of the mine which are full of after-damp. The lightness and compendiousness of this apparatus are of particular importance. They make it possible to provide the miners working in fiery mines with the apparatus every day, or to deposit a number of the apparatus at suitable spots in the mine, and thus to enable those below ground to save themselves after a catastrophe, and immediately to proceed to the help of their comrades. As the Pneumatophor does not require a second person to set it going, it is of great value to those in the mine also when the descent of the rescue party is delayed by damage to the winding apparatus. Thus, the Pneumatophor serves: (1) For the equipment of the rescuers, and (2) for the self-preservation of the miners. The Imperial and Royal Mining Office in Vienna, the *Berghauptmannschaft*, on the 6th April, 1897, issued 'A decree concerning the measures to be taken for the safety of persons and property in the mines of the Ostrau-Karwin Coal-mine district in case of the occurrence of an explosion of firedamp or coal-dust, or of a fire in the shaft.' It orders that such life-saving apparatus be provided as can be used for at least an hour, and as permits of free movement during its use. The Pneumatophor, of Rudolph Chevalier de Walcher-Uysdal and Dr. Gustavus Gautner, is declared to be such an apparatus; and it is decreed that each of the mines included in one of the 'firedamp classes' of §7 of the decree of Z. 2350 of the year 1895 shall be provided with apparatus to the number of 5 per cent. of the maximal shift, including overseers and blasters."

The apparatus, of which a full description is given in the pamphlet, consists of a breathing-bag worn in front of the body, and connected with straps over the shoulder to a knapsack worn at the back, which contains the caustic soda solution, and also two oxygen cylinders tested for 250 atmospheres. When the apparatus is used the solution bottle is broken, and the contents flow into the breathing-bag, which is fitted with two "loofah" pads to absorb the solution. A valve connected with the oxygen cylinders is then opened, and the contents allowed to reach the breathing-bag. The bag is fitted with a breathing-tube and mouthpiece; a spring clip is also used to prevent any air being breathed through the nostrils, and the whole of the respiration is effected through the mouth. The carbonic-acid gas exhaled through the breathing tube is absorbed by the caustic soda solution, the atmosphere inhaled consisting of 4 per cent. of carbonic acid and 96 per cent. oxygen. The stock of oxygen is stated to be sufficient to enable the person using the apparatus to live in a vitiated atmosphere for a period of from thirty to sixty minutes. If what is claimed for the Pneumatophor can be proved to be the case in actual practice, it would enable persons using it to undergo physical exertion through breathing a pure air whilst surrounded by the most deadly gases. In this way it would be the means of rescuing persons overpowered by noxious fumes either in a mine or a burning building. Of the apparatus mentioned, or any others suitable for similar use, it is highly necessary that a stock should be kept in readiness at every coal-mine of importance.

In quartz-mines it is also necessary that some such appliances should be at hand, especially in those mines where carbonic-acid gas is sometimes given off freely from the strata.

MINE-MANAGERS' EXAMINATION PAPERS.

QUESTIONS USED IN EXAMINATION OF MINE-MANAGERS FOR FIRST-CLASS CERTIFICATES.

("The Coal-mines Act, 1891.")

FIRST DAY.—TIME: 9 A.M. to 12 NOON.

[Candidates must attempt to answer every question. All calculations to be shown in detail.]

SUBJECT I.—*On the Sinking of Shafts and Construction of Main Roadways, opening out a Mine, and the Division of a Mine into Districts.*

1. Describe the methods of sinking and securing a shaft 500 ft. deep in ordinary ground—(*a*) rectangular, (*b*) circular; describe the most approved methods of blasting, and show how you would keep the buckets from swinging about in the shaft.

2. In sinking a circular shaft 14 ft. in diameter, the first 100 ft. is soft ground, below this is hard ground on the top of which is a heavy feeder of water. State how you would proceed with the sinking until the shaft is well into the hard ground; describe fully the materials and appliances required for securing the shaft and the safety of the men, as well as dealing with the water temporarily and permanently.

3. Sketch a ground-plan of—(*a*) the surface arrangements of a colliery capable of dealing with an output of 500 tons in 8 hours from a shaft, the quantity of water to be raised being equal to the weight of coal; and (*b*) the arrangements at shaft bottom.

4. A new colliery is to be opened out by a dip incline from the outcrop of the coal. Show the best means of doing this as regards future working and ventilating on an extensive scale.

SUBJECT II.—*The Various Methods adopted in securing Shafts and Workings in a Mine, showing Relative Efficiency of each Class of Material used.*

1. Show, in plan and section, how you would secure with timber the sides and roof of a tunnel being driven through loose or running ground.

2. In constructing an archway of brick or stone underground, would you build close up to the adjoining strata or not? Give reasons and particulars.

3. Describe in practical language, and show by sketches—(*a*) how a bord should be timbered, (*b*) how coal should be spragged whilst being holed or undercut, (*c*) how a roadway 9 ft. wide should be supported, and (*d*) how a chock should be built.

4. How would you timber the starting-off of a branch drawing-road into a long-wall face, and how would you timber the faces, assuming a fairly strong roof? Illustrate by sketches.

5. In working a seam on the long-wall system, where sufficient material cannot be obtained for packing the waste fully, how would you timber and pack the working places?

FIRST DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT III.—*The Various Methods of hewing and cutting Coal of Different Classes, and securing Ground while so engaged.*

1. Describe generally the methods of working coal with which you are acquainted.

2. How would you proceed to open out and work a seam of coal 6 ft. thick, with a dip of 1 in 3, having a bad roof and a very soft floor? Give reasons.

3. Illustrate fully your method of working a 3 ft. seam having a dip of 1 in 6, cleavage of coal being faced at right angles to the inclination; roof of strong blue metal, floor fireclay.

4. In working a seam of coal on the long-wall method, what are the leading features to be observed from the commencement onwards?

5. Assume two seams of coal in close proximity: the upper seam is 4 ft. 6 in. thick and yields fire-damp, the lower seam is 5 ft. 6 in. thick. Coaly strata varying from 4 ft. to 7 ft. thick (the lower part of which is liable to spontaneous combustion) separate the seams. Dip of seams, 1 in 4. How would you work them so as to take out the greatest possible amount of coal in safety?

SUBJECT IV.—*Various Methods of ventilating and the Construction of Airways.*

1. Describe such ventilating fans as you are acquainted with, explain their action, and give reasons for preferring any particular type of fan.

2. A fan is exhausting 160,000 cubic feet of air per minute. Water guage, 1·85 in.; engine has 24 in. cylinder by 3 ft. stroke, and makes 58 revolutions per minute; piston-rod is $3\frac{1}{2}$ in. diameter; mean pressure of steam is 40 lb. per square inch. What percentage of useful effect is obtained by the fan, allowing for 12 per cent. of the steam-power being absorbed by friction?

3. Ventilate the workings on accompanying plan. Show by arrows the direction of air currents, and locate all doors, stoppings, and other arrangements, having due regard to the haulage of coal from the working places to the shaft. Sign the plan.

SECOND DAY.—TIME: 9 A.M. TO 12 NOON.

[Candidates must attempt to answer every question. All calculations to be shown in detail.]

SUBJECT V.—*On Area of Airways, the Velocity and Division of Currents, and Deductions to be made for Friction.*

1. An airway is 1,350 yds. long, its average width and height are 7 ft. 4 in. and 5 ft. 10 in. respectively. What is the amount of rubbing surface in square feet?

2. Explain the reasons for splitting the air-current in a mine, and state what general features should be observed.

3. Sketch the workings of a mine, and show how they may be ventilated by two or more splits without any doors in the roadways. (Separation doors in a roadway connecting the two shafts will be excepted.)

4. Assuming 20,000 cub. ft. of air per minute, at 0·75 in. W.G., being circulated through a mine, what horse-power will be necessary to circulate 40,000 cub. ft. per minute, the roadways being unaltered, and allowing a mechanical efficiency of 45 per cent. in the ventilating-fan?

SUBJECT VI.—*On the Nature and Composition of Explosives and Dangerous Gases met with in Coal-mines, and on Spontaneous Combustion.*

1. Enumerate the gases met with in collieries, give their symbols and specific gravities, and state the characteristics of each.

2. What gas is evolved from a blown-out shot of blasting-powder, and what would be the probable effects of a blown-out shot in (*a*) a wet mine, and (*b*) a dry and dusty mine? Give reasons for your opinions.

3. Describe a suitable safety-lamp for testing for mine gases, and state the smallest percentage of firedamp such a lamp will detect.

4. Show a system of working a mine liable to spontaneous combustion whereby fires can be localised, and the output of the mine not affected to any serious extent.

SECOND DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT VII.—*On the Drainage of Mines, and Pumping Appliances.*

1. Illustrate by sketches and describe a bucket-lift, also a ram or plunger-pump for shaft drainage, and show how connection is made with the engine.

2. What quantity of water per hour will be raised by a single acting pump of 14 in. diameter by 8 ft. stroke, working at a speed of 88 ft. per minute, allowing 6 per cent. for slip?—Give answer in gallons.

3. Describe the essential features of, and fittings for, a steam-pump working underground and forcing water direct to a height of 300 ft., economy of steam, and accessibility of parts most liable to derangement being considered.

4. What is a siphon? Describe its action, and state under what conditions it is applicable to mining work.

SUBJECT VIII.—*The Haulage of Coal on Underground Planes and Shafts; also, Different Systems of such, and Horse-power required to do the Work.*

1. Describe the main- and tail-rope system of haulage, and state under what conditions you would adopt it.

2. Show the best method of laying-out a system of endless rope haulage underground, the driving engine being on the surface, and the haulage to be effected along roads running in opposite directions from the shaft-bottom.

3. It is required to haul 20 tons of coal per hour with a direct rope up a single-road incline 600 yds. long, having a gradient of 1 in 3; tubs hold 10 cwt. each. With an initial steam-pressure of 80 lb. per square inch, what horse-power of engine will be required, allowing a loss of 20 per cent. for friction of machinery, rope, and tubs?

4. Describe the various methods of bringing coals down steep haulage-roads by gravitation. State under which system the largest and most steady output may be maintained, and mention any other advantages or possibilities which such system affords.

THIRD DAY.—TIME: 9 A.M. TO 12 NOON.

[Candidates must attempt to answer every question. All calculations to be shown in detail.]

SUBJECT IX.—*The Theoretical and Effective Power of Steam-engines and Boilers; also on the Strength of Hauling-ropes and -chains.*

1. It is required to wind 500 tons of coal in an eight-hour shift from a depth of 750 ft. Assuming an initial steam pressure of 80 lb. per square inch, and a pair of coupled engines employed, give diameter of cylinders, length of stroke, and diameter of drum required. In case of one engine being on centre, the other engine must be capable of starting the load.

2. Describe the construction of the most suitable boilers for mining purposes where much steam-power is required, and sketch the setting, flue arrangements, and course of heat through the flues.

3. What conditions should be observed in making the rivet-holes of a boiler, and what fittings should be provided with every boiler?

4. Sketch in plan and section, and describe the most suitable chimney for three working Lancashire boilers, each 28 ft. by 7 ft. 6 in. Give leading dimensions.

5. Show the best method of connecting an air-compressor with one cylinder to a steam-engine having only one cylinder, and give reasons for same.

SUBJECT X.—*The Incrustation in Steam-boilers: Causes of same, and Remedies therefor.*

1. State what you know as to the causes of incrustation in steam-boilers.
2. What precautions should be taken to prevent incrustation as far as possible?
3. If feed-water is impregnated with acid, what remedy would you apply?
4. Describe an effective method of heating feed-water for boilers, and state what precaution is needed in respect to the hot-water pump.

THIRD DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT XI.—*Tapping Water in Mines, and Mode of constructing Dams Underground.*

1. In approaching old rise workings known to contain an accumulation of water what precautions would you adopt? Inclination of seam, 1 in 3.
2. Sketch and describe a form of dam to keep back water having a pressure due to a head of 100 ft. Site of dam, 6 ft. wide by 5 ft. high (roadway measurement).

SUBJECT XII.—*Blasting and the Use of Explosives.*

1. Under what conditions would you adopt blasting in a coal-seam, what explosives would you use in fiery and non-fiery mines, and what precautions would you adopt to insure safety generally?
2. In driving a tunnel from existing workings to a seam of coal expected to give off a large body of explosive gas—(*a*) what measures would you take to insure safety; (*b*) what explosives would you use; (*c*) how would you fire the shots; and (*d*) assuming a blower of gas becomes ignited to an extent beyond what can be extinguished with wet bags, how would you extinguish the flame?
3. Is coal-dust an element of danger in a mine? If so, state under what conditions it is dangerous, and the various methods adopted for reducing the danger as far as practicable. Give advantages and disadvantages of same.

SUBJECT XIII.—*The Effect that Faults produce in Coal-seams, and how to ascertain the Direction of a Coal-seam when severed by a Fault.*

1. Whilst working a seam of coal with a sandstone roof, it is found that the coal gradually thins from the roof downward, stone taking the place of coal, the floor maintaining its own continuity—(*a*) what inference would you draw as to the cause of this; (*b*) what resultant conditions would you expect to find; and (*c*) how would you proceed to search for the recurrence of the seam?
2. In driving a level roadway due north, a fault is met with in the floor first and found sloping to the roof. Taking the displacement at 30 ft. (vertical measurement), and the seam dipping east at the rate of 1 in 4, in what direction would you drive a level tunnel to regain the seam, and what would be the length of same if driven at an angle of 45 deg. from the level roadway first mentioned? Illustrate by sketch.
3. In sinking a shaft a seam of coal is cut through, lower down a fault is crossed, and lower still the seam previously cut is again met with. What is the character of the said fault?

FOURTH DAY.—TIME: 9 A.M. TO 12 NOON.

[Candidates must attempt to answer every question. All calculations to be shown in detail.]

SUBJECT XIV.—*A Knowledge of Surface and Underground Surveying, and of making Plans, showing System of Working, Inclination of Seams, Faults, and Course of Ventilation.*

1. Describe one or more methods of obtaining the correct position of underground workings (where such are entered by a vertical shaft) in relation to the survey of the surface.
2. Show how you would make a traverse survey of underground workings, and how the angular measurements may be checked when a tie or connection is not possible.
3. In surveying the workings of a mine with a compass, what precautions must be observed both above and below ground?
4. Draw a straight line, and fix two stations (A and B) 20 chains apart. The bearing from A to B is N. 78° 30′ E. Commencing at A, plot the following work on a scale of 2 chains to an inch: —N. 35° 30′ E., 350 links; S. 76° E., 275 links; S. 20° W., 300 links; N. 59° E., 480 links; S. 85° E., 290 links; S. 50° E., 300 links; N. 89° 45′ E., 470 links. What is the bearing and distance from the last station to station B?

SUBJECT XV.—*A Knowledge of the Character of the Different Classes of Coal, and also of the Character of the Rocks and Formation of Country where Coal is likely to be found.*

1. In what geological systems are the various coals and lignites of New Zealand found, and how do you account for the wide differences in the qualities of these minerals?
2. Describe the characteristics of lignite, brown, bituminous, and anthracite coals, and give comparative analyses.
3. What are the characteristics of a good coal for gas-making purposes?
4. State what you know of the Jurassic System, especially as regards the possibility of the rocks of this period being coal-bearing.

FOURTH DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT XVI.—*A Knowledge of Arithmetic, and the Method of keeping Accounts.*

1. A shaft 16 ft. in diameter in the clear is 300 yards deep: for 140 yards it is lined with 9 in. brickwork, for 90 yards with 13½ in. work, and the balance with 18 in. brickwork. How many cubic yards of ground have to be excavated, allowing for an average space of 3 in. behind the brickwork for backing material; how many cubic yards of backing will be required, and how many bricks, allowing 90 bricks per square yard for 9 in. work?

2. A heap of stacked coal 250 ft. long, 19 ft. 6 in. deep, by an average width of 85 ft., has to be filled into trucks at the rate of 4d. per ton; each truck is 3 ft. 6 in. long, 3 ft. wide by 2 ft. deep, and carries 10½ cwt. How many tons are contained in the heap, and what is the cost of filling?

3. Work out the following pay-bill, adding an advance of 15 per cent.:—

84 tons 7 cwt.	...	at 2/1½ per ton.
12 yards cutting	...	at 3/9 „ yard.
Setting 6 sets timber...		at 1/10½ „ set.
Drawings 44 props	...	at 1¼d. each.

SUBJECT XVII.—*A Knowledge of the Provisions of "The Coal-mines Act, 1891." Oral Examination.*

1. What are the requirements of "The Coal-mines Act, 1891," with respect to mine-managers and engine-drivers?

2. Describe the provisions of the Act relating to various notices and returns required from owners and managers.

3. What are the general rules with respect to—(*a*) ventilation, (*b*) explosive materials and blasting, (*c*) signalling, (*d*) man-holes and refuge places, (*e*) machinery?

4. What books are to be kept at a mine, and who is to enter up and sign them?

5. What provisions are made under the Act with respect to plans?

[Supervisor to be good enough to report result of this oral examination.]

QUESTIONS USED IN EXAMINATION OF MINING MANAGERS FOR SECOND-CLASS CERTIFICATES.

("The Coal-mines Act, 1891.")

FIRST DAY.—TIME: 9 A.M. TO 12 NOON.

[Candidates must attempt to answer every question. All calculations to be shown in detail.]

SUBJECT 1.—*On the Sinking of Shafts and Construction of Main Roadways, opening out a Mine, and the Division of a Mine into Districts.*

1. Describe the methods of sinking and securing a shaft 500 ft. deep in ordinary ground—(*a*) rectangular, (*b*) circular. Describe the most approved methods of blasting, and show how you would keep the buckets from swinging about in the shaft.

2. In sinking a circular shaft, 14 ft. in diameter, the first 100 ft. is soft ground; below this is hard ground, on the top of which is a heavy feeder of water. State how you would proceed with the sinking until the shaft is well into the hard ground. Describe fully the materials and appliances required for securing the shaft and the safety of the men, as well as dealing with the water temporarily and permanently.

3. A new colliery is to be opened out by a dip-incline from the outcrop of the coal. Show the best means of doing this as regards future working and ventilating on an extensive scale.

SUBJECT 2.—*The Various Methods adopted in securing Shafts and Workings in a Mine, showing the Relative Advantages and Efficiency of each Class of Material used.*

1. Show in plan and section how you would secure with timber the sides and roof of a tunnel being driven through loose or running ground.

2. In constructing an archway of brick or stone underground, would you build close up to the adjoining strata or not? Give reasons and particulars.

3. Describe in practical language, and show by sketches—(*a*) how a bord should be timbered, (*b*) how coal should be spragged whilst being holed or undercut, (*c*) how a roadway 9 ft. wide should be supported, and (*d*) how a chock should be built.

FIRST DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT 3.—*The Various Methods of hewing and cutting Coal of Different Classes to advantage, and securing Ground while so engaged.*

1. Describe generally the methods of working coal with which you are acquainted.

2. How would you proceed to open out and work a seam of coal 6 ft. thick, with a dip of 1 in 3, having a bad roof and a very soft floor? Give reasons.

3. Illustrate fully your method of working a 3 ft. seam having a dip of 1 in 6, cleavage of coal being faced at right angles to the inclination; roof of strong blue metal, floor fireclay.

SUBJECT 4.—*The Various Methods of Ventilation, and the Construction of Airways so as to produce a Good Circulation of Fresh Air in any Part of a Mine.*

1. If an airway measures 7 ft. 6 in. wide by 5 ft. 3 in. high, and the air-current is travelling at a velocity of 335 ft. per minute, what quantity of air is being passed? Give answer in cubic feet per minute.

2. Ventilate the workings on accompanying plan: Show by arrows the direction of air-currents, and locate all doors, stoppings, and other arrangements, having due regard to the haulage of coal from the working-places to the shaft. Sign the plan.

SECOND DAY.—TIME: 9.30 A.M. TO 12.30 P.M.

[Candidates must attempt to answer every question. All calculations to be shown in detail.]

SUBJECT 5.—*On the Area of Airways, the Velocity and Division, and the Deductions to be made for Friction.*

1. Explain the reasons for splitting the air-current in a mine, and state what general features should be observed.

2. Sketch the workings of a mine, and show how they may be ventilated by two or more splits without any doors in the roadways (separation doors in a roadway connecting the two shafts will be excepted).

3. What is a water-gauge, and what is its use in connection with mine ventilation?

SUBJECT 6.—*On the Nature and Composition of Explosives and Dangerous Gases occurring in Coal-mines, and on Spontaneous Combustion.*

1. Enumerate the gases met with in collieries, and state the characteristics of each.

2. What gas is evolved from a blown-out shot of blasting-powder, and what would be the probable effects of a blown-out shot in (*a*) a wet mine, and (*b*) a dry and dusty mine? Give reasons for your opinions.

3. Describe a suitable safety-lamp for testing for mine gases, and state the smallest percentage of firedamp such a lamp will detect.

SECOND DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT 7.—*On the Drainage of Mines, and Pumping Appliances.*

1. Illustrate by sketches, and describe a bucket-lift, also a ram or plunger-pump for shaft-drainage, and show how connection is made with the engine.

2. What quantity of water per hour will be raised by a single-acting pump of 14 in. diameter by 8 ft. stroke working at a speed of 88 ft. per minute, allowing 6 per cent. for slip? Give answer in gallons.

3. What is a siphon? Describe its action, and state under what conditions it is applicable to mining work.

SUBJECT 8.—*The Haulage on Planes and in Shafts; also Different Systems of Underground Haulage, with Horse-power required to do the Work; also on Strength of Hauling-ropes and -chains.*

1. Describe the main- and tail-rope system of haulage, and state under what conditions you would adopt it.

2. Show the best method of laying out a system of endless-rope-haulage underground, the driving-engine being on the surface, and the haulage to be effected along roads running in opposite directions from the shaft bottom.

3. Describe the various methods of bringing coals down steep haulage-roads by gravitation. State under which system the largest and most steady output may be maintained, and mention any other advantages or possibilities which such system affords.

THIRD DAY.—TIME: 9 30 A.M. TO 12.30 P.M.

[Candidates must attempt to answer every question. All calculations to be shown in detail.]

SUBJECT 9.—*Tapping Water in Mines, and Mode of constructing Dams in Underground Workings to keep Water back.*

1. In approaching old rise workings known to contain an accumulation of water, what precautions would you adopt? Inclination of seam, 1 in 3.

2. Sketch and describe a form of dam to keep back water having a pressure due to a head of 100 ft. Site of dam, 6 ft. wide by 5 ft. high (roadway measurement).

SUBJECT 10.—*Blasting and the Use of Explosives.*

1. Under what conditions would you adopt blasting in a coal-seam, what explosives would you use in fiery and non-fiery mines, and what precautions would you adopt to insure safety generally?

2. In driving a tunnel from existing workings to a seam of coal expected to give off a large body of explosive gas—(*a*) what measures would you take to insure safety, (*b*) what explosives would you use, (*c*) how would you fire the shots, and (*d*) assuming a blower of gas becomes ignited to an extent beyond what can be extinguished with wet bags, how would you extinguish the flame?

3. Is coal-dust an element of danger in a mine? If so, state under what conditions it is dangerous, and the various methods adopted for reducing the danger as far as practicable. Give advantages and disadvantages of same.

THIRD DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT 11.—*The Effects of Faults on Coal-mines, and how to ascertain the Direction of a Coal-seam when severed by a Fault.*

1. Whilst working a seam of coal with a sandstone roof, it is found that the coal gradually thins from the roof downward, stone taking the place of coal, the floor maintaining its own continuity—(*a*) what inference would you draw as to the cause of this, (*b*) what resultant conditions would you expect to find, and (*c*) how would you proceed to search for the recurrence of the seam?

2. In driving a level roadway due north, a fault is met with in the floor first, and found sloping to the roof. Taking the displacement at 30 ft. (vertical measurement), and the seam dipping east at the rate of 1 in 4, in what direction would you drive a level tunnel to regain the seam, and what would be the length of same if driven at an angle of 45° from the level roadway first mentioned? Illustrate by sketch.

SUBJECT 12.—*A Knowledge of Arithmetic, and Keeping of Accounts.*

1. A heap of stacked coal 250 ft. long, 19 ft. 6 in. deep, by an average width of 85 ft., has to be filled into trucks at the rate of 4d. per ton: each truck is 3 ft. 6 in. long, 3 ft. wide by 2 ft. deep, and carries 10½ cwt. How many tons are contained in the heap, and what is the cost of filling?

2. Work out the following pay-bill, adding an advance of 15 per cent.:—

84 tons 7 cwt.	...	at 2/1½ per ton.
12 yards cutting		at 3/9 „ yard.
Setting 6 sets timber...		at 1/10½ „ set.
Drawing 44 props	...	at 1¼d. each.

SUBJECT 13.—*A Knowledge of the Provisions of "The Coal-mines Act, 1891."*

1. Describe the provisions of the Act relating to various notices and returns required from owners and managers.

2. What are the general rules with respect to—(*a*) ventilation, (*b*) explosive materials, and blasting, (*c*) signalling, (*d*) manholes and refuge-places, (*e*) machinery?

3. What books are to be kept at a mine, and who is to enter up and sign them?

QUESTIONS USED IN EXAMINATION OF MINING MANAGERS FOR FIRST-CLASS CERTIFICATES.

("The Mining Act, 1891.")

FIRST DAY.—TIME: 9 A.M. TO 12 NOON.

[No book will be permitted to be used with the exception of logarithm tables. The candidate must attempt to answer every question. All calculations to be shown in detail.]

SUBJECT A.—*On the Sinking of Shafts and Construction of Main Drives.*

1. Describe fully the preliminary work required to be done before commencing to sink an engine-shaft.

2. If a shaft were required for winding 300 tons of ore per day, and also for pumping where a plunger-pump of 18 in. in diameter was required to lift the water, and also to provide for a sufficient ladder-way, state the size of the shaft and also the size of each compartment you would recommend, giving your reasons for same.

3. If the outcrop of a quartz reef showed an inclination of 67° from the horizon to the west, and a shaft had to be sunk to cut the reef at a depth of 450 ft. below the surface, show by calculation the distance the shaft would require to be from the outcrop.

4. If a lode were outcropping on the top of a ridge having an inclination to the horizon of 60° to the westward, and an adit-level were required to be constructed from the eastern side of the ridge which had an inclination of 18° to the horizon, show by calculation the length of the adit required to cut the lode at a vertical depth of 150 ft. below the outcrop.

5. If you were constructing a cross-cut from a shaft to open up a main level on a lode where 300 tons of ore per day had to pass through, give the dimensions of the cross-cut you would recommend; also, state your estimate of the cost of constructing same—(*a*) if in medium hard rock of volcanic origin, (*b*) if in hard slate rock.

6. State what distance you would have between the passes in stoping a lode that was 6 ft. in thickness; also, give the dimensions of such passes, and how you would secure the ground where the lode had been stoped out.

7. If you had a quartz claim on which no work had been done, and it was necessary to sink a shaft, what steps would you take to fix the site?

FIRST DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT B.—*On the Timbering of Shafts, Adits, Main Drives or Levels, Passes, Stopes, and generally on the Systems of timbering Mines, and also of filling up Old Workings.*

1. Having timbered a shaft with frame-sets, and finding that the timber was not of sufficient strength, what steps would you take to overcome the difficulty?

2. State how you would timber passes—(*a*) with round timber, and (*b*) with slabs. Show by sketch how the timber should be fitted.

3. Show by sketch how you would timber a shaft where there were two winding-compartments, and a compartment in which two plunger-pumps of 18 in. in diameter had to be placed. Give the dimensions of the shaft, the size and character of timber you would use, and also the dimensions of the chamber required at the place where there would be a change of lifts if a second set of plunger-pumps were required.

4. If you were timbering a main level where the ground was very heavy, give the dimensions of the timber you would use—namely, the length and size of the legs, also of the cap-pieces, and the distance between each set of timber; and state how you would keep up the sides of the level if the rock were of a swelling nature.

5. Show by sketch how you would fit sets for a main level; also how you would fit timber for a shaft that was timbered with planking, without having battens or pegs at the corners of the shaft.

6. Show by calculation the breaking-strain on a cap-piece of black-birch timber 14 in. in diameter and 6 ft. in length between the legs; also show the crushing-strain on a prop 10 in. in diameter, of the same class of timber, and 7 ft. long.

7. If you were working alluvial ground where there was a bad roof, what provision would you make to keep the sets of timber secure in the event of one of the cap-pieces breaking down?

8. If you were to erect poppet-heads 70 ft. high, and if there were a vertical load of 2 tons to lift up the shaft, and the winding-drum were placed 75 ft. away from the shaft and 70 ft. below the level of the top of the poppet-heads, show by calculation the resistant strain there would be to affect the stability of the poppet-heads.

SECOND DAY.—TIME: 9 A.M. TO 12 NOON.

[No book will be permitted to be used with the exception of logarithm tables. The candidate must attempt to answer every question. All calculations to be shown in detail.]

SUBJECT E.—*On the Ventilation of Mines.*

1. What effect has carbonic-acid gas on the workmen in a mine? How would you detect it?

2. What is the least percentage of carbonic-acid gas in the air of a mine that is fatal to human life, and also the greatest percentage that would not be deleterious to the lives of the workmen?

3. State the quantity of air that is required by the Mining Regulations to pass through a mine where fifty men and two horses are employed.

4. There were two shafts in a mine, each 12 ft. by 5 ft., and 500 ft. in depth, connected at the bottom by an air-course. The quantity of air passing through the downcast shaft was 6,000 cubic feet per minute, and the temperature was 80°; the temperature in the upcast shaft was 100°: show by calculation the ventilating-power.

5. If you had to divide an air-current having 6,000 cubic feet of air passing through per minute—the dimensions of the air-course being 6 ft. by 5 ft., and 600 ft. in length—into two divisions, one of which was 6 ft. by 4 ft., and 1,000 ft. in length, and the other was 5 ft. by 4 ft., and 2,300 ft. in length, show by calculation the quantity of air that would pass through each division, the pressure being the same in each case.

6. How would you ventilate a level of 3,000 ft. in length from a pumping-shaft 300 ft. in depth, when there was only one opening to the surface, and you had neither a blast nor compressed air? Describe the method you would adopt, and how you would apply it.

SECOND DAY.—Time: 2 P.M. TO 5 P.M.

SUBJECT F.—*Tapping Water in Mines, and Mode of constructing Dams in Underground Working.*

1. If you were to meet with a large stream of water coming out of the rock in sinking a shaft, describe what you would do to prevent it from getting down the shaft as it was being sunk.

2. Show by sketch how you would construct a dam in a drive 6 ft. by 5 ft. in solid rock, to dam back water—(*a*) if you had only to dam it to a height of 4 ft., (*b*) if you had to dam it so that the water would rise 200 ft. above the centre of the drive. (*c*) State the material you would use in the construction of the former dam; (*d*) if you were using bricks or cement for the latter dam.

3. Show by calculation what pressure there would be on a dam that was constructed in a drive 6 ft. by 6 ft. if the water stood to a height of 300 ft. above the centre of the dam.

4. If you were approaching a lodgment of water in a mine by a drive in alluvial ground, and expected to tap it 100 ft. below its surface, state the precautions you would take, and how you would secure everything before tapping the water.

SUBJECT G.—*On Blasting and the Use of Explosives.*

1. Give your experience in blasting in mines, and the explosives you have been accustomed to use.

2. If you were constructing an adit-level through hard slate rock, the direction of the adit being due north, and the bedding of the slate rock running parallel with the direction of the adit-level, but standing at an angle of 70° to the west, describe fully the position in which you would put in the bore-holes for the first charge of explosives, and give your reasons fully.

3. If you were using blasting-gelatine in a bore-hole below water, how would you tamp the hole? And describe how you would charge it, and what precautions you would take.

4. What effect has cold on dynamite? and how would you increase it from a temperature of 33° to 60° Fahr.? and what effect, if any, has cold on dynamite in regard to its strength as an explosive? Describe fully.

5. If you had to fire simultaneously five bore-holes charged with dynamite, state how you would do it. Also state what advantage, if any, there is in doing so. Give your reasons fully.

6. In using dynamite and blasting-powder, what is the general effect that each of these explosives produces in regard to its action on the rock?

THIRD DAY.—TIME: 9 A.M. TO 12 NOON.

[Candidates must attempt to answer every question. All calculations to be shown in detail.]

SUBJECT I.—*A Knowledge of Underground Surveying, and the Making of Plans of Underground Workings, showing also the Dip or Inclination and Strike of the Reefs or Lodes.*

(*a.*) The candidate must produce a plan, drawn to a scale not less than 5 chains to an inch, showing the surface boundaries of a mining claim not less than 20 acres in extent. The plan must also show the underground workings on the same plan, but in different coloured inks. All traverse-lines on which the survey is based must be shown, with their bearings and lengths, all offsets to boundaries or other objects, together with the lines connecting the underground with the surface survey. The plan must have a north point, and the word "magnetic" or "true" written on it according to the meridian used. All traverses should be calculated from the starting-point or a trig. station. The plan must bear a certificate as follows: "I certify that the survey from which this plan has been drawn was done by myself, and that the plan is my own work also"; and it must be signed and dated. The area in acres must be shown. The survey must be actually closed on the ground. Calculated closures are not admissible.

(*b.*) The original field-notes of the survey must be produced, together with the tables of meridian and perpendicular distances (if any) for each traverse station in the survey; also produce a specimen of the method of calculations from which the positions have been derived. All of these must be signed by the candidate and dated.

(*c.*) Give a full description, in writing, of the method adopted in the survey, describing the initial point from which it was started, and show the close of the work, both in links, and the angular difference on closing. Describe how the incline measurements were reduced to horizontal. State whether the true or what other meridian was used—if the former, whence derived—and whether the same meridian was used both above and below ground.

(*d.*) Say what precautions were used to ascertain if the instrument was in adjustment, and how the length of the chain or tape was tested. Did you adjust the instrument, and test the chain or tape yourself? What adjustments were tested? [A full description of the usual adjustments is to be given under heading (*i*).] What instrument was used for the angular measurements, and what for the linear measurements?

(*e.*) Draw a rough diagram to show how the surface and underground surveys were connected, and describe in writing the method adopted. State your opinion of the most accurate way of performing the above operation—first, when there is only one shaft; second, when there are two or more shafts. State what parts of the operation require the most care, and what precautions should be taken to insure accuracy in carrying the meridian down shafts.

THIRD DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT I. (*continued*).—*A Knowledge of Underground Surveying, and the Making of Plans of Underground Workings, showing also the Dip or Inclination and Strike of the Reefs and Lodes.*

(*f.*) State whether the compass can be relied on for underground surveys, and give your reasons for the answer. If you had a choice of a compass or a theodolite, which would you use?

(*g*.) If you are obliged to make a magnetic underground survey, state what means you would use to check the correctness of the survey, and how you would know that the surface and underground survey are on the same meridian, or how you would reduce them to the same supposing one to be magnetic and the other true.

(*h*.) The position of a peg at the end of a drive is N. 27426 links, and E. 5630·5 links: what is the bearing and distance to a point situated on the boundary of the claim N. 22230 and E. 3320—both co-ordinated from the same point?

(*i*.) Describe in writing the adjustments of a plane theodolite under the headings of "Horizontal Level," "Vertical Level," "Collimation," "Parallax"; and state what others are necessary. Also describe a miner's compass and its adjustments. (In both of these subjects the candidate will be examined by the Supervisor, who must furnish a separate report on each candidate's knowledge of the subject.)

(*j*.) Describe the method of plotting the plan, and how the area of the claim was ascertained, and what drawing-instruments were used.

(*k*.) What are the regulation marks that should define the boundaries of a claim under the Mines Act? And state sizes.

(*l*.) State where you learnt surveying, and who taught you, and how long you have had practice at surveying.

FOURTH DAY.—TIME: 9 A.M. TO 12 NOON.

[No book will be permitted to be used with the exception of logarithm tables. The candidate must attempt to answer every question. All calculations must be shown in detail.]

SUBJECT C.—*Drainage of Mines, and Pumping Appliances.*

1. How would you provide for expansion and contraction in putting steam-pipes in a shaft?
2. What type of pump would you adopt to raise 300 gallons per minute up a shaft 180 yards deep?
3. Sketch in ink a good form of foot-valve for a pump, and explain its use.
4. What are the advantages and disadvantages of employing compressed air as a means of obtaining power in mines?
5. How many gallons are there in sixteen tons of water, taking the weight of one gallon to equal ten pounds?
6. Describe the class of pump you would use to drain an inclined shaft, say at an angle of 45°, pumps to be rope-driven.
7. What would be the thickness of a cast-iron pipe 9 in. diameter for a head of 1,000 ft.?
8. Describe a Lancashire boiler, fittings, and how the flues run from furnace to chimney.

SUBJECT D.—*Haulage in Shafts and Underground Planes; also Strength of Hauling-ropes and chains.*

1. What would be the theoretical horse-power of a stream of water passing 1,000 cubic feet per minute over a fall of 30 ft.—height measured from level of water in the head-race to level of water in the tail-race?
2. What allowance would you make in last question for leakage and friction so as to arrive at the available horse-power?
3. Describe some system of underground haulage.
4. What is the breaking-weight of a 4 in. iron-wire rope?
5. What is the working-load for a $\frac{3}{4}$ in. short-linked chain?
6. Describe a safety-catch for a cage in detail.
7. Where would you look for defects in a chain that had been in use for some time?
8. What is the breaking- and proof-load, in tons, of a $\frac{7}{8}$ in. steel shackle-pin?

FOURTH DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT H.—*The Effect that Faults, Slides, and Mullock-bars have on Lodes, and how to ascertain the Direction of Slides and Heavals.*

Give six diagrams, with fully written explanations, to illustrate the effect that is exercised on mineral lodes by faults, slides, and mullock-bars; and describe instances from your personal observations.

SUBJECT J.—*A Knowledge of the Different Rocks where Gold, Silver, Tin, Copper, Zinc, Lead, and Antimony are found, and on the Formation of Lodes and Leads.*

1. What metallic ores are usually associated with granite slate, propolyte, serpentine, and limestone respectively?
2. What is the composition of the chief ores of silver, lead, tin, antimony, copper, and zinc, and where are they found in New Zealand?

SUBJECT K.—*A Knowledge of Arithmetic and the Method of keeping Accounts.*

1. Divide ·0434 by ·0653, and extract the square root of the quotient.
2. If 5 men accomplished a certain piece of work in 7 days 4 hours, how long would it take 12 men to do the same work?

3. There were 279 props, 47 caps, and 553 slabs delivered at a mine. The contract price at bush for props was £5 9s. per 100, caps £8 7s. per 100, and slabs £1 3s. 6d per 100; the price paid for carting was—for props 8s. 4d. per 100, the caps 9s. 5d. per 100, and the slabs 3s. 6d. per 100: show by calculation the cost of above materials at the bush and at the mine.

4. There were 100 employés in connection with the working of a mine, 60 of which were paid £142 10s. for their week's work, 25 of them were paid at five-sevenths of daily wage that each of the 60 men received, and 15 got two-thirds of the daily wage that each of the 25 men received. What were the wages of each per day, and the amount of money required to pay the wages for the week?

5. There are 4 poppet-legs for the construction of poppet-heads, 70 ft. long, 22 in. square at one end and 15 in. square at the other. The contract price being 19s. 6d. per 100 ft. super., required the number of superficial feet in the legs, and the total cost.

SUBJECT L.—*Oral Examination on Part VI. of "The Mining Act, 1891."*

1. Under what conditions can a mine be worked without having a certificated manager, also a mine requiring a manager holding a second-class certificate, and the class of mine requiring a manager who holds a first-class certificate?

2. What penalties is a mine-owner or mine-manager liable to for working a mine without a first-class mine-manager's certificate?

3. What provision is required in both storing and using explosives in connection with a mine, and under what conditions are explosives allowed to be taken into the workings? State fully.

4. What provision is required to be made in approaching a lodgment of water?

5. If an accident occurs in a mine, what does the Mining Act require the mine-manager to do?

6. How often would you make an examination of winding-ropes and cages, and what record would you keep of such examination?

7. What does the Mining Act require in connection with safety as regards machinery and shafts, and the duty of any employer who finds anything unsafe?

8. In what manner does the Mining Act require ladders to be fixed in a shaft?

9. What provision does the Mining Act require in connection with the employment of brace-men and engine-men?

10. What provision does the Mining Act require where men are lowered down a shaft where cages are not used?

QUESTIONS USED IN EXAMINATION OF MINING MANAGERS FOR SECOND-CLASS CERTIFICATES.

("The Mining Act, 1891.")

FIRST DAY.—TIME: 9 A.M. TO 12 NOON.

[Candidates must attempt to answer every question. All calculations to be shown in detail.]

SUBJECT A.—*The Laying-out and Construction of Shafts, Chambers, Main Drives or Levels, Uprises, and Stopes.*

1. If an outcrop of a quartz lode were seen on the top of a ridge, lying at an inclination to the west of 1 ft. horizontally for every 2 ft. in depth, and you had to commence an adit-level from the west face of the ridge, the surface of which had an inclination of 3 ft. horizontal to every 1 ft. vertical, what would be the length of an adit-level to cut the lode at 100 ft. below the surface?

2. Give the dimensions of an adit-level for single line of rails, and state what provision you would make for the full trucks passing the empty ones.

3. State how you would sink a shaft that required timbering: (*a.*) What preliminary work is required before commencing to sink? (*b.*) State how you would timber the shaft with planks if neither pegs nor battens were used at the corners; (*c*) how you would keep it plumb, and prevent it from twisting.

4. What distance do you consider most advantageous to have passes apart if the lode were 5 ft. wide? Give your reasons fully.

5. Give your experience in the practical working of mines—(*a*) the length of time you were actually employed in underground workings; (*b*) the time and localities in which you were so employed.

FIRST DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT C.—*On the Ventilation of Mines.*

1. What is meant by ventilation, and why is it required?

2. What effect does carbonic-acid gas have on the workmen? How would you detect it when it was injurious to health?

3. How would you ventilate a mine where there was only one opening to the surface? and what quantity of air do you consider requires to pass through a mine for each man and horse employed therein?

4. If you had to split a current of air to pass through three divisions, state how you would do it, and how you would ascertain the quantity of air passing through each division.

5. Describe the mechanical appliances used for ventilating mines.

SUBJECT D.—*Tapping Water in Mines.*

1. What provision would you make to prevent water going down a shaft if it came out of a fissure in the rock while you were sinking the shaft? Describe fully.
2. State how you would dam back water in a drive through solid rock—(*a*) if the water had only to be dammed back to a height of 4 ft.; (*b*) if a dam had to be made to stand a pressure of water standing 200 ft. above the centre of dam.
3. What precaution would you use in driving through soft ground where you were approaching a lodgment of water in old workings where the water was standing 50 ft. above the level of the drive?

SECOND DAY.—TIME: 9 A.M. TO 12 NOON.

[Candidates must attempt to answer every question. All calculations to be shown in detail.]

SUBJECT B.—*On the Timbering of Shafts, Adits, Main Drives or Levels, Passes, Stopes, and generally on the Systems of timbering Mines, and also on filling up Old Workings.*

1. In timbering a drive where the ground was of a swelling nature, describe how you would timber it to guard against the ground breaking the timber.
2. Describe how you would fit a set of timber for a main drive or level from which a quartz lode would be stoped. What dimensions of timber would you use? and what provision would you make to prevent the adjoining sets of timber from coming down in the event of one cap-piece breaking?
3. Describe how you would timber passes—(*a*) with round timber, (*b*) with slabs. (*c.*) What dimensions would you make the passes where timber had to be hauled up, and to provide for a ladder-way to allow the men to get up and down from their work?
4. If you were driving through alluvial drift liable to run like quicksand, state how you would timber the drive; and what provision would you make to guard against the ground running?
5. In opening out a cross-drive from a level in very bad ground, state how you would place the opening set in position if you had to take out one of the legs in the main set in the level; also, how you would fix the second set of timber to provide for driving the top laths or slabs.

SECOND DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT E.—*On Blasting and the Use of Explosives.*

1. State what experience you have had in blasting, what explosives you have used, and the comparative strength of dynamite, gelignite, and gelatine in relation to blasting-powder.
2. What effect does cold produce on dynamite?—(*a.*) At what temperature does it freeze? (*b.*) How can it be exploded to produce a good effect when in a frozen condition? (*c.*) What provision would you make to restore the dynamite to its normal temperature?
3. If you had a charge that missed fire, how long would you keep away from the place where the charge was, and what provision would you make to blast the ground, in the event of the shot missing fire?
4. How would you tamp a bore-hole where a charge of gelatine was used, if the hole were under water?
5. How would you use blasting-powder if a bore-hole were full of water? and what material and appliance would you use for tamping?

SUBJECT F.—*A Knowledge of Arithmetic and a Method of keeping Accounts.*

1. If 12 men did a certain piece of work in 4 days 3 hours, how long would it take 4 men and a boy to do the same work if the boy did two-thirds the work of a man?
2. Multiply ·0347 by 6976, and divide the result by 94.
3. How much would 112 oz. 3 dwt. 14 gr. of gold come to at £3 15s. 6d. per oz.?
4. If you had 16 men at 7s. 6d. per day, 4 men at 6s. 4d. per day, and 5 youths at 5s. 3d. per day, what would be the total amount of the wages for a week?
5. 176 props at £5 12s. per 100.
   94 caps at £8 17s. per 100.
   215 laths at £1 15s. 6d. per 100.
   359 ft. of sawn timber at 12s. 6d. per 100.

Required, the cost of each item.

SUBJECT G.—*A Knowledge of Part VI. of "The Mining Act, 1891."*

1. Under what conditions can a mine be worked without having a certificated manager, also a mine requiring a manager holding a second-ctass certificate, and the class of mine requiring a manager who holds a first-class certificate?
2. What penalties is a mine-owner or mine-manager liable to for working a mine without a first-class mine-manager's certificate?
3. What provision is required in both storing and using explosives in connection with a mine, and under what conditions are explosives allowed to be taken into the workings? State fully.
4. What provision is required to be made in approaching a lodgment of water?
5. If an accident occurs in a mine, what does the Mining Act require the mine-manager to do?
6. How often would you make an examination of winding-ropes and cages, and what record would you keep of such examination?
7. What does the Mining Act require in connection with safety as regards machinery and shafts, and the duty of any employer who finds anything unsafe?

8. In what manner does the Mining Act require ladders to be fixed in a shaft?
9. What provision does the Mining Act require in connection with the employment of bracemen and engine-men?
10. What provision does the Mining Act require where men are lowered down a shaft where cages are not used?

Questions used in the Examination of Battery Superintendents for Certificates.

("The Mining Act Amendment Act, 1894.")

First Day.—Time: 9 a.m. to 1 p.m.

[The candidates will not be allowed any books other than logarithm tables during the time they are sitting for examination. They must attempt to answer every question, and all calculations must be shown in detail.]

Subject A.—*The Different Modes of reducing and pulverising Ores.*

1. What experience have you had in ore-crushing plants? Give the name of the company you were employed by, and the period and date you were so employed.
2. If you were working a stamp-mill, the stamps having a drop of 8 in., what is the maximum speed you could drive the stamps with safety? Give your reasons why.
3. In placing new dies in a stamp mortar-box, give the level you would place them in relation to the bottom of the screen, and give your reasons for same.
4. Describe fully a stamp-mill of twenty stamps fitted up with all the latest appliances, the quantity of hard ore such mill would crush per day if a twenty-mesh screen were used, and also if a thirty-mesh screen were used, the stamps being 1,000 lb. each, and wet crushing adopted.
5. Describe an Ottis and Krupp mill, the quantity of ore they will crush per day through a forty-mesh screen, the class of ore they are best suited for, and the horse-power required to work them for the quantity of ore they crush.
6. A stamp-mill with forty head of stamps of 1,000 lb. each, making ninety blows per minute with a drop of 7 in.: required the horse-power to work the mill, allowing thirty-two per cent. of the power for friction, &c.
7. What fall do you consider necessary from the tramway when the ore is delivered to the rock-breaker floor, and from that floor to the stamp-mortars, also from the stamp-mortars to the floor where concentrating vanners are placed, the tables in front of the mortar-boxes being 12 ft. in length? Describe fully, and give your reasons why.
8. If you were working a thirty-stamp mill with stamps of 950 lb. each, with a Pelton wheel, and the pressure of water in the pipe at the wheel was 65 lb. per square inch, show by calculation the diameter of the nozzle you would use.
9. State what method you would adopt in taking samples of ore from a mill for assay.

Subject B.—*Amalgamating-machines.*

1. Give the width and fall per foot of tables covered with copper plates used for amalgamating purposes in front of mortar-boxes in a stamping-mill, for each five head of stamps.
2. Give a sketch of a spitzkasten, describe its use, and where it is placed in a stamp-mill when wet crushing is adopted.
3. Give the dimensions of a berdan, the angle it is worked at, the quantity of quicksilver you would use in each berdan, the speed you would work it at, and the horse-power required.
4. Describe the combination-pan—the quantity of pulverised ore they are capable of treating each charge, the time required for treatment, and the quantity of quicksilver used for each charge.
5. Describe the difference between Watson-Denny, Fraser's, McKay's, and Price's pans—the speed each requires to be worked at, the quantity of pulverised ore they will treat per day, and the horse-power required to work them.
6. State the class of amalgamating-machines you have used, the advantages or disadvantages you found in using them, and the percentage of bullion they recovered, and also state what means you took to ascertain such percentage.

First Day.—Time: 2 p.m. to 5 p.m.

Subject C.—*The Use of Quicksilver, and the Methods of using it in Connection with the Extraction of Gold and Silver from Ores.*

1. What steps would you take to remove lead or antimony from quicksilver? Also, what effect do these metals produce when in combination with quicksilver used for amalgamation in gold and silver ores?
2. Do you know of any conditions under which gold is not subject to amalgamation with quicksilver? If so, state them fully, and what you would do to make the gold readily amalgamable.
3. Describe fully how you would retort quicksilver or gold amalgam, and how you ascertained when the gold was completely free of quicksilver.
4. If quicksilver were charged with base metals, describe the method you would adopt to bring the quicksilver back to its original state.
5. Describe fully what method you would adopt in coating copper plates with quicksilver if you were not allowed to use any acid in cleaning the plates.
6. What causes the flouring of quicksilver, and how would you prevent it?

SUBJECT E.—*Chlorination Process of recovering Gold from Ores.*

1. Describe the method of chlorination now used at the Mount Morgan Mine, and its advantages over the Newbery-Vautin and Plattner process.
2. State the different methods adopted to recover the gold after it has been subjected to chlorination.
3. Describe how you would recover silver if there was a large percentage of it in ore subjected to chlorination.
4. Give a description of a modern hearth roasting-furnace; also of a revolving furnace where the ore is constantly passing through.
5. Describe the different methods of generating chlorine gas, and state how you would apply it in chlorinating gold-ores.
6. State fully how you would ascertain when gold-and-silver ore was properly roasted, and what chemicals (if any) you would use in roasting ore, and how you would use them.

SECOND DAY.—TIME: 9 A.M. TO 1 P.M.

[The candidates will not be allowed any books other than logarithm tables during the time they are sitting for examination. They must attempt to answer every question, and all calculations must be shown in detail.]

SUBJECT D.—*Lixiviation Process of recovering Gold and Silver from Ores.*

1. How is potassium-cyanide made, what are its impurities, and how do they affect the extraction of gold and silver?
2. What causes the deterioration of cyanide solutions, and what compounds are the result?
3. What volumetric method are you familiar with for testing the strength of cyanide solutions? Give the chemical equations involved, the final or indicator reactions, and state whether you use gram or grain measures and normal or decinormal solutions.
4. What are the antidotes of prussic acid? If a workman showed signs of cyanide poisoning what remedies would you use, and how would you apply them?
5. If you were treating raw concentrates which contained 4 oz. gold per ton, what strength of KCN solution would you use, and what steps would you take to ensure a reasonable extraction from such concentrates? Describe fully.
6. How many tons of a 0·4-per-cent. KCN solution can be obtained from 8 tons of 0·9-per-cent. solution, using a 0·1-per-cent. solution for the dilution?
7. If you were using crude cyanide containing 75 per cent. KCN, and making up a sump solution of 20 tons containing 0·15 per cent., what quantity of crude cyanide would you require to make the solution up to a strength of 0·5 per cent. KCN?
8. Give a sketch of a cyanide-solution plant, and show how you would place the different vats, sumps, and precipitating-boxes in relation to one another.
9. If a vat were 30 ft. in diameter and filled with ore to a depth of 5 ft. 4 in., how many tons of ore would it contain, and what quantity of solution of KCN would you use?
10. What are the advantages or disadvantages by having one percolating-vat above the other? Why are they used? Describe fully.
11. What effect do sulphides of copper, zinc, and antimony have when present in ores containing gold and silver which are subjected to treatment with KCN solutions? Describe fully how you would treat such ores.
12. If you were treating decomposed pyritous tailings with solutions of KCN, what preliminary treatment would you adopt to ensure a successful extraction of the bullion?
13. Describe fully the clean-up of the zinc-extractors, including drying, roasting, and smelting of the slimes.
14. What is the average consumption of cyanide and zinc per ton of ore in any cyanide-works you have been employed in? and give the name of your employer.

SECOND DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT F.—*Sampling and Testing of Ores.*

1. Half a hundredweight of lode-stuff is submitted to you. Describe the methods, step by step, that you would follow for its examination with the view of determining its value as an or for gold, silver, copper, lead, or zinc.

SUBJECT G.—*Knowledge of Arithmetic and Method of keeping Accounts.*

1. If ore gain by assay 3 oz. 4 dwt. of gold and 26 oz. 5 dwt. silver per ton, show by calculation the quantity of gold and silver that would be recovered from 340 tons if the saving was equal to 80·8 per cent. of the assay quantity of gold and 39·9 per cent. of the assay quantity of the silver.
2. If 9 men and 5 boys did a certain quantity of work in 6 days 5 hours; each of the boys did five-eighths the work of a man: how long would it take 16 men and 9 boys to do the same amount of work?
3. If gold of 22 carats fine is worth £3 17s. per oz., what would be the value of 349 oz. 13 dwt. of gold of 14·9 carats fine?
4. The wages of 20 miners, 7 truckers, and 12 boys, for 24 days came to £366 11s. 6d.; the truckers got $\frac{7}{8}$ of a miner's wages, and the boys got $\frac{2}{3}$ of a trucker's wages: how much did each miner, trucker, and boy receive?
5. The difference of 2 numbers is 14, and the difference of their squares is 476, show by calculation the numbers.

LIST OF MINE-MANAGERS, BATTERY-SUPERINTENDENTS, AND ENGINE-DRIVERS WHO HAVE OBTAINED CERTIFICATES UNDER THE MINING AND COAL-MINES ACTS OF 1886, 1891, 1894, AND 1896, AND "THE INSPECTION OF MACHINERY ACT 1882 AMENDMENT ACT, 1894."

As there have been several inquiries made as to the names of persons who hold certificates as mine-managers and engine-drivers, the annexed is a complete list of those holding certificates at the date of this report, taken from the register:—

THE MINING ACT.

FIRST-CLASS SERVICE CERTIFICATES.

Issued under "The Mining Act, 1886," without Examination.

Adams, H. H., Waiorongomai.
Anderson, P., Thames.
Andrews, R., Coromandel.
Andrews, T., Thames.
Barclay, T. H., Thames.
Bennett, J., Alexandra.
Benney, J., Coromandel.
Black, T., Waiomoi.
Bollersley, N., Boatman's.
Bradbury, M., Reefton.
Bray, John, Lyell.
Burch, W. H., Thames.
Byrne, J. F., Stafford.
Cameron, A., Macetown.
Cameron, E., Te Aroha.
Chapman, J. A., Dunedin.
Clarke, G. S., Thames.
Comer, R., Thames.
Conradson, M., Lyell.
Corin, W., Thames.
Cornes, C. A., Karangahake.
Coutts, J., Thames.
Crawford, T. H., Thames.
Crowley, C., Reefton.
Cummings, W., Reefton.
Davis, J. E., Queenstown.
Davey, C., Ross.
Donald, J., Cromwell.
Dryden, S., Thames.
Dunlop, T. A., Thames.
Edwards, J., Skipper's.
Elliott, J., Macetown.
Evans, F., Skipper's.
Evans, J. H., Skipper's.
Fitzmaurice, R., Reefton.
Frewen, J. B., Queenstown.
Gavin, T., Te Aroha.
Gilbert, J., Reefton.
Gilmour, T., Thames.
Giles, G. F., West Wanganui.
Glass, W. M., Naseby.
Goldsworthy, J., Waiorongomai.
Greenish, J., Reefton.
Greenville, W., Ohinemuri.
Hall, J. P.
Hansen, P. C., Thames.
Harris, J., Owen's Reefs.
Harrison, R. H., Coromandel.
Hicks, T. B., Thames.
Hilton, G. P., Bendigo.
Hodge, F., Coromandel.
Hollis, W., Thames.
Hunter, R., Thames.
James, F., Thames.
Jamieson, A., Coromandel.
Jenkins, M., Wakatipu.
Johnstone, H., Bluespur.
Julian, J., Boatman's.
Kelly, J., Lyell.
Kerr, J., Thames.
Lawn, E., Black's Point.
Lawn, H., Boatman's.
Lawn, J., Reefton.
Littlejohn, W., Karangahake.
Lowe, E. W., Thames.
Malfroy, J. M. C., Ross.
Martin, W. G., Thames.
McCallum, J., Reefton.
McCullough, R., Thames.
McGruer, G. N., Karangahake.
McIlhaney, J., Thames.
McIntosh, D., Bluespur.
McKay, J., Ross.
McKenney, J., Reefton.
McKenzie, W., Thames.
McLeod, G., Coromandel.
McLiver, F., Thames.
McLiver, H., Thames.
McMaster, J., Reefton.
Moore, H. W., Thames.
Moore, J. H., Thames.
Morgan, R., Otago.
Morrisby, A. A., Glenorchy.
Nasmyth, T., Reefton.
Newman, W., Naseby.
Northey, J., Thames.
O'Sullivan, D. E., Thames.
Polton, A., Karangahake.
Porter, J., Waipori.
Purvis, G., Ross.
Quinn, E., Te Aroha.
Radford, T., Thames.
Ralph, J. G., Thames.
Ranger, J., Reefton.
Rasmussen, C. L., Mokihinui.
Rasmussen, C. P., Mokihinui.
Reid, P., Coromandel.
Resta, L., Macetown.
Roberts, E., Ross.
Rooney, F., Reefton.
Scott, T., Waiorongomai.
Searight, A., Reefton.
Senior, J., Thames.
Smith, J. E., Thames.
Stone, F., Karangahake.
Steedman, J. B., Thames.
Sturm, A., Waipori.
Taylor, N., Thames.
Todd, C., Heriot.
Treloer, J. S., Reefton.
Tripp, R. S., Arrowtown.
Vivian, J. G., Thames.
Vivian, S., Reefton.
Waite, C. D., Thames.
Waite, E., Thames.
Walker, J. W., Thames.
Watson, T., Reefton.
Wearne, J. E., Endeavour Inlet.
Wearne, T., Endeavour Inlet.
Wilcox, J., Thames.
Williams, J., Skipper's.
Wright, G., Boatman's.
Wylie, W., Ross.
Young, G., Skipper's.

First-class Mine-managers' Certificates, issued after Examination, under "The Mining Act, 1886," and Amendment Acts.

Adams, B., Thames.
Baker, W., Thames.
Black, G., Reefton.
Caples, P. Q., Reefton.
Carter, J., Thames.
Casley, G., Reefton.
Cochrane, D. L., Reefton.
Colebrook, J. D., Coromandel.
Coombe, J., Reefton.
Crawford, J. J., Thames.
Cummings, W., Reefton.
Donaldson, W., Otago.
Fleming, M., Thames.
Gardner, W. P., Reefton.
Harris, W., Thames.
Horn, G. W., Thames.
Horne, W., Coromandel.
Hornick, M., Thames.
Hosking, G. F., Auckland.
Kruizenza, W., Reefton.
Lawn, T., Reefton.
Logan, H. F., Wellington.
Mangan, T., Thames.
Mouat, W. G., Dunedin.
Truscott, G., Thames.
Watkins, W. E., Reefton.
Wilkie, J., Reefton.

First-class Mine-manager's Certificates, issued on Production of Certificate from a Recognised Authority outside the Colony, under "The Mining Act, 1886," and "The Mining Act, 1891."

Argall, W. H., Coromandel.
Beckwith, L. H., Wellington.
Datson, J., Manaia.
Goold, A. L., Auckland.
Griffiths, A. P., Auckland.
Griffiths, H. P., Auckland.
Hailey, R. C., Dunedin.
Williams, W. H., Auckland.

First-class Mine-managers' Certificates, issued after Examination, under "The Mining Act, 1891."

Agnew, J. A., Thames.
Annear, William, Reefton.
Bennett, E. P., Thames.
Boydell, H. C., Coromandel.
Bradley, R. J. H., Te Puke.
Bray, E., Thames.
Bruce, Malcolm, Thames.
Carroll, J., Lyell.
Cartwright, E., Thames.
Crabb, J., Reefton.
Dobson, J. A., Auckland.
Evans, H. A., Wellington.
Fahey, P., Reefton.
Flannigan, Francis, Reefton.
Gilmour, J. L., Thames.
Hodge, J. H., Thames.
Hughes, D., Thames.
James, T., Thames.
Keam, P. E., Thames.
Lane, J., Reefton.
Lawn, C. H., Capleston.
Linck, F. W., Thames.
Marshall, F., Reefton.
Morrison, R., Thames.
McDermott, J., Thames.
McDermott, G., Thames.
McDermott, W., Thames.
McGregor, W. T., Thames.
McKenzie, H. J., Coromandel.
McPeake, J., Thames.
O'Keeffe, M. D., Thames.
Paul, Matthew, Thames.
Paltridge, Henry, Thames.
Prince, F. H., Reefton.
Robertson, D. B., Stafford.
Ross, Richard, Thames.
Russell, Murray, Dunedin.
Shepherd, H. F., Thames.
Stanford, W. J., Macetown.
Steedman, J. G., Thames.
Sutherland, Benjamin, Reefton.
Tierney, R., Thames.
Vialoux, F., Coromandel.
Warne, George, Thames.
Waters, D. B., Skipper's.
Watt, J., Thames.
White, G. H., Thames.
Whitley, A., Thames.
Williams, C., Capleston.

First-class Mine-managers' Certificates, issued under Section 313 of "The Mining Act, 1891."

Edwards, George, Westport.
Hornibrooke, H. P., Coromandel.
Martin, James, Reefton.
Rickard, John, Thames.
Snow, Thomas, Huntly.
Thomas, James, Thames.
Trelease, J. H., Thames.
Williams, John, Kuaotunu.
White, John S., Karangahake.

First-class Mine-managers' Certificates of Competency granted to Holders of Provisional Warrants under Section 32 of "The Mining Act Amendment Act, 1896."

Alexander, Thomas, Deep Creek.
Argall, A. E., Coromandel.
Battens, H., Coromandel.
Begley, Thomas, Reefton.
Bennett, Charles Henry, Kuaotunu.
Bunney, Joseph, Waihi.
Campbell, Alexander, Cullensville.
Carlyon, Samuel, Coromandel.
Cornes, C. A., jun., Karangahake.
Daldy, Edward Arthur, Coromandel.
Draffin, Samuel, Waitekauri.
Farmer, C. S., Waitekauri.
Goldsworthy, Thomas, Tokatea.
Goldsworthy, William, Karangahake.
Govan, Joseph, Thames.
Harvey, A. G., Coromandel.
Howard, Samuel, Karangahake.
James, Robert, Thames.
Jamieson, John, Reefton.
Johns, Thomas, Waihi.
Kennerley, W. H., Thames.
Langford, James, Coromandel.
McCombie, John, Karangahake.
MacDonald, H., Coromandel.
McEnteer, James, Tararu.
McFarlane, Charles M., Tokatea.
McLean, Benjamin J., Waitekauri.
McLean, Charles, Thames.
McLean, James, Tararu, Thames.
Meehan, James, Westport.
Moorecraft, Walter, Coromandel.
Morgan, William, Owharoa.
Moyle, Thomas, Thames.
Patton, William, Macetown.
Pearce, Francis, Reefton.
Potter, William H., Thames.
Rabe, Henry, Karaka.
Rillstone, Charles, Waipori.
Somervell, John, Thames.
Stackpole, Robert, jun., Karangahake.
Thomas, Archelaus, Tapu, Thames.
Turnbull, Thomas A., Whangamata.
Willets, Henry, Thames.
Wilson, James R. S., Kuaotunu.

SECOND-CLASS SERVICE CERTIFICATES AS MINE-MANAGERS.

Issued under "The Mining Act, 1891."

Adams, W. J., Thames.
Agnew, J. A., Coromandel.
Allen, Richard, Reefton.
Argall, A. E., Coromandel.
Bennett, C. H., Coromandel.
Begley, Thomas, Reefton.
Beard, W. T., Reefton.
Bone, William, Reefton.
Bowler, John, Thames.
Blair, Thomas, Kuaotunu.
Bray, Edwin, Reefton.
Brownlee, Thomas James, Thames.
Brokenshire, James, Thames.
Bolitho, James, Reefton.
Brown, John, Macrae's.
Bremner, John, Coromandel.
Borlase, J. H., Capleston.
Bunny, Joseph, Thames.
Byrne, John, Karangahake.
Caird, Alexander McNeil, Reefton.
Campbell, J., Kuaotunu.
Climo, Noah, Coromandel.
Comer, George, Thames.
Cowan, Hugh, Kuaotunu.
Corbett, T., Paeroa.
Comer, W. W., Thames.
Crabb, Thomas, Reefton.
Daniel, P. F., Greymouth.
Dobson, John Allen, Kuaotunu.
Edwards, George, Westport.
Ellery, John, Reefton.
Flannigan, Francis, Reefton.
Foster, Thomas, Wellington.
Gale, C. W., Coromandel.
Gill, George, Thames.
Glasgow, T. M., Thames.
Goldsworthy, Henry, Thames.
Govan, Joseph, Thames.
Griffin, Patrick, Thames.
Grimmond, Joseph, Ross.
Goldsworthy, William, Mauku, Auckland.
Gemmings, Charles, Thames.
Gribble, James, Norsewood.
Guthrie, John, Wellington.
Guy, Robert, Kuaotunu.
Harvey, William, Reefton.
Hardman, James Edward, Thames.
Harris, R., Thames.
Hetherington, William, Thames.
Hicks, W., Thames.
Hill, Alex. Grey, Waikakaho.
Hore, John, Wellington.
Hollis, Fred. J., Waihi.
Hornibrook, H. P., Kuaotunu.
Jamieson, John, Reefton.
Johnstone, William, Collingwood.
Jobe, James, Thames.
Johns, Thomas, Thames.
Kendall, Henry, Thames.
Kerr, George, Kamo.
Kirker, Thomas, Thames.
Laughlin, David, Thames.
Law, John, Thames.
Lough, H., Thames.
Loughlin, S., Thames.
McLean, James, Thames.
McLean, Alex., Coromandel.
McLean, Charles, Thames.
McCormick, Charles, Coromandel.
McQuillan, John, Reefton.
McNeill, Daniel, Thames.
McNeill, George, Upper Kuaotunu.
McCombie, John, Karangahake.
McEwen, James, Reefton.
McLoghry, Archibald, Karangahake.
Mackay, William, Nenthorn.
Martin, James, Reefton.
Meagher, John, Karangahake.
Mills, George, Thames.
Mayn, John, Coromandel.
Martin, David, Black's Point.
Morgan, William, Upper Thames.
Moorecroft, Thomas, Thames.
Milne, John, Thames.
Moyle, Thomas, Thames.
Naysmith, James, Reefton.
Newdick, Alfred, Thames.
Notman, Alexander, Reefton.
O'Keefe, M. W. D., Thames.
Page, John, Lyell.
Parkiss, Jos. W., Reefton.
Potts, W. H., Thames.
Primrose, J., Kuaotunu.
Pettigrew, Robert, Sydney.
Peebles, Alexander, Kuaotunu.
Phillips, W. H., Thames.
Pollock, John, Thames.
Rabe, Henry, Thames.
Reid, Thomas Groat, Thames.
Rickard, John, Thames.
Richards, A. H., Kuaotunu.
Radford, Thomas, Thames.
Rogers, Charles Henry, Reefton.
Rogers, William Henry, Kumara.
Ross, J., Thames.
Rowe, James, Thames.
Shaw, James, Karangahake.
Sligo, Alex., Nenthorn.
Thomas, James, Thames.
Thomas, A., Thames.
Thomson, John, Dunedin.
Tregellas, James, Reefton.
Tregoweth, William, Thames.
Wells, Charles Lewis, Thames.
Willets, Henry, Thames.
Williams, James, Thames.
Williams, John, Thames.
Whisker, Charles, Thames.
White, John S., Karangahake.
Wilson, James R. S., Kuaotunu.
Wilson, J. G., Thames.
Woodcock, James, Thames.
Worth, Robert, Waihi.

Second-class Mine-manager's Certificates, issued after Examination, under "The Mining Act, 1891."

Benney, J., jun., Paeroa.
Christie, William, Waitekauri.
Draffin, S., Waitekauri.
Dunkin, T., Coromandel.
Evans, H. A., Skipper's.
Gatland, V. Y., Coromandel.
Mathewson, A., Hyde.
McNeil, A. H., Coromandel.
White, F. H., Kuaotunu.
White, G. H., Thames.

Second-class Mine-managers' Certificates. issued under Section 313 of "The Mining Act, 1891."

Connon, William, Thames.
Coran, Henry, Thames.
Edwards, E., Coromandel.
Kelso, Archibald, Coromandel.
McCormick, W. J., Waitekauri.

Second-class Mine-managers' Certificates of Competency granted to Holders of Provisional Warrants under Section 32 of "The Mining Act Amendment Act, 1896."

Allen, W. J., Coromandel.
Barney, Montague T., Waitekauri.
Brownlee, Henry, Thames.
Collins, Charles, Waitekauri.
Curtis, Charles, Taylorville.
Davis, James, Coromandel.
Gardner, James, Waimangaroa.
Howe, Albion S., Waitekauri.
Johnson, Frank H., Collingwood.
Kirwan, William, Reefton.
McDonald, John, Tairua.
McInnes, John, Puriri.
Martin, William, Tararu, Thames.
Murphy, Joseph, Coromandel.
O'Brien, John, Westport.
Prescott, Arthur J., Coromandel.
Radford, Samuel, Waihi.
Ruffin, Richard, Manaia, Coromandel.

THE COAL-MINES ACT.

First-class Mine-managers' Certificates.

Issued under the Coal-mines Acts, 1886 and 1891.

Aitken, T., Wendon.
Alexander, T., Brunnerton.
Austin, J., Sheffield.
Binns, G. J., Dunedin.
Bishop, J., Brunnerton.
Brown, T., Westport.
Brown, T., Glentunnel.
Cameron, J., Denniston.
Campbell, J. C., Fairfield.
Cochrane, N. D., Dunedin.
Collins, W., Taupiri.
Dando, M., Brunnerton.
Elliott, R., Wallsend.
Ferguson, A., Whitecliffs.
Freeman, J., Green Island.
Geary, J., Kamo.
Gray, J., Abbotsford.
Harrison, J., Brunnerton.
Irving, J., Kaitangata.
Jemison, W., Waimangaroa.
Kenyon, J., Shag Point.
Kerr, G., Kamo.
Lindop, A. B., Springfield.
Lindsay, W., Otago.
Lloyd, J., Invercargill.
Louden, J., Green Island.
Love, A., Whangarei.
Mason, J., Nightcaps.
May, J., Greymouth.
Moody, T. P., Kawakawa.
Moore, W. J., Springfield.
Nelson, J., Green Island.
Ord, J., Huntly.
Redshaw, W., Whangarei.
Reed, F., Westport.
Richardson, D., Abbotsford.
Shore, J., Kaitangata.
Shore, T., Orepuki.
Shore, W. M., Kaitangata.
Smart, W., Christchurch.
Smith, A. E., Nelson.
Smith, T. F., Nelson.
Sneddon, J., Mosgiel.
Swinbanks, J., Kawakawa.
Taylor, E. B., Huntly.
Thompson, A., Whitecliffs.
Walker, J., Collingwood.
Williams, W. H., Shag Point.

First-class Certificates issued after Examination under the Coal-mines Acts, 1886 and 1891.

Armitage, F. W., Auckland.
Armstrong, J., Brunnerton.
Barclay, T., Kaitangata.
Carruthers, J., Shag Point.
Carson, W., Kaitangata.
Coulthard, J., Taylorville.
Dixon, W., jun., Kaitangata.
Dunn, W., Brunnerton.
Fleming, J., Kaitangata.
Gibson, John, Westport
Gillanders, A., Shag Point.
Green, E. R., Abbotsford.
Green, J., Brunnerton.
Herd, J., Brunnerton.
Hosking, G. F., Auckland.
Jebson, D., Canterbury.
Leitch, J., Blackball.
Leitch, W., Blackball.
McCormack, W., Denniston.
Milligan, N., Thames.
Murray, T., Westport.
Newsome, F., Denniston.
Sowerby, H., Denniston.
Tattley, E. W., Huntly.
Taylor, A. H., Waikato.
Turner, G. F., Shag Point.

Mine-managers' Certificates, issued on Production of English Certificate, under "The Coal-mines Act, 1886."

Binns, G. J., Dunedin.
Black, T. H., Waipori.
Broome, G. H., Ngakawau.
Cater, T., Auckland.
Cochrane, N. D., Dunedin.
Garrett, J. H., Auckland.
Hayes, J., Kaitangata.
Hodgson, J .W., Ross.
Macalister, J., Invercargill.
Nimmo, J., Oamaru.
Straw, M., Westport.
Tattley, W., Auckland.

First-class Mine-managers' Certificates, issued to Inspectors of Mines by virtue of Office, under the Mining Acts and the Coal-mines Acts.

Binns, G. J., Dunedin.
Cochrane, N. D., Westport.
Coutts, J., Thames.
Gordon, H. A., Wellington.
Gow, J., Dunedin.
Hayes, J., Dunedin.
McLaren, J. M., Thames.
Tennent, R., Reefton.
Wilson, G., Thames.

Mine-managers' Certificates, issued on Production of English Certificate, under "The Coal-mines Act, 1891.'

Alison, R., Greymouth.
Dixon, J., Westport.
Frame, Joseph, Kaitangata.
Irvine, James, Dunedin.
Jordan, R. J., Kaitangata.
Lewis, W., Blackball.
Pollock, James, Green Island, Otago.
Proud, Joseph, Wanganui.
Scott, Joseph, Ngahere.
Tennent, R., Brunnerton.
Wright, E. S., Auckland.

Second-class Mine-managers' Service Certificates.

Issued under "The Coal-mines Act, 1891."

Carson, M., Kaitangata.
Collier, Levi, Kamo.
Clarke, Edward, Shag Point.
Elliot, Joseph, Coal Creek.
Harris, John, Denniston.
Herd, Joseph, Brunnerton.
Howie, James, Kaitangata.
Leeming, William, Whitecliffs.
Lobb, Joseph, Mokau.
Love, Alexander, Orepuki.
McIntosh, Allan, Shag Point.
McLaren, J. M., Thames.
Marshall, J., Ngakawau.
Murray, Thomas, Denniston.
Nimmo, George Stewart, Ngapara.
Radcliffe, William, Reefton.
Roberts, John, Brunnerton.
Ross, John, Kawakawa.
Sara, James, Reefton.
Smith, Charles, Whangarei.
Thomas, James, Springfield.
Wallace, William, Huntly.
Willetts, John, Papakaio.
Willetts, John Morris, Papakaio.
Young, William, Waimangaroa.

Second-class Certificates issued after Examination under the Coal-mines Acts, 1886 and 1891.

Austin, W. B., Sheffield.
Barclay, T., Kaitangata.
Dixon, W., jun., Kaitangata.
Harris, A., Saddle Hill.
Hill, R., Abbotsford.
Hunter, A., Southland.
Lindsay, J. B., Orepuki.
Snow, T., Mercer.
Waldie, A. B., Mokau.

Battery-superintendents' Certificates.

Issued under "The Mining Act 1891 Amendment Act, 1894," without undergoing Examination.

Adams, H. H., Waihi.
Aitken, R. M., Reefton.
Banks, Edwin Gripper, Waihi.
Barry, Hubert Percy, Waihi.
Goldsworthy, Henry, Kuaotunu.
Goldsworthy, John, Kuaotunu.
Greenway, H. Howard, Auckland.
Heard, G. St. Clair, Waihi.
Hope, John S., Waitekauri.
Hutchison, William, Karangahake.
Margetts, Frederick Ernest, Kuaotunu.
McLellan, William, Waitekuri.
Mellett, Richard Sheridan, Waitekauri.
Napier, James, Karangahake.
Noble, James R., Karangahake.
Park, James, Thames.
Shepherd, Henry Franklin, Waihi.
Walker, James A., Kuaotunu.
Wilson, Arthur E., Waihi.
Wilson, James Kitchener, Auckland.

Battery-superintendents' Certificates, 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, R., Waitekauri.
Clarke, W. J., Waihi.
Day, A. T., Thames.
Dixon, Clement, Waihi.
Doveton, G. D., Thames.
Fleming, G. C. S., Thames.
Gray, J. W., Waihi.
Hayward, F. W., Komata.
Jackson, J. H., Paeroa.
Jones, Achison, Waihi.
Kidd, F. D., Thames.
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.

Engine-drivers' Certificates.

Issued under "The Coal-mines Act, 1886."

Bainbridge, William, Brunnerton.
Beirn, William H., Kaitangata.
Clark, A., Kaitangata.
Davidson, Robert, Walton Park.
Elliott, R., Denniston.
Eltringham, Stephen, Greymouth.
Foote, Thomas, Miranda.
Gall, Adam, Huntly.
Gill, Robert, Shag Point.
Gillies, D., Walton Park.
Girven, Adam, Kawakawa.
Grundy, Walter, Kamo.
Gibson, J., Denniston.
Gray, G. A., Kaitangata.
Harrison, C. F. R., Huntly.
Hazeldene, T., Denniston.
Hartley, H., Huntly.
Henderson, J., Huntly.
Hetherington, R., Huntly.
Howie, William, Walton Park.
Kelly, Peter, Kaitangata.
Leisham, G., Denniston.
Marriott, T., Huntly.
Mason, J., Springfield.
Muir, T., Huntly.
Moore, Luke Martin, Brunnerton.
McFarlane, Henry, Miranda.
McGarry, James, Brunnerton.
McGregor, Duncan, Stirling.
McIntosh, Donald, Allandale.
McVie, John, Walton Park.
O'Neil, J., Denniston.
Porter, H. R., Huntly.
Ryan, T., Huntly.
Sampson, J., Huntly.
Saunders, J., Denniston.
Shore, Joseph, Kaitangata.
Skilton, F. G., Denniston.
Skellern, R., Huntly.
Smith, J., Denniston.
Southall, James, Brunnerton.
Thomas, William, Kamo.
Troughhear, Robert, Dobson.
Turner, Henry, Kawakawa.
Vincent, James, Miranda.
Wearn, Alfred, Boatman's.
Wearn, James, Wallsend.
Williams, Llewellyn, Kawakawa.
Woods, William, Kawakawa.
Williams, F. A., Shag Point.

Engine-drivers' Service Certificates.

Issued under "The Mining Act, 1891."

Audley, F., Coromandel.
Battens, H., Coromandel.
Black, C., Reefton.
Black, G. J., Reefton.
Bridson, Mat. J., Thames.
Casley, J., Thames.
Clerkin, F., Reefton.
Crabb, J., Reefton.
Crofts, J. W., Skipper's.
Cook, W., Thames.
Craig, D., Thames.
Davies, T., Thames.
Dunstan, J., Thames.
Faithful, William, sen., Cromwell.
Faithful, William, jun., Cromwell.
FitzMaurice, Raymond, Reefton.
Grundy, T., Thames.
Harrison, R. H., Kuaotunu.
Hope, J. S., Waitekauri.
Hufton, George, Reefton.
Ivey, R., Thames.
Latimer, Alfred, Dunedin.
Lamberton, J., Reefton.
Lawn, E., Reefton.
McLean, J., Reefton.
Milne, S., Coromandel.
Murphy, A. R., Queenstown.
Morton, C., Thames.
Patterson, D., Reefton.
Patten, A. C., Reefton.
Phillips, W. H., Thames.
Ryan, J. P., Coromandel.
Roche, H., Thames.
Saunders, William, Reefton.
Smith, R., Thames.
Skilton, A. G., Westport.
Sullivan, W., Coromandel.
Titley, A. W., Black's Point.
Walding, J., sen., Coromandel.
Walding, J., jun., Coromandel.
Warne, G., Thames.
Wishart, R., Thames.
Wood, A., Thames.

Engine-drivers' Certificates, issued after Examination, under "The Mining Act, 1891."

Allen, A., Thames.
Auld, James, Reefton.
Blackadder, D., Reefton.
Cook, S., Fairfield.
Daldy, E. A., Coromandel.
Dunstan, I., Waihi.
Elliston, A. J., Reefton.
Lawn, C. H., Capleston.
McAuley, T., Reefton (for water).
Ross, M., Reefton.
Slowey, William, Reefton.
Wilson, F. H., Thames.
Wynn, M., jun., Reefton (for water).

Engine-drivers' Service Certificates.

Issued under "The Coal-mines Act, 1891."

Archibald, W., Kaitangata.
Barlow, William John, Shag Point.
Boag, John, Shag Point.
Forrestor, Robert, Kaitangata.
Girvan, R., Kawakawa.
Greening, Luke, Springfield.
Johnstone, R. N., Kaitangata.
McVie, Gavin, Kaitangata.
Milburn, Edward, Westport.
Park, John A., Huntly.
Prentice, J., Shag Point.
Rixon, William E., Shag Point.
Todd, William, Dunedin.
Webb, Peter Oliver, Nightcaps.

Engine-drivers' Certificates, issued after Examination, under "The Coal-mines Act, 1891."

Johnston, W. P., Kaitangata.
Marshall, D., Kaitangata.
Napier, A. T., Kaitangata.
Shearer, W., Huntly.

Winding-engine Drivers' Certificates of Competency.

Issued under "The Inspection of Machinery Act 1882 Amendment Act, 1894."

Aickin, Charles James.
Allan, Peter.
Allen, William John.
Ashby, William George.
Bainbridge, William.
Bainbridge, Henry.
Balfour, Herber Thomas.
Bell, Edward.
Bentley, John Daniel.
Bickford, Charles Frederick.
Black, George James.
Bolitho, James.
Bowman, Charles Henry.
Budge, George Symons.
Buddle, Frank.
Burgess, Benjamin.
Buxton, Harry Arthur.
Bydder, Charles Alfred.
Campbell, Robert.
Cathey, Alexander.
Chamberlain, Charles.
Chamberlain, John Edward.
Cheverton, George Henry.
Christmas, James.
Christian, Herbert.
Coad, Albert.
Colligan, John.
Copeland, Joseph Barlow.
Copeland, John.
Cowie, Alexander.
Cox, Archibald.
Craig, James.
Cunningham, George.
Dawson, William.
Dodd, William.
Dodd, James.
Donnelly, Thomas.
Durham, Alfred Thomas.
Duthie, William James.
Eustace, Charles Henry.
Evans, Herbert Henry.
Fraser, Theodore Tinne.
Gillanders, Alexander Sinclair.
Gore, Cornelius Wesley.
Greenway, George.
Griffin, Lewis.
Hallinan, Thomas.
Harkins, William.
Henderson, George.
Henderson, William.
Henry, Francis.
Heslin, Frederick.
Highet, John.
Hindmarsh, Ralph St. John.
Hill, Benjamin.
Hughes, William Henry.
Hughes, William.
Hunter, George.
Hunter, Henry.
Jack, James John.
Jefcoate, James Edward.
Jenkinson, Alfred.
Johnson, Thomas.
Jones, Hugh Pughe.
Kay, John.
Kaye, Joseph Ernest.
Kelly, Peter George.
Kidd, William.
King, Hector William.
Lamb, Edward.
Langan, Gerald.
Langdon, Walker Henry Charles.
Langford, Samuel George.
Lawle, James.
Lennox, James Fisher.
Letcher, John Henry.
Lever, Harry Graham.
Lisle, James.
Lovatt, Charles Robert.
Lyons, John.
Mackie, Edward Morrison.
Maloney, James Joseph.
Martin, Thomas.
Meier, George Arthur.
Moffit, Henry John.
Moore, Michael.
Morgan, William.
Morgan, Joseph.
Mulholland, Thomas.
Mussicks, John Jackson.
Mybroi, William.
McAnulty, William.
McAuley, Thomas.
McFarlane, Robert John.
McIntosh, John.
McIntosh, Allan Smith.
McIntyre, James.
McLean, Arthur Charles.
McLean, William David Lindsay.
McLelland, James.
McMahan, Timothy.
McQuillan, Hugh.
Nelson, Henry.
Newton, James.
Nilsson, John Oscar.
Norris, John William.
O'Sullivan, Thomas Francis.
Parker, Daniel.

WINDING-ENGINE DRIVERS' CERTIFICATES OF COMPETENCY—*continued.*

Issued under "The Inspection of Machinery Act 1882 Amendment Act, 1894"—continued.

Provan, Andrew.
Radford, Thomas.
Rayner, Alfred Edward.
Roach, Thomas Jenkin.
Robertson, John.
Roering, Franz.
Ryan, John Patrick.
Sanson, William.
Sargent, Henry.
Saunders, William Henry.
Schmetzer, Percy Carl.
Scobbie, George.
Scott, Walter George.
Seawright, Robert E. E. M.
Shore, George Henry.
Shortt, Edward.
Sinclair, George.
Skelton, John.
Slater, William.
Smith, Walter.
Smith, Robert.
Snow, John George.
Sutcliffe, George Henry.
Taylor, Alfred Edward.
Thwaites, William.
Thomas, Thomas.
Tills, Charles.
Todd, James.
Tollard, Alfred Harry.
Tomkies, Arthur Grettan.
Tomkies, Horace.
Trembath, John.
Turner, George Frederick.
Waddell, Andrew Hamilton.
Wearne, Jaketh Joseph.
Welby, Amos Walter.
Whitehouse, John.
Williams, Francis.
Williams, Reece.
Williams, Benjamin.
Wilkinson, Thomas.
Wilson, Daniel.
Wilson, John.
Wood, John Dawley.
Wray, John.
Wylan, John.
Young, William Robert.

WINDING-ENGINE DRIVERS' SERVICE CERTIFICATES.

Issued under "The Inspection of Machinery Act 1882 Amendment Act, 1894."

Ballantyne, C. C.
Boswell, James.
Brokenshire, Joseph.
Broomfield, Charles Jones.
Bruggy, Patrick M.
Buchan, George A.
Burk, Thomas.
Cassidy, James.
Clarke, George.
Collier, Levi.
Coutts, John.
Cummock, John.
Davidson, Alexander.
Dunn, Joseph.
Elmore, William H.
Ford, Arthur S.
Griffin, Jonathan.
Gray, Edward.
Kennedy, Edward Thomas.
Leece, Henry S.
Lindsay, Robert.
McCormick, John.
McKenzie, John.
McMillan, William.
McQuade, Richard C.
Nichols, D. J.
Porch, John James.
Robinson, John.
Sachirthal, Edward.
Shanley, J. W.
Soppet, Frederic W.
Stevens, Samuel.
Thomson, James.
Verran, James.
Walsh, Patrick.
White, Alexander.
Wilson, James William.

HYDRAULIC WINDING-ENGINE DRIVERS' CERTIFICATES OF COMPETENCY.

Thomas Lamberton. Thomas Moyle. Thomas Richardson Watson.

HYDRAULIC WINDING-ENGINE DRIVERS' CERTIFICATES OF COMPETENCY.

Edwin Bray.

SUMMARY OF WORKS CONSTRUCTED.

The following statement shows the whole of the different classes of works constructed by the department, either by direct grants or by subsidies to local bodies, during the last seventeen years (the votes for this purpose having been under the control of the Hon. the Minister of Mines), for the purpose of opening up the mineral belts throughout the colony, and also for the development of the mining industry:—

Nature of Works.	Total Cost of Construction, or Amount authorised to be expended.	Expenditure, by way of Subsidy or otherwise, by Mines Department.	Amount of Liability by Mines Department on Works in Progress.
UP TO YEARS 1882–83 AND 1883–84.	£ s. d.	£ s. d.	£ s. d.
Water-races	29,252 1 11	14,853 9 5	14,398 11 6
Roads on goldfields	21,437 11 2	13,089 16 0	8,347 15 2
Roads and tracks undertaken by County Councils, subsidised by Mines Department	52,841 17 0	21,844 16 7	10,207 15 9
Works undertaken by prospecting associations, subsidised by Mines Department	13,216 13 4	3,350 0 0	3,400 0 0
Construction of drainage- and sludge-channels, subsidised by Mines Department	5,750 0 0	2,468 15 4	781 4 8
	122,498 3 5	55,606 17 4	37,135 7 1
1884–85.			
Water-races	4,846 1 9	14,596 2 9	4,648 11 6
Roads on goldfields	13,667 10 1	9,630 9 6	12,384 15 9
Roads and tracks undertaken by County Councils, subsidised by Mines Department	13,566 14 1	6,293 16 6	12,739 17 6
Roads to mines, other than gold, subsidised by Mines Department	4,594 10 0	111 19 0	2,888 1 0
Works undertaken by prospecting associations, subsidised by Mines Department	850 0 0	108 0 0	3,692 0 0
Construction of drainage- and sludge-channels, subsidised by Mines Department	4,050 0 0	1,050 0 0	1,931 4 8
Diamond and other drills	3,600 0 0	1,858 0 0	..
	45,174 15 11	33,648 7 0	38,284 10 5
1885–86.			
Water-races	3,660 4 9	6,063 2 3	6,964 4 4
Roads on goldfields	27,543 18 8	12,360 14 9	27,567 19 8
Roads undertaken by County Councils, subsidised by Mines Department	14,773 2 3	13,043 15 9	12,477 9 2
Roads to mines, other than gold, subsidised by Mines Department	1,551 19 10	4,327 0 10	490 12 8
Works undertaken by prospecting associations, subsidised by Mines Department	11,860 18 0	1,999 5 7	6,389 5 9
Construction of drainage- and sludge-channels, subsidised by Mines Department	10,051 14 9	3,994 16 6	6,995 9 9
Schools of Mines	2,160 9 7	1,260 9 7	900 0 0
	71,602 7 10	43,049 5 3	61,785 1 4

SUMMARY OF WORKS CONSTRUCTED—*continued.*

Nature of Works.	Total Cost of Construction, or Amount authorised to be expended.	Expenditure, by way of Subsidy or otherwise, by Mines Department.	Amount of Liability by Mines Department on Works in Progress.
1886–87.	£ s. d.	£ s. d.	£ s. d.
Water-races	..	1,928 14 4	3,466 0 8
Roads on goldfields	12,453 3 5	22,229 16 1	17,791 7 0
Roads and tracks undertaken by County Councils, subsidised by Mines Department	12,613 4 8	7,415 19 6	10,455 1 5
Roads to mines, other than gold, subsidised by Mines Department	..	306 1 0	110 13 1
Works undertaken by prospecting associations and companies, subsidised by Mines Department	15,671 19 6	4,521 7 3	4,618 4 7
Construction of drainage- and sludge-channels, subsidised by Mines Department	5,549 14 6	6,207 18 0	672 6 10
Diamond and other drills	422 15 6	422 15 6	..
Schools of Mines	3,183 7 1	3,383 7 1	700 0 0
	49,894 4 8	46,415 18 9	37,813 13 7
1887–88.			
Water-races	6 6 6	6 6 6	..
Roads on goldfields	6,860 4 3	17,281 11 3	7,370 0 0
Roads and tracks undertaken by County Councils, subsidised by Mines Department	2,998 15 0	8,012 5 2	3,942 4 2
Roads to mines, other than gold, subsidised by Mines Department	..	14 5 4	..
Works undertaken by prospecting associations and companies, subsidised by Mines Department	6,456 8 0	2,703 19 3	924 8 0
Construction of drainage- and sludge-channels, subsidised by Mines Department	..	1,110 4 11	2,054 10 6
Schools of Mines	1,859 3 7	2,221 19 4	337 4 3
Aids to treatment of ores	1,200 0 0	390 18 3	209 1 9
	19,380 17 4	31,741 10 0	14,837 8 8
1888–89.			
Roads on goldfields	10,253 5 3	4,304 3 9	13,218 11 6
Roads and tracks undertaken by County Councils, subsidised by Mines Department	7,318 1 0	2,466 16 8	5,195 6 1
Works undertaken by prospecting associations and companies, subsidised by Mines Department	474 0 0	236 0 0	687 8 0
Construction of drainage- and sludge-channels, subsidised by Mines Department	..	54 10 6	..
Wharves, contributions by Mines Department	589 19 5	96 6 0	343 13 5
Aids to treatment of ores, subsidised	..	209 1 9	..
Schools of Mines	895 16 10	1,188 6 10	44 14 3
	19,531 2 6	8,555 5 6	19,489 13 3
1889–90.			
Roads on goldfields	3,834 9 7	9,148 5 9	8,005 5 4
Roads and tracks undertaken by County Councils, subsidised by Mines Department	8,507 15 8	3,451 17 11	5,928 1 3
Works undertaken by prospecting associations and companies, subsidised by Mines Department	..	..	663 0 0
Water-races	2,200 0 0	719 0 0	681 0 0
Wharves	..	150 0 0	193 13 5
Schools of Mines	1,040 0 8	1,034 0 11	50 14 0
Aids to treatment of ores	142 8 9	142 8 9	..
Tracks to open up mineral lands	1,000 0 0	207 3 6	792 16 6
Diamond drills	425 14 5	425 14 5	..
	17,150 9 1	15,278 11 3	16,314 10 6
1890–91.			
Roads on goldfields	8,811 14 4	10,815 14 8	5,201 5 0
Roads and tracks undertaken by County Councils, subsidised by Mines Department	2,703 5 0	2,252 5 5	5,027 8 4
Works undertaken by prospecting associations and companies, subsidised by Mines Department	..	..	663 0 0
Water-races	5,542 19 8	6,234 4 6	..
Wharves	..	39 9 9	..
Schools of Mines	3,847 10 0	3,898 4 0	..
Tracks to open up mineral lands	..	78 4 7	419 19 5
	20,905 9 0	23,319 2 11	11,311 12 9
1891–92.			
Roads on goldfields	14,226 5 1	8,460 0 3	11,767 9 10
Roads and tracks undertaken by County Councils, subsidised by Mines Department	3,162 0 0	1,720 18 6	4,937 10 2
Works undertaken by prospecting associations and companies, subsidised by Mines Department	1,455 5 5	336 15 9	1,663 0 0
Water-races	2,256 13 6	2,256 13 6	..
Wharves	..	..	..
Schools of Mines	1,370 19 9	1,370 19 9	..
Tracks to open up mineral lands	40 0 0	41 16 0	418 3 7
	22,511 3 9	14,187 3 9	18,786 3 7

SUMMARY OF WORKS CONSTRUCTED—*continued.*

Nature of Works.	Total Cost of Construction, or Amount authorised to be expended.	Expenditure, by way of Subsidy or otherwise, by Mines Department.	Amount of Liability by Mines Department on Works in Progress.
1892–93.	£ s. d.	£ s. d.	£ s. d.
Roads on goldfields	15,199 2 4	17,325 10 0	9,628 6 10
Roads and tracks undertaken by County Councils, subsidised by Mines Department	550 0 0	1,033 0 0	4,831 9 10
Works undertaken by prospecting associations and companies, subsidised by Mines Department	970 4 9	865 4 3	1,768 0 6
Water-races	3,811 1 10	3,811 1 10	..
Wharves	..	..	..
Schools of Mines	1,232 4 4	1,232 4 4	..
Tracks to open up mineral lands	..	..	419 19 5
Artesian-well boring, Maniototo Plains	550 0 0	281 3 6	268 16 6
	22,312 13 3	24,548 3 11	16,916 3 1
1893–94.			
Roads on goldfields	18,418 19 2	15,056 0 11	13,013 18 5
Roads and tracks undertaken by County Councils, subsidised by Mines Department	5,038 11 6	2,718 17 8	5,576 10 7
Works undertaken by prospecting associations and companies, subsidised by Mines Department	2,245 19 4	1,709 18 5	1,027 7 11
Water-races	5,271 17 1	5,271 17 1	900 0 0
Drainage-channels	..	..	1,000 0 0
Wharves	..	..	..
Schools of Mines	1,555 19 9	1,555 19 9	..
Tracks to open up mineral lands	..	..	..
Repairing flood damages	500 0 0	500 0 0	..
Artesian-well boring, Maniototo Plains	800 0 0	518 16 6	..
	33,831 6 10	27,331 10 4	21,517 16 11
1894–95.			
Roads on goldfields	20,908 13 7	15,160 3 5	18,752 10 7
Roads and tracks undertaken by County Councils, subsidised by Mines Department	685 18 4	2,295 9 2	1,934 5 7
Works undertaken by prospecting associations and companies, subsidised by Mines Department	10,805 15 4	2,378 13 2	3,006 13 0
Water-races	4,801 19 7	2,427 10 11	2,151 18 8
Drainage-channels	1,521 0 0	673 14 10	3,647 5 2
Wharves	..	..	..
Schools of Mines	999 8 6	999 8 6	..
Tracks to open up mineral lands	..	..	..
Repairing flood damages	..	..	..
Artesian-well boring, Maniototo Plains	505 19 11	505 19 11	..
Diamond-drills	..	..	..
	40,228 15 3	24,440 19 11	29,492 13 0
1895–96.			
Roads on goldfields	14,554 0 7	19,970 6 6	14,086 4 8
Roads and tracks undertaken by County Councils, subsidised by Mines Department	4,614 11 1	1,607 8 6	4,290 16 11
Works undertaken by prospecting associations and companies, subsidised by Mines Department	3,477 7 0	1,726 4 8	10,093 3 0
Water-races	6,820 18 3	5,162 9 2	2,515 7 9
Drainage-channels	5,100 0 0	2,240 5 1	2,657 0 1
Wharves	..	..	..
Schools of Mines	999 3 0	999 3 0	..
Tracks to open up mineral lands	..	..	..
Repairing flood damages	..	..	..
Artesian-well boring, Maniototo Plains	..	..	..
Diamond-drills	216 1 6	216 1 6	..
	35,782 1 5	31,921 18 5	33,642 12 5
1896–97.			
Roads on goldfields	57,685 9 6	30,720 12 7	35,622 15 3
Roads and tracks undertaken by County Councils, subsidised by Mines Department	11,677 0 0	1,759 6 5	4,079 18 3
Works undertaken by prospecting associations and companies, subsidised by Mines Department	1,570 7 3	1,533 6 7	2,915 14 3
Water-races	3,090 11 1	3,927 18 0	1,678 0 10
Drainage-channels	1,409 0 0	2,149 3 11	2,516 16 2
Wharves	..	..	..
Schools of Mines	1,682 19 5	1,682 19 5	..
Tracks to open up mineral lands	..	..	..
Repairing flood damage	..	..	..
Artesian-well boring, Maniototo Plains	..	..	..
Resumption of land	300 0 0	300 0 0	..
Prospecting deep levels	25,500 0 0	2,697 14 5	22,802 5 7
	102,915 7 3	44,771 1 4	69,615 10 4

SUMMARY OF WORKS CONSTRUCTED—*continued.*

Nature of Works.	Total Cost of Construction, or Amount authorised to be expended.	Expenditure, by way of Subsidy or otherwise, by Mines Department.	Amount of Liability by Mines Department on Works in Progress.
1897–98.	£ s. d.	£ s. d.	£ s. d.
Roads on goldfields	71,318 11 7	37,410 14 3	33,907 17 4
Roads and tracks undertaken by County Councils, subsidised by Mines Department	25,151 9 8	12,158 6 7	9,677 14 0
Works undertaken by prospecting associations and companies, subsidised by Mines Department	3,939 8 1	2,357 15 1	1,581 13 0
Water-races	3,275 8 9	2,272 5 0	1,003 3 9
Drainage-channels	4,481 14 0	1,212 14 9	3,268 19 3
Schools of Mines	1,780 17 3	1,780 17 3	..
Prospecting deep levels	25,500 0 0	21,520 15 0	1,281 10 7
Water-conservation	507 3 9	507 3 9	..
Construction of telephone-lines	60 0 0	50 0 0	..
Compensation proclamation of rivers	5,196 13 10	5,196 13 10	..
	141,211 6 11	84,467 5 6	50,720 17 11
1898–99.			
Roads on goldfields	48,201 0 2	42,358 8 6	39,825 9 0
Roads and tracks undertaken by County Councils, subsidised by Mines Department	21,025 12 0	4,191 7 9	5,914 7 5
Works undertaken by prospecting associations and companies, subsidised by Mines Department	2,936 11 8	2,143 14 1	1,103 13 1
Water-races	3,853 16 5	2,932 12 1	1,719 6 3
Drainage-channels	3,539 7 5	2,426 13 5	3,802 16 4
Schools of Mines	1,450 15 2	1,450 15 2	..
Prospecting deep levels	25,500 0 0	1,281 10 7	..
Water-conservation	12,483 13 1	7,893 19 4	..
Construction of telephone-lines	..	..	..
Compensation proclamation of rivers	676 0 8	676 0 8	..
	119,666 16 7	65,355 1 7	52,365 12 1
SUMMARY.			
Roads on goldfields	365,373 18 9	285,322 8 2	39,825 9 0
Subsidised roads and tracks	187,227 17 3	92,266 8 1	5,914 7 5
Subsidised roads and tracks other than on goldfields	6,146 9 10	4,759 6 2	..
Prospecting	73,982 1 8	25,971 4 9	1,103 13 1
Water-races	78,690 1 1	72,463 7 4	1,719 6 3
Wharves	435 15 9	285 15 9	..
Schools of Mines	24,058 14 11	24,058 14 11	..
Drainage-channels	37,452 10 8	23,587 17 3	3,802 16 4
Diamond-drills	5,170 11 4	3,428 11 4	..
Treatment of ores	1,342 8 9	742 8 9	..
Tracks to open up mineral lands	325 8 1	325 8 1	..
Artesian-well boring, Maniototo Plains	800 0 0	800 0 0	..
Repairing flood damages	500 0 0	500 0 0	..
Prospecting deep levels	51,000 0 0	25,500 0 0	..
Resumption of land	300 0 0	300 0 0	..
Water-conservation	12,990 16 10	8,401 3 1	..
Construction of telephone-lines	60 0 0	50 0 0	..
Proclamation of rivers	5,872 14 6	5,872 14 6	..
	851,729 9 5	574,635 8 2	52,365 12 1

It will be seen from the foregoing statement that works to the value of £119,667 were authorised during the past year, as against £141,211 for the previous year, whilst the expenditure during the period referred to was £65,355, as against £84,467 for the year previous, leaving the liabilities on works authorised and in progress on the 31st March last to be £52,366. The actual cost of works undertaken, completed, and in progress, during the last seventeen years that votes for this purpose have been under the direct control of the Mines Department for the development of the goldfields, has been £851,729, out of which the Government has expended £574,635 in subsidies to local bodies and direct grants for the construction of the different works, whilst £277,094 has been contributed by local bodies and prospecting associations.

As I have already pointed out, quartz-mining in the North Island and on the West Coast has been successfully carried on, and, as far as can be seen, the prospects indicate a continuation of prosperity. The capital introduced for the working and development of quartz-mines has been the means of advancing the operations of many companies to a stage in which future profits may with reasonable expectations be considered assured. The prosecution of new works under the conduct of experienced mining engineers, who, by mature judgment, practical knowledge, and economical methods are steadily developing new ground, will ere long add to the number of the gold-producing quartz-mines.

In alluvial mining many of the older fields are gradually becoming exhausted, but the advent of dredging has introduced a fresh lease of life and consequent vitality in operations tending to the maintenance of gold returns, especially in the Otago and Southland districts. On the West Coast dredging has been carried on to such a limited extent that the total yield of gold has not yet been appreciably increased by that means. Indications, however, point out that dredging operations will yet be carried on on many parts of the West Coast goldfields, and it may be expected that from this source considerable yields of gold will help to maintain future West Coast returns.

The nature of the country within the boundaries of the goldfields, which in a great measure is of a mountainous and broken character, necessitates the construction and maintenance of roads and tracks, and substantial amounts must still be expended for the purpose.

The great improvements in the machinery introduced for working the quartz, and the processes now adopted for the extraction of the precious metals, will tend towards an increase in the number of mines worked, by enabling the profitable treatment of ores of comparatively low

grade. The improvements in the construction of dredges, enabling some of them to deal with vast quantities of material at a very low cost, will also lead to the expansion of this class of mining.

The coal-mining industry continues in a healthy state; the marked increase in the output shows that the demand for fuel is becoming more extensive, especially within the colony.

LIST of WORKS on GOLDFIELDS undertaken wholly by the Mines Department, or by Subsidies to County Councils, Local Bodies, and Prospecting Associations, in Progress on the 31st March, 1899.

Locality and Nature of Works.	Total Cost, or Amount authorised.	Amount of Contribution paid by Mines Department.	Amount due by Mines Department on Works still in Progress.
NORTH ISLAND.			
ROADS (SUBSIDISED).			
Coromandel County.	£ s. d.	£ s. d.	£ s. d.
Widening Waitaia Battery Road	250 0 0	50 0 0	50 0 0
Tiki to Opitonui	500 0 0	..	400 0 0
Road, Bridles Point, Cabbage Bay, to Morning Light Bay	200 0 0	..	100 0 0
	950 0 0	50 0 0	550 0 0
Thames County.			
Townsend's Road	150 0 0	26 12 0	48 8 0
Onetai Valley Road	40 0 0	12 10 0	7 10 0
Hape Creek Road	200 0 0	..	100 0 0
	390 0 0	39 2 0	155 18 0
Thames Borough.			
Repairs, Waiotahi and Moanataiari Aqueducts	500 0 0	255 0 0	45 0 0
Ohinemuri County.			
Road running south on left-hand branch Waihou River	400 0 0	384 19 0	15 1 0
Road adjoining Te Iringa-o-Pirori Blocks	200 0 0	94 16 9	48 3 3
Kaimanawa Road	150 0 0	56 12 0	43 8 0
Mangaiti and Waitoa Road and punt	300 0 0	77 13 9	72 6 3
Low-level tunnel, Jubilee Mine (E. Kersey Cooper)	1,500 0 0	103 16 0	646 4 0
	2,550 0 0	717 17 6	825 2 6
Katikati Road Board.			
Te Aroha Track	50 0 0	19 18 9	5 1 3
Piako County.			
Gordon–Waharoa Road	100 0 0	..	50 0 0
Te Aroha–Gordon Road	200 0 0	..	100 0 0
Murphy's Bridge	24 0 0	..	12 0 0
	324 0 0	..	162 0 0
Matamata Road Board.			
Repairing flood damages	300 0 0	..	100 0 0
MIDDLE ISLAND.			
ROADS (SUBSIDISED).			
Picton Road Board.			
Repairs, Kaituna–Tuamarina Road	100 0 0	34 0 0	16 0 0
Pelorus Road Board.			
Widening road to Golden Bar Mine	50 0 0	..	30 0 0
Collingwood County.			
Aorere Bridge	200 0 0	50 0 0	50 0 0
Kaituna River protection-works	300 0 0	..	150 0 0
	500 0 0	50 0 0	200 0 0
Buller County.			
Road to Piper's Flat, Addison's	450 0 0	150 0 0	75 0 0
Road to Britannia Mine, Jones's Creek	400 0 0	..	200 0 0
Lyell Creek to Gibstown	200 0 0	66 13 4	33 6 8
Metalling road to Dee Creek Company's claim	150 0 0	..	75 0 0
Road, Stoney Creek–Waimangaroa	400 0 0	..	200 0 0
Dee Creek Company's claim	350 0 0	..	175 0 0
Foot-bridge, Buller River, below Lyell	250 0 0	..	125 0 0
	2,200 0 0	216 13 4	883 6 8
Inangahua County.			
Widening track from Fiery Cross Battery to Just-in-Time Mine	300 0 0	..	150 0 0
Grey County.			
Crœsus battery-site, Paparoa	200 0 0	79 5 0	20 15 0
Road between Cape Terrace and Teremakau River	50 0 0	..	25 0 0
	250 0 0	79 5 0	45 15 0
Westland County.			
Improving road, Seven-mile, Taipo	150 0 0	27 16 0	47 4 0
Taieri County.			
Removing slips, Berwick, Waipori Road	150 0 0	..	75 0 0

LIST of WORKS on GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost, or Amount authorised.	Amount of Contribution paid by Mines Department.	Amount due by Mines Department on Works still in Progress.
Tuapeka County.	£ s. d.	£ s. d.	£ s. d.
Bridge at Waipori	800 0 0	..	400 0 0
Southland County.			
Waikaka Diggings Road	100 0 0	..	50 0 0
Garston–Nevis	60 0 0	..	30 0 0
	160 0 0	..	80 0 0
Lake County.			
Skipper's Bridge	4,244 0 0	1,100 0 0	2,144 0 0
WORKS CONSTRUCTED WHOLLY BY MINES DEPARTMENT.			
Whakapara–Puhipuhi	450 0 0	350 0 0	100 0 0
Kiripaka to coal-mines	100 0 0	80 0 0	20 0 0
Thompson's Track	4,023 19 11	3,523 19 11	500 0 0
Waiorongomai Road	150 0 0	..	150 0 0
Crosbie Settlement Road	50 0 0	..	50 0 0
Hikutaia–Waihi	2,615 0 0	2,325 0 0	290 0 0
Paeroa–Waitoa	1,135 13 4	585 2 1	550 11 3
Waihi–Whangamata	500 0 0	358 6 0	141 14 0
Paeroa–Te Aroha	500 0 0	382 1 5	117 18 7
Hikutaia–Waitekauri	750 0 0	614 5 4	135 14 8
Komata Reefs–Paeroa	500 0 0	300 0 0	200 0 0
Bridge over Waitekauri Creek	160 0 0	..	160 0 0
Grace Darling Road	217 0 0	142 0 0	75 0 0
Waitekauri to Golden Cross	1,055 0 0	539 14 6	515 5 6
Roads, Netherton	200 0 0	45 0 0	155 0 0
Tairua–Whenuakite	450 0 0	400 0 0	50 0 0
Tiki–Kaimarama	550 0 0	450 0 0	100 0 0
Mercury Bay–Whenuakite and Boat Harbour	400 0 0	350 0 0	50 0 0
Coromandel–Whangapoua	400 0 0	200 0 0	200 0 0
Whitianga to Gumtown	200 0 0	150 0 0	50 0 0
Kuaotunu–Mercury Bay	1,000 0 0	850 0 0	150 0 0
Manaia–Waikawau	2,200 0 0	1,700 0 0	500 0 0
Tiki–Manaia	650 0 0	550 0 0	100 0 0
Tokatea–Kennedy Bay	700 0 0	400 0 0	300 0 0
Cabbage Bay–Port Charles and Cape Colville	1,600 0 0	1,400 0 0	200 0 0
Coromandel–Kuaotunu, *vid* Matarangi	700 0 0	350 0 0	350 0 0
Kikowhakarere–Cabbage Bay	300 0 0	200 0 0	100 0 0
Coromandel–Cabbage Bay	600 0 0	500 0 0	100 0 0
Extending Wharf Road, Coromandel	500 0 0	..	500 0 0
Bridge, Ring's Road	250 0 0	..	250 0 0
Taumatawahine Bridge	300 0 0	..	300 0 0
Tokatea–Matamataharakeke	100 0 0	..	100 0 0
Cemetery Road, Kuaotunu	100 0 0	..	100 0 0
Whitianga–Kaimarama	150 0 0	..	150 0 0
Mahakirau Goldfield Road	100 0 0	..	100 0 0
Tiki–Matawai	150 0 0	..	150 0 0
Tiki–Te Koumu	100 0 0	..	100 0 0
Opitonui Township Road	100 0 0	..	100 0 0
Opitonui Road	200 0 0	..	200 0 0
Thames–Waikawau	1,892 11 7	1,777 11 7	115 0 0
Tapu Creek extension	1,006 1 11	806 1 11	200 0 0
Thames–Hikutaia	1,531 0 1	1,431 0 1	100 0 0
Puru Creek Road	600 0 0	400 0 0	200 0 0
Turua–Netherton	1,000 0 0	650 0 0	350 0 0
Hikutaia–Whangamata "Wires" Track	1,172 0 0	1,027 9 0	144 11 0
Upper Tararu Road	745 9 11	481 9 11	264 0 0
Matatoki Road	389 0 0	200 0 0	189 0 0
Puriri–Tairua	1,147 6 3	750 2 0	397 4 3
Wharepoa Settlement Road	703 7 5	592 7 5	111 0 0
Omahu–Whangamata	1,225 0 0	850 0 0	375 0 0
Waiomo to Mines	200 0 0	..	200 0 0
Tauranga–Te Puke	200 0 0	..	200 0 0
Waihi–Katikati	500 0 0	..	500 0 0
Papamoa–Te Puke	150 0 0	..	150 0 0
Bartlett's Creek Track	449 4 7	349 4 7	100 0 0
Rocky Ferry to Kaituna	600 0 0	..	600 0 0
Bartlett's Creek to Cat Point	200 0 0	..	200 0 0
Road to Mount Patriarch	200 0 0	..	200 0 0
Havelock–Tuamarina	445 0 0	336 12 3	108 7 9
Onamalutu–Wakamarina	650 0 0	400 0 0	250 0 0
Tracks, Wakamarina and Mahakipawa	100 0 0	46 16 6	53 3 6
Clearing Cullensville–Waikakaho Track	25 0 0	..	25 0 0
Bridges, Dead Horse and Walker's Creeks	25 0 0	..	25 0 0
Collingwood–Parapara	800 0 0	790 0 0	10 0 0
Inland Road, Parapara–Takaka	500 0 0	..	500 0 0
Mud-flat portion Takaka–Collingwood Inland Road	200 0 0	..	200 0 0
Bonny Doon Road	1,000 0 0	825 0 0	175 0 0
Anatoki Track	150 0 0	4 0 0	65 16 0
Takaka River Foot-bridge	150 0 0	..	150 0 0
Karamea Track	250 0 0	100 0 0	150 0 0
Bainham–Upper Aorere Valley	200 0 0	..	200 0 0

LIST of WORKS on GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost, or Amount authorised.	Amount of Contribution paid by Mines Department.	Amount due by Mines Department on Works still in Progress.
WORKS CONSTRUCTED BY MINES DEPARTMENT—*continued.*	£ s. d.	£ s. d.	£ s. d.
Takaka–Collingwood Inland Road	500 0 0	29 2 0	470 18 0
Vants to Bubu	100 0 0	..	100 0 0
Ferntown–Pakawau	200 0 0	..	200 0 0
Takaka Bridge protective works	100 0 0	..	100 0 0
Canaan Road	300 0 0	200 0 0	100 0 0
Lloyd's Valley Road bridges	100 0 0	..	100 0 0
Thorpe to Churchill	100 0 0	..	100 0 0
Neudorf to Ngatimoti	100 0 0	..	100 0 0
Shaggery Road	100 0 0	..	100 0 0
Riwaka–Kaiteriteri Beach Road	100 0 0	..	100 0 0
Lyell Bridge to Ryan's	450 0 0	250 0 0	200 0 0
Seddonville–Mokihinui Mine	150 0 0	..	150 0 0
Seddonville to Mokihinui	920 0 0	770 0 0	150 0 0
Wilson's Lead Road	450 0 0	400 0 0	50 0 0
Granity Creek southwards	450 0 0	200 0 0	250 0 0
Oparara River–Karamea	400 0 0	200 0 0	200 0 0
Westport–Mokihinui	750 0 0	500 0 0	250 0 0
Mokihinui to Reefs (widening)	500 0 0	250 0 0	250 0 0
Mokihinui to Wanganui (improving)	600 0 0	250 0 0	350 0 0
Road, Costello's Hill, Charleston (alteration)	450 0 0	150 0 0	300 0 0
Widening road, Lyell to Eight-mile	400 0 0	250 0 0	150 0 0
Addison's Road to Buller Road	500 0 0	250 0 0	250 0 0
Denniston Track	1,448 18 11	1,300 18 6	148 0 5
Promised Land, Ohinarahu Creek	300 0 0	..	300 0 0
Lyell–Victoria Range	450 0 0	300 0 0	150 0 0
Nile Saddle to Maori Creek	150 0 0	..	150 0 0
Land of Promise Road	150 0 0	..	150 0 0
Seddonville–Cardiff	100 0 0	..	100 0 0
Mokihinui end of Westport Road	250 0 0	..	250 0 0
Painkiller–Murray Creek	878 4 0	663 10 6	214 13 6
Reefton–Maruia	1,885 8 0	1,435 8 0	450 0 0
Maruia Road and track *viâ* Caslani's	200 0 0	188 0 0	12 0 0
Snowy Creek to Reefs	450 0 0	295 17 0	154 3 0
Capleston to Larry's	450 0 0	300 0 0	150 0 0
Glenroy to Maruia Plains	250 0 0	220 0 0	30 0 0
Bridge, Little Grey River	400 0 0	300 0 0	100 0 0
Widening Black's Point Road	350 0 0	..	350 0 0
Big River–St. George	250 0 0	..	250 0 0
Mangles Valley Road	350 0 0	..	350 0 0
Ahaura Bridge	2,450 0 0	2,300 0 0	150 0 0
Blackball–Paparoa	1,600 10 0	1,286 10 0	314 0 0
Waipuna Road	200 0 0	100 0 0	100 0 0
Barrytown–Paparoa	425 0 0	350 0 0	75 0 0
Bridge, Nelson Creek	750 0 0	450 0 0	300 0 0
Bridge, Callaghan's Creek	250 0 0	100 0 0	150 0 0
Repairs, Cobden–Barrytown	1,084 0 0	900 0 0	184 0 0
Mosquito–Maori Creek	100 0 0	75 0 0	25 0 0
Paroa–Teremakau	625 0 0	425 0 0	200 0 0
Deviation-road between Westbrook and Teremakau	300 0 0	..	300 0 0
Foot-bridge, Blackball Creek	120 0 0	..	120 0 0
Bridge, Cobden–Brunner Road	150 0 0	..	150 0 0
Bridge, Gilmer's Creek	100 0 0	..	100 0 0
Deviation, Moonlight Track	100 0 0	..	100 0 0
Foot-bridge, Brunner–Moonlight Road	150 0 0	..	150 0 0
Extension, Barrytown–Paparoa Track	200 0 0	..	200 0 0
Track to Lake Hochstetter	80 0 0	..	80 0 0
Totara River to Constitution Hill	139 1 0	123 1 0	16 0 0
Renewal, Fisherman's Creek Bridge	100 0 0	..	100 0 0
Teremakau–Paroa	250 0 0	..	250 0 0
Seven-mile Creek, Taipo	350 0 0	119 19 8	230 0 4
Back Creek Road deviation	200 0 0	..	200 0 0
Repairs, Browning's Pass Track	100 0 0	9 13 0	90 7 0
Deviation and widening track, Kanieri Lake to Milltown	500 0 0	..	500 0 0
Repairs, Donnelly's Creek Bridge	260 1 3	160 1 3	100 0 0
Lawrence–Waipori	1,125 0 0	750 0 0	375 0 0
Lawrence–Clyde	2,250 0 0	2,150 0 0	100 0 0
Waitahuna–Bruce County boundary	300 0 0	150 0 0	150 0 0
Main road, Beaumont to Miller's Flat	250 0 0	..	250 0 0
Clyde–Ophir	200 0 0	..	200 0 0
Waipori Bush Road	300 0 0	..	300 0 0
Clyde–Queenstown	1,000 0 0	450 0 0	550 0 0
Punt, Hawea and Wanaka	300 0 0	..	300 0 0
Young Hill Creek Road	150 0 0	..	150 0 0
Nevis Valley Road	200 0 0	..	200 0 0
Track up Shotover River	300 0 0	200 0 0	100 0 0
Arrowtown–Macetown	1,300 0 0	900 0 0	400 0 0
Skipper's–Bullendale	200 0 0	..	200 0 0
Nokomai Road	250 0 0	..	250 0 0
Road to dredging claims, Waimumu	100 0 0	..	100 0 0
Repairs, road between Sections 17 and 45, Waikaka	100 0 0	..	100 0 0
Colac–Round Hill	250 0 0	..	250 0 0
Wangapeka–Wanganui	2,450 0 2	1,952 3 6	497 16 8
Improving ford, Granity Creek	300 0 0	..	300 0 0

List of Works on Goldfields, &c.—*continued.*

Locality and Nature of Works.	Total Cost, or Amount authorised.	Amount of Contribution paid by Mines Department.	Amount due by Mines Department on Works still in Progress.
	£ s. d.	£ s. d.	£ s. d.
Works constructed by Mines Department—*continued.*			
Dee Creek Bridge	300 0 0	..	300 0 0
Belgrove–Westport–Reefton	6,964 1 8	6,928 8 5	35 13 3
Reefton–Hokitika–Ross	7,440 12 9	7,153 12 9	287 0 0
Mangles Bridge	3,447 10 8	1,059 8 5	2,388 2 3
Karangarua Bridge	450 14 6	350 14 6	100 0 0
Widening Cook's River Flat Road	400 0 0	369 15 6	30 4 6
Okuru River Ford Track	291 0 0	196 2 1	94 17 11
Alpha Track	200 0 0	..	200 0 0
Clifden Bridge–Waiau River	1,522 2 8	122 2 8	1,400 0 0
Roads, Preservation Inlet	499 15 8	239 15 8	260 0 0
Tracks, Cromarty	407 5 0	207 5 0	200 0 0
Roads, Stewart Island	150 0 0	..	150 0 0
Stewart Island, road to mines	150 0 0	..	150 0 0
Orepuki–Preservation Inlet	2,249 10 0	2,175 6 2	74 3 10
Larry's Creek Bridge extension	350 0 0	101 11 1	248 8 11
Picton–Grove	700 0 0	495 0 6	204 19 6
Stafford–Awatuna	691 14 9	591 14 9	100 0 0
Hokitika–Jackson's	1,835 7 0	1,735 7 0	100 0 0
Bridge, Glenroy–Matakitaki	300 0 0	..	300 0 0
Mokihinui–Little River	500 0 0	..	500 0 0
Bridge, Coal Creek	400 0 0	..	400 0 0
Karamea–Mud Flat Road	250 0 0	..	250 0 0
Ahaura–Haupiri	600 0 0	200 0 0	400 0 0
Gillespie's Bluff Track	150 0 0	..	150 0 0
Galway Bluff Track	150 0 0	..	150 0 0
Mason's Bay Track	150 0 0	..	150 0 0
Kokotahi Road	506 6 6	451 2 5	55 4 1
Widening road, Lake Mapourika to Waiho	750 0 0	..	750 0 0
Okarito Forks to Waiho	337 1 8	337 1 8	..
Blind Bay–Whangaparapara	575 0 0	509 10 2	65 9 10
Clearing slips, Seventeen-mile, Bluff	150 0 0	105 15 6	44 4 6
Bridge over Kanieri River	30 15 0	..	30 15 0
	113,452 16 2	73,627 7 2	39,825 9 0
Schools of Mines.			
Schools of Mines	16,755 8 9	16,755 8 9	..
School of Mines (Otago University)	7,303 6 2	7,303 6 2	..
	24,058 14 11	24,058 14 11	..
Prospecting Subsidies.			
Main and party	105 0 0	100 0 0	5 0 0
Tuapeka County, prospecting Gabriel's Gully	400 0 0	213 13 0	86 7 0
Holmes and party, drainage-tunnel, Tucker's Flat	200 0 0	133 12 0	66 8 0
Westland County (Dwyer and party, Blue Spur)	659 10 0	542 15 0	116 15 0
Westland County (McGoveran and party)	50 5 0	37 10 0	12 15 0
Westland County (N. Johnson, Fox's Flat)	140 0 0	59 0 5	12 8 7
Westland County (J. Newton)	28 15 0	..	28 15 0
Westland County, prospecting, Rimu (£1 for £1)	3,172 13 0	1,586 6 6	..
Westland County, prospecting, Kanieri (£1 for £1)	817 7 0	408 13 6	..
Miners' Association, Ross (Smith and Regan)	51 0 0	39 0 0	12 0 0
Miners' Association, Ross, Park Terrace Tunnel	57 10 0	..	28 15 0
Miners' Association, Ross (Gagliardi and Son)	70 0 0	17 10 0	17 10 0
Miners' Association, Ross (Marchesi and Scott)	198 15 0	153 15 0	45 0 0
Miners' Association, Ross (McLeod and Dunlop)	64 4 6	32 11 0	31 13 6
Miners' Association, Ross (Archer and Horsley)	13 0 0	6 0 0	7 0 0
Ryan and Son's tunnel, Dillmanstown	43 4 0	..	21 12 0
R. A. Harcourt's tunnel, Blue Spur Creek	180 0 0	..	90 0 0
Noble and Stenhouse's tunnel, New Chum Creek	286 0 0	59 8 0	83 2 0
Miners' Association, Greenstone (Rowe and party)	200 0 0	..	100 0 0
Coromandel County	400 0 0	151 10 0	48 10 0
Miners' Association, Charleston	80 0 0	..	40 0 0
Miners' Association, Nelson Creek (McGowan and party)	160 0 0	..	80 0 0
Miners' Association, Greenstone (Dickson and party)	72 0 0	15 18 0	20 2 0
Buller County, prospecting Upper Karamea	34 0 0	..	34 0 0
Te Puke Gold-mining Company	200 0 0	..	100 0 0
Buller County (Ramsey and O'Connor)	9 10 0	..	9 10 0
Buller County (Salter and party)	6 10 0	..	6 10 0
	7,699 3 6	3,557 2 5	1,103 13 1
Water-races.			
Waimea–Kumara Water-race	36,133 7 9	34,414 1 6	1,719 6 3
Mount Ida Water-race	8,399 19 5	8,399 19 5	..
Mountain Hut Water-race	82 1 1	82 1 1	..
	44,615 8 3	42,896 2 0	1,719 6 3
Drainage- and Tailings-channels.			
Waimea Main Tail-race	1,800 0 0	1,019 15 8	260 0 0
St. Bathan's Channel	3,000 0 0	1,187 10 0	812 10 0
Muddy Creek Channel	3,000 0 0	1,000 0 0	1,000 0 0
No. 4 Channel	1,110 0 0	1,000 0 0	110 0 0
Donnelly's Creek Tail-race	1,657 0 0	..	828 7 5
Kelly's Terrace Tunnel	1,667 10 0	875 11 1	791 18 11
	12,234 10 0	5,082 16 9	3,802 16 4

LIST of WORKS on GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost or Amount authorised.	Amount of Contribution paid by Mines Department.	Amount due by Mines Department on Works still in Progress.
WATER CONSERVATION ON GOLDFIELDS.	£ s. d.	£ s. d.	£ s. d.
Engineer's salary and expenses	660 11 4	660 11 4	..
Reports on Drainage, Ross Flat	249 13 0	249 13 0	..
Eweburn Reservoir	12,000 0 0	7,410 6 3	..
Coromandel Harbour and Kuaotunu Sludge-channel	80 12 6	80 12 6	..
	12,990 16 10	8,401 3 1	..
Summary of Works.			
Roads (subsidised)—			
Coromandel County	950 0 0	50 0 0	550 0 0
Thames County	390 0 0	39 2 0	155 18 0
Thames Borough	500 0 0	255 0 0	45 0 0
Ohinemuri County	2,550 0 0	717 17 6	825 2 6
Matamata Road Board	300 0 0	..	100 0 0
Katikati Road Board	50 0 0	19 18 9	5 1 3
Piako County	324 0 0	..	162 0 0
Picton Road Board	100 0 0	34 0 0	16 0 0
Pelorus Road Board	50 0 0	..	30 0 0
Collingwood County	500 0 0	50 0 0	200 0 0
Buller County	2,200 0 0	216 13 4	883 6 8
Inangahua County	300 0 0	..	150 0 0
Grey County	250 0 0	79 5 0	45 15 0
Westland County	150 0 0	27 16 0	47 4 0
Tuapeka County	800 0 0	..	400 0 0
Lake County	4,244 0 0	1,100 0 0	2,144 0 0
Southland County	160 0 0	..	80 0 0
Taieri County	150 0 0	..	75 0 0
	13,968 0 0	2,589 12 7	5,914 7 5
Works constructed wholly by Mines Department	113,452 16 2	73,627 7 2	39,825 9 0
Schools of Mines	24,058 14 11	24,058 14 11	..
Prospecting subsidies	7,699 3 6	3,557 2 5	1,103 13 1
Water-races	44,615 8 3	42,896 2 0	1,719 6 3
Drainage- and tailings-channels	12,234 10 0	5,082 16 9	3,802 16 4
Compensation, proclamation of rivers	5,872 14 6	5,872 14 6	..
Water-conservation on goldfields	12,990 16 10	8,401 3 1	..
Total	234,892 4 2	166,085 13 5	52,365 12 1

LIST of WORKS on GOLDFIELDS constructed wholly by the Mines Department, or by Subsidies to County Councils, Local Bodies, and Prospecting Associations, and completed prior to the 31st March, 1899.

Locality and Nature of Works.	Total Cost.	Amount of Contribution paid by Mines Department.
NORTH ISLAND.		
ROADS (SUBSIDISED).		
Bay of Islands County.	£ s. d.	£ s. d.
Tiriwhanga Gorge to Galbraith's Road, Puhipuhi	237 0 0	118 10 0
Air-line Road to battery-site, Puhipuhi	73 0 0	36 10 0
Tiriwhanga Gorge to Puhipuhi	800 0 0	800 0 0
New Bay of Islands Coal Company	500 0 0	250 0 0
Road, Taumarere Railway-station to Puhipuhi	482 0 0	146 0 0
	2,092 0 0	1,351 0 0
Coromandel County.		
Improving road to Iona and Just-in-Time Companies' mines	200 0 0	133 6 8
Making and improving track from Tokatea towards Kennedy Bay	320 0 0	213 6 8
Golden Belt Track	100 0 0	50 0 0
Tokatea Road (repairs)	300 0 0	150 0 0
Making and improving track from Golden Belt to Tiki	239 3 3	159 8 10
Making road from Ring's Bridge to Kapanga Mine	150 0 0	100 0 0
Making road to Kapanga Mine	132 0 0	88 0 0
Temporary track from Tokatea Saddle to Waikoromiko	50 0 0	33 6 8
Continuation of track from Success Company's mine to top of main range	80 0 0	53 6 8
Completion of road from Tokatea Saddle to Tokatea Battery	50 0 0	33 6 8
Widening road from Matawai to Vaughan's claim	357 0 0	238 0 0
Improving track, Mercury Bay to Waitai	100 0 0	66 13 4
Continuation and improving Waikoromiko Track	150 0 0	100 0 0
Emily Battery to Rocky Creek	60 0 0	40 0 0
Track, Bismarck Battery to Kennedy Bay	200 0 0	133 6 8

LIST of WORKS on GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost.			Amount of Contribution paid by Mines Department.		
Coromandel County—continued.	£	s.	d.	£	s.	d.
Road up Manaia	675	10	6	450	7	0
Extension of Vaughan's and Vizard's Tracks	150	0	0	100	0	0
Vizard's towards Marebel	200	0	0	133	6	8
Extending and widening Waitaia Road	100	0	0	66	13	4
Makarau to Waiau	1,600	0	0	1,066	13	4
Waikawau to Tiki	500	0	0	333	6	8
Paul's Creek to Cabbage Bay	200	0	0	133	6	8
Waikawau Creek Track	100	0	0	50	0	0
McLaughlin's Road	100	0	0	50	0	0
Manaia to McGregor's new find	100	0	0	50	0	0
Manaia to Tiki	500	0	0	250	0	0
Old sawmill towards Matawai	200	0	0	100	0	0
Extension of Paul's Creek Track	300	0	0	150	0	0
Matarangi Track	400	0	0	200	0	0
Thames–Coromandel Road, *viâ* Manaia	300	0	0	150	0	0
Harbour View extension	210	0	0	105	0	0
Kapanga to Paul's Creek	200	0	0	100	0	0
Mercury Bay to Kuaotunu	360	0	0	180	0	0
Wainara to Kuaotunu	450	0	0	225	0	0
Sea-beach to Kuaotunu	1,650	0	0	1,450	0	0
Just-in-Time Road, extension to Coromandel	450	0	0	225	0	0
Road, Waikawau Bridge to McLaughlin's	67	10	0	45	0	0
Mercury Bay Road	990	0	0	495	0	0
Bridge to Dugend's store, and widening and metalling road from bridge to Log Hut	450	0	0	300	0	0
Road from junction of Red Mercury battery up Pumpkin Flat to Waitaia	345	0	0	230	0	0
To connect road from Log Hut to commencement of contract of Kuaotunu–Mercury Bay Road	150	0	0	100	0	0
Road, with culverts and bridge, from Kapanga Hill to Scotty's Gold-mining Company's mine	200	0	0	150	0	0
Pumpkin Flat–Just-in-Time Road	310	0	0	170	0	0
Lower road from Great Mercury battery to Kapai low level and battery-site	450	0	0	300	0	0
Road from main road, Kapanga to Success Mine	600	0	0	300	0	0
Cemetery Road and Bridge, Kuaotunu	100	0	0	75	0	0
Road from Coromandel–Kennedy Bay Main Road to Wereroa Creek	300	0	0	150	0	0
Leading Wind Mine Road	100	0	0	50	0	0
Fury's Bridge	450	0	0	225	0	0
Carroll's Bridge	400	0	0	200	0	0
Horne's Bridge	200	0	0	100	0	0
Road from Main Kennedy Bay Road to Monte Carlo and other claims	300	0	0	150	0	0
Castle Rock Mine Road, Tiki	200	0	0	100	0	0
Road between Bismarck Battery and Hauraki Associated Gold-reefs	400	0	0	200	0	0
Bridge, Warekaho Creek	300	0	0	150	0	0
Cabbage Bay to Mines	300	0	0	150	0	0
Two bridges and approaches, Kuaotunu Main Road	300	0	0	150	0	0
Road from Success Road to workings of Karaka Block Syndicate	200	0	0	100	0	0
	18,346	3	9	11,050	15	10
Te Aroha Town Board.						
Road to connect with railway-station	120	0	0	60	0	0
Lipsey's Bridge	64	0	0	32	0	0
Repairing flood-damages	150	0	0	75	0	0
	334	0	0	167	0	0
Thames County.						
Making new road from Ohinemuri River to Karangahake Quartz-mine	650	0	0	433	6	8
Dray-road to connect Otanui Mines with crushing-battery at Maungawherawhera Creek	710	0	0	473	6	8
Improving roads from Waitekauri Road to Katikati Road	250	0	0	166	13	4
Improving road up Karaka Creek to Lucky Hit Company's mine	263	1	0	175	7	4
Improving road to upper mines, Waitahi	258	18	10	172	12	7
Karangahake to battery	300	0	0	200	0	0
Ralph's Battery, Waitekauri	399	1	0	199	10	6
Otanui Road to mines	299	18	0	199	18	8
Road to Wick's Battery	70	0	0	46	13	4
Rocky Point Road, Tararu	300	0	0	200	0	0
Thames Borough boundary to hæmatite-mine	350	0	0	233	6	8
Widening road from bridge over Hape Creek to Otanui Mines	183	17	0	122	11	4
Track, Karangahake Goldfield	784	1	0	522	14	0
Kauaeranga Valley to Otanui	470	7	0	313	11	4
Tapu Road to mines	81	17	9	54	11	10
Tauranga Road to Karangahake Bridge site	341	5	0	227	10	0
Karangahake Bridge	229	6	6	152	17	8
Track up Maungakerikeri Creek	93	4	4	62	2	11
Thames Borough boundary to Hape Creek No. 2	600	0	0	300	0	0
Upper Karaka Road	179	13	0	119	15	4
Repairing flood-damages, Waiotahi, Moanataiari, Karaka, and Collarbone Roads	350	0	0	175	0	0
Sea-beach to Waiomo	750	0	0	375	0	0
Te Papa Gully Road	75	0	0	37	10	0
New Find to Waiomo Battery	110	0	0	55	0	0
Rocky Point Road	429	11	10	214	15	11
Waiotahi towards Mercury Bay	522	11	0	261	5	6

LIST of WORKS on GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost.	Amount of Contribution paid by Mines Department.
Thames County—continued.	£ s. d.	£ s. d.
Te Mata Road	178 17 6	89 8 9
Waiomo Creek to Tapu	1,499 0 0	749 10 0
Alabama Creek Track	100 0 0	50 0 0
Road from Prospectors' Mine, Puriri, to battery	50 0 0	25 0 0
Karaka Creek to Lucky Hit	365 0 0	182 10 0
Bullion Mine, Tapu, to battery	36 5 0	18 2 6
Track to Hikutaia Goldfield	147 15 2	73 17 7
Upper Tararu Road to Sylvia Mine	684 7 0	342 3 6
Road to Puriri Battery	11 13 0	5 16 6
Thames–Waikawau Road	37 10 0	18 15 0
Track from Tararu Creek Road to McDermot's Claim	45 0 0	22 10 0
Track to Try Fluke Claim, Tapu	94 15 0	47 7 6
Waiomo to Puhoi Creek	33 0 0	16 10 0
Waiokaraka Road, Bella Street, and Campbell Street to Moanataiari Creek	200 0 0	100 0 0
Moanataiari Creek Road	100 0 0	50 0 0
Tararu Creek Road and Tararu Road	150 0 0	75 0 0
Hape Creek Road	150 0 0	75 0 0
Omahu–Tairua	100 0 0	42 0 0
Karaka Creek Road	150 0 0	68 4 6
	13,184 15 11	7,546 17 5
Thames Borough.		
Repairing roads	975 19 2	600 0 0
Widening and straightening Karaka Creek	300 0 0	150 0 0
Metalling goldfields roads	584 0 0	438 0 0
Removing *débris*, Karaka Creek	200 0 0	100 0 0
Half-cost damage, Hawk's stable	96 0 0	48 0 0
Repairs, Moanataiari Creek Tunnel	100 0 0	52 0 0
	2,255 19 2	1,388 0 0
Ohinemuri County.		
Jubilee Mine Track	118 0 0	59 0 0
Track up Tui Creek	306 0 0	153 0 0
Prospecting-track, Whangamata and Waitekauri	200 0 0	166 13 4
Tramway, Karangahake to Railey's reduction-works	400 0 0	200 0 0
Strengthening bridges, Waihi Road	200 0 0	133 6 8
Paeroa to Hikutaia	400 0 0	200 0 0
Repairs, flood-damages	34 13 8	17 6 10
Hikutaia River to Marototo Mine	180 15 0	90 7 6
Karangahake through Gorge (bridge and culverts)	200 0 0	100 0 0
Waitekauri Lower Road	360 0 0	189 2 8
Metalling Karangahake Gorge Road	170 0 0	85 0 0
Karangahake and Waihi Road	237 10 0	118 15 0
Karangahake Hill Track	87 4 0	43 12 0
Bridge over Ohinemuri River at Karangahake	12 11 0	6 5 6
Hikutaia–Paeroa Road	500 0 0	250 0 0
Paeroa–Te Aroha Road	200 0 0	100 0 0
Tui Creek Track	129 18 6	64 19 3
Waitekauri to Lowrie's and Birnie's	200 0 0	100 0 0
Road, Karangahake to Waihi	246 12 3	164 8 2
Lower Waitekauri Road	347 13 4	230 16 4
Road, Thames Road to Netherton Punt	60 0 0	50 0 0
Komata Creek Road	600 0 0	300 0 0
Road, Paeroa Bridge to Kuaoti Creek	400 0 0	133 6 8
Punt at south end Netherton–Paeroa Road	275 0 0	175 0 0
Repairs, Waitekauri Township Road	200 0 0	100 0 0
Bridge, Paeroa–Te Aroha Road	60 0 0	30 0 0
Karangahake Bridge	1,032 0 0	512 16 9
Drain along Mill Road, Paeroa	200 0 0	90 2 5
	7,357 17 9	3,863 19 1
Piako County.		
Extension and completion of Te Aroha Tramway	18,000 0 0	12,000 0 0
Tramway to Fergusson's Battery, Waiorongomai	1,500 0 0	1,000 0 0
Road, Waiorongomai	497 17 0	331 18 0
Track to claims at Buck's Reef	55 5 6	36 17 0
Track, Fern Spur to Butler's Spur	231 17 9	154 11 10
Tracks up Stony Creek, Te Aroha Goldfield, &c.	54 0 0	36 0 0
Repairs, Upper Premier Track and new track towards Waitawheta	40 0 0	20 0 0
Repairs, Te Aroha–Lichfield Road	302 0 0	125 0 0
Waiorongomai Tramway	263 2 0	175 0 0
	20,944 2 3	13,879 6 10
Katikati Road Board.		
Katikati–Karangahake Track	400 0 0	200 0 0
Bridge on branch road to Katikati	68 0 0	34 0 0
	468 0 0	234 0 0

LIST of WORKS on GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost.	Amount of Contribution paid by Mines Department.
Hutt County.	£ s. d.	£ s. d.
Road to connect Otorongo Bay with Albion Company's battery, also to connect Terawhiti Quartz-mine with battery	509 16 6	210 17 0
Road, Makara Junction to Terawhiti	450 0 0	225 0 0
	959 16 6	435 17 0
SOUTH ISLAND.		
ROADS (SUBSIDISED).		
Marlborough County.		
Track, Deep Creek to Dead Horse Creek	68 0 0	45 6 8
Mouth of Gorge to Forks, Cullensville to Mahakipawa Diggings	450 0 0	225 0 0
Formation of road at Cullensville, Mahakipawa	217 4 0	108 12 0
Havelock-Mahakipawa Road	905 0 0	505 0 0
Dead Horse Creek to Sunnyside	75 0 0	50 0 0
	1,715 4 0	933 18 8
Waimea County.		
Road to open up Table Diggings	260 0 0	130 0 0
Punt over Motueka River	100 0 0	50 0 0
Repairing Baton to Table-land Track	40 0 0	20 0 0
Dove River to Baton Saddle, and from Rolling River to Wangapeka Saddle ..	120 0 0	60 0 0
	520 0 0	260 0 0
Collingwood County.		
Road, West Wanganui	300 0 0	200 0 0
Bridge over Aorere River	173 14 0	115 16 0
Extending Anatoki Bridle-track	160 0 0	80 0 0
Bridge over Takaka River at Pain's Ford	1,597 7 8	798 13 10
Repairs, Silverstream Bridge, and forming and metalling Bainham Road	200 0 0	100 0 0
	2,431 1 8	1,294 9 10
Buller County.		
Deviation of road from Candlelight Flat to Deep Creek, Charleston	370 0 0	246 13 4
Road from Orowaiti Lagoon to North Terrace	256 18 6	171 5 8
Prospecting-track from Razorback to Paparoa Range	100 0 0	66 13 4
Track from Seatonville to Larrikin's	438 9 6	292 6 4
Waimangaroa to Denniston	787 0 0	393 10 0
Road to connect alluvial workings with Charleston Road	400 0 0	266 13 4
Track, Four-mile Creek towards Grey Valley	300 0 0	200 0 0
Road to connect alluvial diggings north of Deadman's Creek	278 0 0	185 6 8
Ngakawau to Mokihinui, *viâ* beaches	100 0 0	66 13 4
Road to connect Ngakawau Railway with Mokihinui Coal Company's workings ..	193 0 0	128 13 4
Lyell Bluff to Victor Emmanuel Claim	650 0 0	433 6 8
Beach, Little Wanganui to Mokihinui	300 0 0	100 0 0
Cape Foulwind Road	450 0 0	300 0 0
Road up Nile Valley	56 16 4	28 8 2
Denniston extension	850 0 0	425 0 0
Promised Land towards Motueka	380 0 0	190 0 0
Road over Gentle Annie	200 0 0	100 0 0
Extension, Lyell Creek to Low-level Tunnel	60 0 0	30 0 0
Extension of track 50 chains south of Brighton	140 0 0	70 0 0
Continuation of road, Deadman's Creek	437 17 0	218 18 6
Ngakawau Railway-station to Mokihinui	50 0 0	25 0 0
Addison's Flat towards ranges	20 0 0	10 0 0
North Terrace to Oparara Diggings	500 0 0	333 6 8
Extension of Croninville Road	100 0 0	50 0 0
Waimangaroa to sea-beach	80 0 0	40 0 0
Extension of track, Oparara to Fenian Creek	100 0 0	50 0 0
Con's Creek to Beaconsfield	80 0 0	40 0 0
Addison's Flat to Caroline Terrace	200 0 0	100 0 0
Waimangaroa to sea-beach extension	390 0 0	195 0 0
Addison's Flat to Gallagher's Lead	50 0 0	25 0 0
Road to Swanston's Gold-mining Company	50 0 0	25 0 0
Repairs to roads at Lyell	200 0 0	100 0 0
Track, Fairdown from North Terrace	150 0 0	97 8 0
Improving road to Four-mile Creek, Charleston	900 0 0	450 0 0
Bridge, Waimangaroa River	70 0 0	35 0 0
	9,688 1 4	5,489 3 4
Inangahua County.		
Dray-road from Soldier's Creek to Devil's Creek	647 0 0	431 6 8
Dray-road from Inangahua to Rainy Creek Battery	900 10 0	606 6 8
Dray-road from Capleston up Little Boatman's Creek	379 0 0	252 13 4
Dray-road from Capleston up Main Boatman's Creek	697 0 0	464 13 4
Dray-road from Westport Road to Inangahua River	224 5 0	149 10 0
Track from Devil's Creek to Big River	134 3 6	89 9 0
Track from Waitahu River to Capleston	358 0 0	238 13 4
Survey and expenses	250 0 0	166 13 4
Track from Cariboo to Big River	728 0 0	364 0 0

LIST of WORKS on GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost.	Amount of Contribution paid by Mines Department.
Inangahua County—continued.	£ s. d.	£ s. d.
Dray-road up Murray Creek to United Inglewood Claim	3,472 0 0	2,314 17 4
Road from Reefton to Big River, *viâ* Devil's Creek	614 0 0	307 0 0
Road up Big River	922 19 0	615 6 0
Continuation of dray-road up Little Boatman's Creek	169 7 6	112 18 4
Road from Capleston to Larry's Creek	640 0 0	426 13 4
Track to connect Capleston with Lone Star	75 0 0	50 0 0
Crushington to Globe Company's workings	403 0 0	201 10 0
Snowy Creek Track	85 15 0	42 17 6
Reefton to Big River	1,792 0 0	1,194 13 4
Glenroy to Horse Terrace	254 0 0	122 10 0
Devil's Creek to Globe Hill	917 6 2	458 13 1
Extension of dray-road to Boatman's *viâ* Painkiller	53 17 6	26 18 9
Mangles Valley to McGregor's Station	600 0 0	300 0 0
Globe Hill to Merrijigs	1,397 6 0	698 13 0
Larry's Creek to Lyell	1,061 15 0	530 17 6
Widening Larry's Creek Road	118 10 0	59 5 0
Road up Burke's Creek, Little Boatman's	149 0 0	74 10 0
Widening track from Scotia Tunnel, on Big River Road, to Inkermann Mine	200 0 0	80 9 0
	17,252 14 8	10,380 17 10
Grey County.		
Road from No Town to Deep Creek	1,100 0 0	550 0 0
Road from Langdon's to Moonlight	1,600 0 0	800 0 0
Contribution from goldfields vote towards main road	2,296 6 6	2,296 6 6
Track, Waipuna to Clarke's River	1,200 0 0	800 0 0
Track, Cameron's to Cape Terrace	700 0 0	466 13 4
Road, Limestone to Maori Creek	800 0 0	533 6 8
Red Jack's to Nelson Creek	601 17 6	401 5 0
Barrytown to Deadman's	2,240 0 0	1,493 6 8
German Gully to Arnold's Flat	120 0 0	60 0 0
Baird's Terrace to Lake Brunner	400 0 0	200 0 0
Hatter's Terrace Road	1,000 0 0	500 0 0
Irishman's to Lake Brunner	2,400 0 0	1,200 0 0
Hatter's Terrace	600 0 0	400 0 0
Track, Baird's Terrace to Irishman's	250 0 0	125 0 0
Deep Creek to Bell Hill	1,331 0 0	665 10 0
Track to Blackball Diggings	790 0 0	395 0 0
Track from Ahaura, Kopara, Reese's Flat, to new rush on banks of Ahaura River	20 0 0	10 0 0
Renewal, bridge over Nelson Creek, Marsden–Dunganville Road	38 0 0	19 0 0
Repairs (corduroying), Cobden–Seven-mile Road	36 0 0	18 0 0
Repairs, Cobden–Point-Elizabeth Road	30 0 0	15 0 0
Extension Ngahere–Blackball Road to Blackball Ferry	50 0 0	25 0 0
Dray-bridge, Ten-mile Creek	688 0 0	344 0 0
Deviation, Moonlight Track	100 0 0	50 0 0
Repairs, bridges, Marsden–Dunganville Road	348 0 0	219 0 0
Seventeen-mile Bluff to Barrytown	80 0 0	40 0 0
Removing rocks, Nine- and Ten-mile Bluffs	100 0 0	50 0 0
	18,919 4 0	11,676 8 2
Westland County.		
Improving track, Butcher's Creek to Gentle Annie Terrace	225 10 0	163 13 4
Bridle-track to Kanieri Lake	719 11 0	350 5 6
Bridle-track to Eel Creek	168 9 0	84 4 6
Tunnel-track, Galway Beach to Gillespie's Beach	437 5 0	218 12 6
Road from Duffer's Creek, Greenstone Road, to fifteen-mile peg, Christchurch Road	726 9 0	480 4 6
Continuation of track, Back Creek to Eel Creek	249 4 0	166 3 4
Bridle-track, Duffer's Creek, Bowen and Okarito Road, to sea-beach	333 18 0	222 12 0
Ross Borough boundary to Mount Greenland	1,280 15 0	853 16 8
Track, Kanieri Lake to Humphrey's Gully	279 2 0	186 1 4
Track, Larrikin's to Loop-line Dam	449 11 0	299 14 0
Rough Wainihinihi to Upper Dam	450 0 0	300 0 0
Browning's Pass to Reefs	3,311 6 0	2,207 10 8
Okarito Forks to Teal Creek	600 0 0	400 0 0
Road, Christchurch to Baldhill Range reefs	500 0 0	250 0 0
Extension of Tucker's Flat Road to New Rush	170 19 6	85 9 9
Hokitika Borough boundary (Reefton) to Shotover Rush	120 0 0	60 0 0
Track to New Rush, Back Creek	100 0 0	50 0 0
Repairing old track round Wataroa Bluff	50 0 0	25 0 0
New Rush, south side of Hokitika River	37 18 6	18 19 3
Cedar Creek Road to Farmer's Creek	55 7 0	27 13 6
Road to gold discovery near Blue Spur	75 0 0	37 10 0
Widening Seddon's Terrace Track	150 0 0	65 10 0
Branch Road at Seddon's Terrace	38 10 6	19 5 3
Track up Middle Branch, Styx River	30 0 0	15 0 0
	10,558 15 6	6,596 6 1
Taieri County.		
Mullocky Gully to Silver Peak	499 15 0	333 3 4

LIST of WORKS on GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost.			Amount of Contribution paid by Mines Department.		
	£	s.	d.	£	s.	d.
Lake County.						
Track, Skipper's to Phœnix and Scandinavian Reefs	292	2	3	194	14	10
Track to connect scheelite-mine with Lake Wakatipu	225	0	0	150	0	0
Arrowtown to Macetown, construction	225	0	0	150	0	0
Arrowtown to Macetown, maintenance	150	0	0	100	0	0
Invincible Quartz-reef Track, Rees River	300	0	0	200	0	0
Rees Valley to company's workings	61	7	6	30	13	9
Pack-track, Criffel Diggings	50	6	6	33	11	0
Left-hand Branch Road, Skipper's	63	9	10	31	14	11
Old Morven Ferry Road	289	0	0	144	10	0
Road to workings above Cardrona	70	0	0	35	0	0
Piers, Victoria Bridge	725	0	0	362	10	0
Skipper's Road Saddle to Deep Creek	200	0	0	100	0	0
	2,651	6	1	1,532	14	6
Tuapeka County.						
Making road from top of Terrace to Waipori Bush	300	0	0	200	0	0
Road, Beaumont to Remarkable Bush	300	0	0	200	0	0
Improving road from Waipori Township to antimony-mines, Lammerlaw Ranges	200	0	0	133	6	8
Waipori Township to Waipori Bush	200	0	0	133	6	8
Clutha River to Campbell's	76	9	0	50	19	4
Waitahuna to copper-mine	200	0	0	133	6	8
Road to open up quarry for Waitahuna Bridge	160	9	10	106	19	11
Waipori Road, *viâ* Bungtown	566	8	10	283	4	5
Miller's Flat Bridge	11,242	0	0	6,621	0	0
Metalling road, Lawrence–Waipori	550	0	0	291	3	6
Shelter-sheds and snow-poles	100	0	0	50	0	0
	13,895	7	8	8,203	7	2
Wallace County.						
Track, Colac Bay to Round Hill	200	0	0	133	6	8
Pack-track to Round Hill, Colac, and Orepuki	1,050	0	0	500	0	0
Cutting tracks, Longwood	59	6	0	29	13	0
	1,309	6	0	662	19	8
Vincent County.						
Renewal bridge to Bannockburn	1,532	0	0	850	0	0
Maniototo County.						
Road to Serpentine Diggings	136	10	0	91	0	0
Pig and Whistle to Clarke's Diggings	200	0	0	133	6	8
Shepherd's Hut Flat to Vinegar Hill	100	0	0	66	13	4
Kyeburn Peninsula to main road	82	0	0	41	0	0
	518	10	0	332	0	0
Fiord County.						
Dusky Sound, tracks	300	0	0	200	0	0
Waitaki County.						
Road, Naseby to Livingstone	41	12	0	20	16	0
Southland County.						
Improving tracks from Mataura to Nokomai	75	0	0	50	0	0
Improving road, Waikaka to Leatham	150	0	0	100	0	0
Improving road from Waikaka Township to Leatham Creek	30	0	0	20	0	0
Improving road from Waikaka to Waikaka railway-siding	150	0	0	100	0	0
Widening and improving bush-track to Waikawa	150	0	0	100	0	0
Waikaka to Switzer's	150	0	0	100	0	0
Road near Waikaka Township	150	0	0	100	0	0
Waipapa to Six-mile Beach	175	0	0	87	10	0
Repairing bridges, Waikaia Bush	38	13	4	13	4	0
Dray-road to Ferry Terrace, Nokomai	100	0	0	50	0	0
Waikaia to Whitecomb	511	6	8	280	13	4
Parawa to Switzer's, *viâ* Nokomai	150	0	0	75	0	0
Track to Switzer's Freehold Gold-mining Company	175	0	0	175	0	0
Nevis Road	100	0	0	50	0	0
Parawa to Nokomai	150	0	0	75	0	0
Waikaia to Break-'em-All Claim	100	0	0	50	0	0
	2,355	0	0	1,426	7	4
DIAMOND AND OTHER DRILLS.						
Inangahua County Council (diamond)	2,000	0	0	1,000	0	0
Springfield Colliery Company (diamond)	1,250	0	0	625	0	0
Westland County Council (tiffin)	350	0	0	233	0	0
Diamond-drills for prospecting purposes	1,570	11	4	1,570	11	4
	5,170	11	4	3,428	11	4

LIST of WORKS on GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost.			Amount of Contribution paid by Mines Department.		
WHARVES.	£	s.	d.	£	s.	d.
Repairs to wharf, Coromandel	300	0	0	150	0	0
Anikiwi Jetty, Marlborough	135	15	9	135	15	9
	435	15	9	285	15	9
AIDS TO PROSPECTING.						
Construction of low-level tunnel, Terawhiti	750	0	0	150	0	0
Queen of Beauty Company, prospecting deep levels	300	0	0	150	0	0
Caledonian Low-level Company, prospecting deep levels	300	0	0	150	0	0
Red Hill Gold-mining Company, prospecting deep levels	600	0	0	300	0	0
Caledonian Low-level Company, low-level tunnel	2,700	0	0	300	0	0
Lyell Creek Extended Company, low-level tunnel	300	0	0	150	0	0
New Cromwell Gold-mining Company	250	0	0	100	0	0
Deep-level Association, Waipori	450	0	0	300	0	0
Little Boatman's deep-level tunnel	600	0	0	300	0	0
Oterongia Prospecting Association	198	17	2	99	8	7
Vincent County	137	9	0	68	14	6
Tapanui Prospecting Association	25	0	0	12	10	0
Tuapeka County	12	0	0	6	0	0
Maniototo County	500	0	0	250	0	0
Pullar, Shelmerdine, and Basan	400	0	0	200	0	0
Royal Oak Association	300	0	0	150	0	0
Star of the East Quartz-mining Company	150	0	0	75	0	0
West Coast Prospecting Association	300	0	0	150	0	0
McBride and party	169	2	2	84	11	1
McLean and party	66	0	0	33	0	0
Deep-level tunnel, Tokatea	700	0	0	350	0	0
Deep-level tunnel, Owharoa	300	8	0	200	5	4
Deep-level tunnel, Tapu	1,200	0	0	600	0	0
Deep-level tunnel, Cedar Creek	1,207	10	0	603	15	0
Manuka Flat Prospecting Association	200	0	0	100	0	0
Red Hill Minerals Company	437	19	10	218	19	11
Tuapeka Prospecting Association	277	0	0	138	10	0
Cardrona Prospecting Association	800	0	0	400	0	0
Cromwell Prospecting Association	500	0	0	250	0	0
Coromandel County	550	0	0	275	0	0
Thames County	309	18	0	154	19	0
Thames Borough	200	0	0	100	0	0
Buller County	146	12	6	73	6	3
Inangahua County	488	7	0	244	3	6
Westland County	1,236	19	4	618	9	8
Grey County	871	15	2	435	17	7
Deep-level Prospecting Association, Waipori	432	9	8	216	4	10
Waipu Prospecting Association	180	0	0	90	0	0
Hokianga County	100	0	0	50	0	0
Vulcan Smelting-works, Onehunga	30	0	0	15	0	0
Ohinemuri County	100	0	0	50	0	6
Waitaki County	29	5	0	14	12	6
Waihemo County	85	9	0	42	14	0
William Fox and party	711	1	8	355	10	11
Kirk and party	176	0	10	88	4	10
Hodge and party	98	13	8	49	6	10
Carey and Hyndman	441	9	4	220	14	0
Don, Boyce, and party	107	16	0	53	18	0
Quentin McKinnon	58	10	0	29	5	0
Bullion Mine deep-level tunnel	300	0	0	150	0	0
Sutherland and party	30	0	0	15	0	0
Inangahua low-level tunnel	6,966	0	0	3,000	0	0
Deep-level tunnel, Manaia	451	4	0	225	12	0
Waimea Miners' Association, prospecting at Callaghan's	50	0	0	50	0	0
Totara Miners' Association, Ross	51	3	6	51	3	6
Ross, Cunningham, and another	9	0	0	9	0	0
Wm. Thompson, stores from Benmore Station	2	1	10	2	1	10
Totara Miners' Association, Ross	8	6	6	8	6	6
Harris, Davidson, and party	27	7	6	27	7	0
Boatman's Tailings Company	150	0	0	150	0	0
Boys's tunnel, Bluespur	94	12	3	94	12	0
Totara Miners' Association (Ross, Montina, and party)	246	10	0	246	10	0
Gillam's Gully Prospecting Association	94	15	0	94	15	0
Deep-level Prospecting Committee, Dillmanstown	407	0	3	407	0	3
Westport Prospecting Association	25	0	0	25	0	0
Te Aroha Prospecting Association	20	12	6	20	12	6
Robert Richie, Kuaotunu	72	3	0	36	1	0
Owharoa Tunnel (Lindsay Jackson)	325	0	0	162	10	0
Coromandel County (£1 for £1)	200	0	0	100	0	0
Mr. G. Rehay, Arahura	98	15	0	49	7	6
Hyndman and party, Callaghan's Flat	552	14	6	276	7	3
Lakes Mapourika, Waiho, and Wataroa Miners' Association	53	12	0	26	16	0
Kumara Miners' Association	22	10	0	11	5	0
Thames Miners' Union	75	15	0	37	17	6
Star of Canterbury Miners' Association	38	5	0	19	2	6
Miners' Association, Rimu	16	0	0	8	0	0
Buller County (Messrs. Negri and others)	27	0	0	13	10	0
Johnson and party, tunnel at Callaghan's Flat	90	0	0	45	0	0

LIST of WORKS on GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost.	Amount of Contribution paid by Mines Department.
AIDS TO PROSPECTING—*continued.*	£ s. d.	£ s. d.
W. L. Webb, Nelson	24 0 0	12 0 0
Kumara Miners' Association (Solberg, Stewart, and party)	64 15 0	32 7 6
Buller County, between head of Fox's River, Brighton, and Deadman's Creek	29 5 0	14 12 6
Welcome United Gold-mining Company, Greymouth	245 12 6	122 16 3
Orepuki Miners' Association	90 0 0	45 0 0
Totara Miners' Association (Gagliardi and party)	12 10 0	6 5 0
Contingencies	484 15 10	242 7 11
Halligan and party, tunnel at Cedar Creek	198 1 10	99 0 11
Totara Miners' Association (Chamberlain and party)	208 10 0	104 5 0
Miners' Association, Greenstone	59 0 0	29 10 0
Westland County (T. Radonicki and party)	40 0 0	20 0 0
Waimea Miners' Association (Lot, Keir, and party)	90 0 0	45 0 0
Cardrona Prospecting Association	140 5 4	70 2 8
Waimea Miners' Association, Stafford	113 1 0	56 10 6
H. Crossan, Beaumont	28 0 0	14 0 0
Prospecting Association, Westport	39 0 0	19 10 0
Cape Colville Prospecting Syndicate	32 0 0	16 0 0
Port Charles Prospecting Association	28 0 0	14 0 0
Totara Miners' Association, Ross	24 0 0	12 0 0
Lake Mapourika Miners' Association	12 0 0	6 0 0
Lister and Robertson, Karamea	13 0 0	13 0 0
Canada Reefs Tunnel	187 10 0	93 15 0
Otago Miners' Association	600 0 0	291 8 2
Westland County (Goudie and party)	215 19 9	107 19 6
Paparata Road Board	26 0 0	13 0 0
Tauranga County (Te Puke Prospecting Association)	50 0 0	25 0 0
Havelock Miners' Association	78 0 0	39 0 0
Ohinemuri County	200 0 0	6 0 0
Mr. Olderog, Arahura	54 18 0	16 4 0
Miners' Association, Ross (J. Smith and party)	135 0 0	61 7 6
Extension of low-level tunnel, Boatman's	300 0 0	137 7 11
Prospecting-tunnel, south side Inangahua River	60 0 0	25 0 0
Prospecting Association, Mokihinui	40 0 0	15 0 0
Miners' Association, Kumara (John Kane)	9 0 0	1 2 6
Prospecting Association, Invercargill	150 0 0	68 13 6
Miners' Association, Kuaotunu	40 0 0	13 2 6
Miners' Association, Ross (Waylen and party)	50 0 0	16 13 0
Prospecting Association, Coromandel (Leahy and others)	200 0 0	100 0 0
Adit-level, Maungatawhiri Creek (G. B. Osmond)	120 0 0	68 17 0
Bay of Islands County Prospecting, Pokaka	112 13 0	112 13 0
Prospecting Russell's Outcrop	100 0 0	100 0 0
Fox's River Prospecting Association (A. T. Bate, secretary)	19 10 0	19 10 0
Buller County (Newton and party, shaft, Ballarat Terrace)	22 15 0	22 15 0
Buller County (Spence and party)	19 10 0	19 10 0
Wairau Miners' Association	50 0 0	48 4 0
Miners' Association, Nelson Creek (Thrower and Potts)	45 0 0	45 0 0
Miners' Association, Dillmanstown (Turnbull and others)	7 10 0	7 10 0
Miners' Association, Ross (Gagliardi and party)	64 18 0	64 18 0
Miners' Association, Ross (Allen and Son)	40 0 0	20 0 0
Miners' Association, Greenstone (Black and party)	27 0 0	27 0 0
Miners' Association, Cardrona	40 0 0	40 0 0
Miners' Association, Lowburn (E. Murrell)	20 0 0	13 5 0
Puhipuhi Prospecting Association	200 0 0	13 15 0
Thames County (F. and J. Wallis)	97 10 0	35 19 2
Thames County (Sheridan Company's tunnel, Tapu)	180 10 0	30 5 0
Cinnabar Mining Company, Auckland (£1 to £1 10s.)	162 16 9	108 11 2
H. H. Adam's, Waiorongomai	250 0 0	48 3 9
Miners' Association, Ross (Moye and Son)	15 10 0	6 10 6
Westland County (J. Staines)	96 0 0	4 10 0
Westland County (O'Brien and Glynn)	40 0 0	36 10 6
Upper Moutere Road Board	40 0 0	1 16 0
Buller County (Mohan and party)	220 0 0	71 8 6
Buller County (Gardiner and McKay)	56 0 0	24 0 0
Buller County (Negri and others)	43 0 0	29 1 3
Buller County (Scarlett and McHarrie)	39 0 0	18 0 0
Kumara Miners' Association (Scatterini and Anderson)	124 0 0	6 13 6
Kumara Miners' Association (Henley and party)	58 14 0	2 8 0
Kumara Miners' Association (M. Manton)	57 10 0	3 18 9
Kumara Miners' Association (Rogers and Block)	75 0 0	35 6 6
Frying-pan Tail-race	600 0 0	161 11 3
Prospecting Association, Mokihinui (French and others)	58 10 0	11 5 0
Prospecting Association, Westport	432 6 0	197 9 8
Dyer and party, Kuaotunu	120 0 0	37 16 0
Gillam's Gully Prospecting Association (Bramhall and party)	60 0 0	12 3 0
Miners' Association, Riverton	100 0 0	32 0 0
Kennedy-Waikaia Miners' Association, Invercargill	100 0 0	9 0 0
Inangahua District Miners' Association	100 0 0	25 17 6
New El Dorado Sluicing Company, Fat Boys, Criffel	300 0 0	94 4 9
Miners' Association, Greenstone (O'Donnell and party, and J. Pope)	75 0 0	30 4 3
Miners' Association, Tinkers, prospecting Matakanui	6 0 0	3 0 0
Chatterbox Tunnel (G. Clapton)	6 0 0	2 17 9
Port Charles Prospecting Association	20 0 0	11 8 0
Miners' Association, Lake Mapourika	17 4 0	7 13 3
Pitchers and Kitto, Anderson's Flat	100 0 0	20 5 11

LIST OF WORKS ON GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost.			Amount of Contribution paid by Mines Department.		
AIDS TO PROSPECTING—*continued.*	£	s.	d.	£	s.	d.
Miners' Association, Nelson Creek (Kelly and party)	23	5	0	9	18	0
South British Prospecting Association, Lyell	135	0	0	6	15	0
Miners' Association, Ross (A. Zala)	69	0	0	69	0	0
Miners' Association, Ross (McKay and Muir)	39	0	0	39	0	0
Miners' Association, Ross (McKay and Brown)	13	0	0	13	0	0
Miners' Association, Ross (McEwen and McEchnie)	26	0	0	26	0	0
Miners' Association, Ross (C. Porter)	226	0	0	128	0	0
Miners' Association, Riverton	18	0	0	18	0	0
Katikati Prospecting Association	52	0	0	26	0	0
Cornwall, Walker, and party's tunnel, Boatman's	302	10	0	154	14	0
Miners' Association, Greenstone (Crawford and party)	109	7	6	109	7	6
Mararoa Mining Association	18	0	0	18	0	0
Hororata Prospecting Association	30	15	0	30	15	0
Paparata Road Board (Parker and Piggott)	32	10	0	32	10	0
Drainage-tunnel, Dunedin Flat (£1 for £1)	2,375	0	0	1,187	10	4
New Bay of Islands Coal Company, prospecting Moody's outcrop	200	0	0	173	4	3
Longwood Sluicing Company	300	0	0	150	0	0
Red Jack's Miners' Association (Drummond and McDonough)	28	0	0	28	0	0
Kapanga Gold-mining Company (Limited)	20,600	0	0	1,735	3	11
Kuaotunu Prospecting Association	48	10	0	26	0	0
Te Aroha Town Board	100	0	0	37	17	6
Bombay Prospecting Association	40	0	0	16	7	9
Charleston Miners' Association	110	0	0	33	8	6
Buller County (Reaney and Rasmussen)	120	0	0	30	0	0
Buller County (Samuel and party)	100	0	0	5	11	0
Gold-mining League, Westport (McFarlane and others)	39	0	0	13	10	0
Inangahua County (Gabriel and party)	100	0	0	11	11	0
Miners' Association, Dillmanstown (Black and party)	31	10	0	12	0	0
Tapanui Prospecting Association	40	0	0	18	10	0
Miners' Association, Lowburn (Tilliman and party)	57	10	0	42	9	9
Miners' Association, Upper Waikaia	19	10	0	13	0	0
	65,306	8	8	22,414	2	4
WATER-RACES.						
Water-main, Bull's Battery	350	0	0	100	0	0
Round Hill Water-race	200	19	0	133	19	4
Tomkiss's Water-race	100	0	0	100	0	0
Cardrona Sludge-channel	100	0	0	50	0	0
New water-mains, Thames Water-race	1,479	10	4	739	15	2
Nelson Creek	957	16	9	957	16	9
Mikonui Water-race	14,279	16	4	14,279	16	4
Brown and party, Kumara	90	0	0	22	10	0
Randall Creek Water-race	222	2	3	222	2	3
Thames Water-race	1,250	0	0	1,250	0	0
Contingencies	659	12	8	659	12	8
Randall Creek Water-race	100	15	0	100	15	0
Quinn's Creek Water-race	70	0	0	70	0	0
Wainihinihi Water-race	84	3	8	84	3	8
Survey, water-race, Ninety-mile Beach	65	6	7	65	6	7
Improving water-supply, Oamaru	1,250	0	0	1,150	7	2
Roaring Meg Water-race (Jones, Baxter, and party)	1,600	0	0	800	0	0
Sulky Gully Water-race	504	0	0	218	0	0
Gentle Annie Creek, Mata (R. Kelly)	200	0	0	40	0	0
Finlay McLiver's Water-race	400	0	0	34	5	4
Purchase Byrne, O'Hallahan, and Murdoch's water rights	35	0	0	35	0	0
Argyle Water-race	8,453	15	1	8,453	15	1
	32,452	17	8	29,567	5	4
DRAINAGE- AND TAILINGS-CHANNELS.						
Drainage-channel, Lawrence (total cost, approximate)	3,000	0	0	2,000	0	0
Subsidy towards purchase of Messrs. Laidlaw and Crawford's freehold in Spotti's Creek, to allow tailings to be deposited (Tinker's Diggings)	500	0	0	400	0	0
Damage by floods, Thames	1,000	0	0	500	0	0
Sludge-channel, Smith's Gully, Bannockburn	1,000	0	0	251	1	0
Round Hill Sludge-channel survey	52	19	7	52	19	7
Compensation to J. Costello, damage done by tailings	788	0	0	788	0	0
Long Gully Sludge-channel	150	0	0	100	0	0
New Pipeclay Gully Sludge-channel	1,547	18	0	773	19	0
Kumara Sludge-channel No. 2	2,762	17	2	2,762	17	2
Ophir Tail-race	2,300	0	0	1,150	0	0
Lawrence Drainage-channel	1,150	0	0	956	14	0
Tailings-outlet, Maerewhenua	1,595	4	0	1,595	4	0
Ross Sludge and Storm-water Channel	1,675	10	6	1,675	10	6
Kuaotunu Sludge-channel (£1 for £1)	400	0	0	200	0	0
Branch tail-race to No. 4 Channel	100	0	0	100	0	0
Rimu Drainage-channel	500	0	0	191	19	6
Kumara Sludge-channel No. 5	5,006	15	9	5,006	15	9
	23,529	5	0	18,505	0	6

LIST of WORKS on GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost.			Amount of Contribution paid by Mines Department.		
AID TOWARDS THE TREATMENT OF ORES.	£	s.	d.	£	s.	d.
Testing-plant, School of Mines, Thames	1,200	0	0	600	0	0
Testing minerals, Dunedin Exhibition	142	8	9	142	8	9
	1,342	8	9	742	8	9
AID TOWARDS CONSTRUCTION OF TELEPHONE-LINES.						
Bannockburn to Nevis	60	0	0	50	0	0
WORKS WHOLLY CONSTRUCTED BY MINES DEPARTMENT.						
Construction of road, Arrowtown to Macetown	9,270	6	8	9,270	6	8
Road to open up Woodstock Goldfield	1,000	0	0	1,000	0	0
Ahaura to Amuri	2,504	19	7	2,504	19	7
Waikaia Bush Road	1,000	0	0	1,000	0	0
Waitahuna Bridge	750	0	0	750	0	0
Merrivale tracks	500	0	0	500	0	0
Mokihinui to Specimen Creek	1,238	7	5	1,238	7	5
Wilberforce Quartz-reef Road	1,830	17	7	1,830	17	7
Opening Mokau River	552	8	0	552	8	0
Lyell to Mokihinui	5,098	8	6	5,098	8	6
Brighton to Seventeen-mile Beach	1,789	7	2	1,789	7	2
Wangapeka to Karamea	2,000	0	0	2,000	0	0
Hatter's Terrace to Bell Hill	500	0	0	500	0	0
Cedar Creek Road	3,000	0	0	3,000	0	0
Owen Valley Road	2,208	9	2	2,208	9	2
Cobden to Seventeen-mile Beach	3,036	1	4	3,036	1	4
Cedar Creek Road	1,500	0	0	1,500	0	0
Bridle-track to Upper Anatoki	722	8	0	722	8	0
Whangamata Road	141	10	6	141	10	6
Karangahake through Gorge	1,000	0	0	1,000	0	0
Arthur's Point to Skipper's	12,167	4	1	12,167	4	1
Tracks to Coal Island	54	6	3	54	6	3
Grey Valley to Teremakau	900	0	0	900	0	0
Rimu to New Rush	829	17	9	829	17	9
Tapu to Waikawau	750	10	0	750	10	0
Puhipuhi Road	1,396	17	9	1,396	17	9
Jackson's Bay to Cascade and George River district	5,310	10	11	5,310	10	11
Improving roads and tracks, Collingwood to Takaka and Motueka	10,905	8	11	10,905	8	11
Tramway from New Find to Waitekauri	100	0	0	100	0	0
Havelock–Mahakipawa Dray-road	1,311	9	0	1,311	9	0
Mokihinui to Wanganui	200	0	0	200	0	0
Burnett's Face to Coalbrookdale	200	0	0	200	0	0
Deadman's to Christmas Terrace	20	0	0	20	0	0
Low-level Alpine Claim, Lyell	80	0	0	80	0	0
Bowen Road to Salt-water Beach	60	0	0	60	0	0
Repairing damage done by floods, Westland County	100	0	0	100	0	0
Deviation of road at Kanieri Forks	140	0	0	140	0	0
Road up Dart River	200	0	0	200	0	0
Kuaotunu to Mercury Bay	350	0	0	350	0	0
Thames to Manaia	500	0	0	500	0	0
Cobden to Seventeen-mile Beach	400	0	0	400	0	0
Bridge over Mahinapua Creek	503	16	10	503	16	10
Track up Waiho River	105	0	0	105	0	0
Haast Ferry to Glue-pot	126	0	0	126	0	0
Paeroa–Waihi Road	114	0	0	114	0	0
Waitekauri to New Find	250	0	0	250	0	0
Mahakipawa to Waikakaho	183	12	1	183	12	1
Oparara through gorge to gold-workings	150	0	0	150	0	0
Okira Bridge, at Dirty Mary's Creek	100	0	0	100	0	0
Lagoon Bridge	100	0	0	100	0	0
Widening Cape Terrace Road	100	0	0	100	0	0
Deviation, Granville Road	70	0	0	70	0	0
Tucker's Flat Road	247	18	7	247	18	7
Dillman's–Larrikin's Road	125	15	0	125	15	0
Track at Kanieri Lake and McIntosh Falls, Lake Mahinapua	195	4	6	195	4	6
Extension of road, Rimu to Shallow Rush	150	0	0	150	0	0
Gillam's Gully Track	149	16	0	149	16	0
McKay's Creek, Kokatahi Track	100	0	0	100	0	0
Aorere Valley to Karamea and Mokihinui	29,938	1	2	29,938	1	2
Arrowtown to Macetown	450	0	0	450	0	0
Nelson Creek Bridge	100	0	0	100	0	0
Cascade to Barn Bay Road	411	7	0	411	7	0
Repairs to decking, Tapu Wharf	100	0	0	100	0	0
Waitekauri Battery from Junction–Waihi Road	150	0	0	150	0	0
Deep Creek, Wakamarina, to Empire City Company's claim	50	0	0	50	0	0
Track to diggings at Cape Foulwind	497	11	0	497	11	0
Bridge over Fox's River at Brighton	100	0	0	100	0	0
Totara Bridge	255	0	0	255	0	0
Road from Mokihinui Bridge to gold-workings	75	0	0	75	0	0
Clearing two miles of old track from right-hand branch of Kanieri River to Gentle Annie Terrace	13	0	0	13	0	0
Extending horse-track to Blackball Creek	500	0	0	500	0	0
Matawai to Kaimarama	150	0	0	150	0	0
Tiki to Mahakirau	250	0	0	250	0	0
Karangahake Gorge to Waihi	350	0	0	350	0	0

LIST of WORKS on GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost.			Amount of Contribution paid by Mines Department.		
WORKS WHOLLY CONSTRUCTED BY MINES DEPARTMENT—*continued.*	£	s.	d.	£	s.	d.
Upper Tararu Road	471	10	3	471	10	3
Red Hill Road	249	8	1	249	8	1
Repairs, Nile Bridge	1,131	2	6	1,131	2	6
Miller's Flat to Skipper's	580	0	0	580	0	0
Cobden to Coal Creek	375	0	0	375	0	0
Track to New Find, Tairua	47	11	6	47	11	6
Cedar Creek Dray-road	466	11	2	466	11	2
Road to Matarangi Goldfield	75	0	0	75	0	0
Repairs, Manaia Track	90	0	0	90	0	0
Upper Township School Bridge	50	0	0	50	0	0
Tiki Bridge across Waiau	256	0	0	256	0	0
Scott's Bridge	175	0	0	175	0	0
Oteau Bridge	150	0	0	150	0	0
Mercury Bay–Kaimarama Road	50	0	0	50	0	0
Stoney Creek Track	15	0	0	15	0	0
Road to mines, Waiomo	50	0	0	50	0	0
Upper Hill Track to branch track, Waiorongomai	30	0	0	30	0	0
Canadian Gully Bridge, and repairs to tunnel on horse-grade, Waiorongomai	70	0	0	70	0	0
Waiorongomai Road	100	0	0	100	0	0
Track from Slate River to Rocky	225	0	0	225	0	0
Pack-track to Killdevil	100	0	0	100	0	0
Repairs, Wangapeka Road towards Crow Diggings	153	0	7	153	0	7
Repairing flood-damages, Grey County	370	0	0	370	0	0
Taipo Track to Seven-mile	194	5	8	194	5	8
Repairs, Totara Bridge	336	0	0	336	0	0
Repairs, Kanieri Lake Road	80	0	0	80	0	0
Mercury Bay to Whenuakite and Boat Harbour	150	0	0	150	0	0
Tiki to Gumtown, *viâ* Kaimarama	160	0	0	160	0	0
Driving Creek to Cabbage Bay, and Driving Creek to Cape Colville	660	0	0	660	0	0
Tiki to Waikawau	600	0	0	600	0	0
Paeroa to Te Aroha	365	0	0	365	0	0
Puriri to east side of range	596	19	6	596	19	6
Onamalutu to Wakamarina Forks	400	0	0	400	0	0
Waimangaroa to Denniston	100	0	0	100	0	0
Road to Lyell's Creek Extended Company's tunnel	200	0	0	200	0	0
Jackson's Bay to Cascade	1,110	8	1	1,110	8	1
Bridge over Ogilvie's Creek	150	0	0	150	0	0
Gillam's Gully Track	220	0	0	220	0	0
Bridge over Kanieri River at Kokatahi	467	10	10	467	10	10
Road to Oparara Diggings	100	0	0	100	0	0
Millerton Road	249	0	3	249	0	3
Waiau to Preservation Inlet	7,961	19	6	7,961	19	6
Hatter's Terrace to Haupiri	1,650	0	0	1,650	0	0
Grey River to Moonlight	530	0	0	530	0	0
Blackball Track	1,185	12	5	1,185	12	5
Ahaura–Kopara Road	400	0	0	400	0	0
Mackley's to Waipuna Terrace	100	0	0	100	0	0
Footbridge over Blackball Creek	150	0	0	150	0	0
Waipapa to Waikawa	200	0	0	200	0	0
Waipapa to Six-mile	100	0	0	100	0	0
Drain at Adamson's	50	0	0	50	0	0
Maruia Track, between Reefton and Maruia	50	0	0	50	0	0
Sledge-track to Langdon Reefs	30	0	0	30	0	0
Track to Blackball Township, repairs	40	0	0	40	0	0
Track, Old Man Range	50	0	0	50	0	0
Road to gold discovery near Blue Spur	45	0	0	45	0	0
Bartlett's Creek Track	200	0	0	200	0	0
Prospecting-track, Brunnerton to Paparoa	125	0	0	125	0	0
Extension Seddon's Terrace Track to new claim	208	10	6	208	10	6
West Tokatea Road	50	0	0	50	0	0
Waitaia Battery Road	150	0	0	150	0	0
Preece's Point Road	150	0	0	150	0	0
Tokatea–Kennedy Bay Road	100	0	0	100	0	0
Main Cabbage Bay Road	50	0	0	50	0	0
Hooker's to Mercury Bay	100	0	0	100	0	0
Opeto Road	100	0	0	100	0	0
Blagrove's Road	400	0	0	400	0	0
Cemetery–Cabbage Bay Road	100	0	0	100	0	0
Rails for Coromandel Wharf	31	5	0	31	5	0
Culverts, Tiki Road	100	0	0	100	0	0
Soldier's Creek Road	198	5	0	198	5	0
Road to Barrytown	300	0	0	300	0	0
Tracks to western sounds	7,307	17	11	7,307	17	11
Road to R. Kelly's claim, Gentle Annie Creek	100	0	0	100	0	0
Waitekauri to New Find	250	0	0	250	0	0
Paeroa Mill Road	50	0	0	50	0	0
Owharoa to Waitawheta	50	0	0	50	0	0
Deviation Road, Earl's Hill	200	0	0	200	0	0
Waihi to Katikati	75	0	0	75	0	0
Bridge over Slate River	50	0	0	50	0	0
Pack-track to Glover's Flat, Lower Anatoki	50	0	0	50	0	0
Clearing Karaka Creek of flood-damage	50	0	0	50	0	0
Track up right-hand branch of Cullen's Creek	25	0	0	25	0	0
Footbridge, Waimangaroa River	50	0	0	50	0	0
Track up Calary Branch, Waiho River	70	0	0	70	0	0

LIST of WORKS on GOLDFIELDS, &c.—*continued.*

Locality and Nature of Works.	Total Cost.			Amount of Contribution paid by Mines Department.		
WORKS WHOLLY CONSTRUCTED BY MINES DEPARTMENT—*continued.*	£	s.	d.	£	s.	d.
Converting Wilson's Lead Track, Addison's, into a dray-road	400	0	0	400	0	0
Cabbage Bay to mines	400	0	0	400	0	0
Coromandel to Kuaotunu	2,070	0	0	2,070	0	0
Manaia to mines	100	0	0	100	0	0
Whitianga to Mahakirau	300	0	0	300	0	0
Whangapoua Mill Road	100	0	0	100	0	0
Kuaotunu Bridge	200	0	0	200	0	0
Granity Creek to Ngakawau	100	0	0	100	0	0
Crow Diggings Track	527	8	2	527	8	2
Road to diggings, Cape Foulwind	100	0	0	100	0	0
Ngahere to Blackball	600	0	0	600	0	0
Fencing land, Blackball Road	110	0	0	110	0	0
Prospecting-track, Greek's Gully to Kanieri Forks	150	0	0	150	0	0
Repairing Jones's Creek and Donohue's Storm-channels	100	0	0	100	0	0
Deviation, Pleasant Creek Track	130	0	0	130	0	0
Road-works at Ohaeawai	500	0	0	500	0	0
Mahakirau Creek Road	200	0	0	200	0	0
Puriri to mines	100	0	0	100	0	0
Katikati–Waihi Road	150	0	0	150	0	0
Pack-track from Kerikeri	50	0	0	50	0	0
Track to Waitakohe Goldfield	50	0	0	50	0	0
Repairing bridges to mines, Te Puke	250	0	0	250	0	0
Helena Bay to Whakapara Railway-station	100	0	0	100	0	0
Gordon Settlement to Waharoa	600	0	0	600	0	0
Waiorongomai Road	300	0	0	300	0	0
Approach to railway-bridge, Te Aroha	150	0	0	150	0	0
Upper Waitekauri Bridge	250	0	0	250	0	0
Junction Waihi Road to New Find, Waitekauri	328	8	0	328	8	0
Repairing bridges, Doctor's and Staunton's Creeks	200	0	0	200	0	0
Four-mile Bridge	100	0	0	100	0	0
Fox's Bridge	100	0	0	100	0	0
Fairdown–Waimangaroa	200	0	0	200	0	0
Charleston–Nine-mile Beach	200	0	0	200	0	0
Road, Promised Land–Karamea	550	0	0	550	0	0
Karamea Bridge and approaches	3,565	19	8	3,565	19	8
Approaches, Matakitaki Bridge	279	15	0	279	15	0
Snowy Creek Bridge	300	0	0	300	0	0
Big River Road	4,571	0	0	4,571	0	0
Footbridge across by-wash, Ngahere–Blackball Ferry	210	0	0	210	0	0
Track to Healey's Gully	90	0	0	90	0	0
Track, Lancashire Flat to head of Clearwater Creek	50	0	0	50	0	0
Granville Road	100	0	0	100	0	0
Footbridges, Blackwater and Greenstone	300	0	0	300	0	0
Brown's Terrace to Arnold	200	0	0	200	0	0
Protective works, main Grey Bridge	191	0	0	191	0	0
Extension, Tucker's Flat Road	103	2	6	103	2	6
Butcher's Creek Bridge, Kanieri Lake Road	129	17	6	129	17	6
Kapitea Creek Bridge, Lamplough Track	118	0	0	118	0	0
Widening Milltown Track to Humphrey's Gully	600	0	0	600	0	0
Pack-track, Seddon's Terrace to Eel Creek	246	17	6	246	17	6
New bridge, Kapitea Creek, Loop-line Road	30	8	7	30	8	7
Stribbing's Creek Bridge	70	8	11	70	8	11
Widening Seddon's Terrace Road extension	199	0	0	199	0	0
Compensation, Larrikin's Road	56	0	0	56	0	0
Garston to Nevis	1,965	17	2	1,965	17	2
Nevis Valley Road	400	0	0	400	0	0
Okarito River Bridge	300	0	0	300	0	0
Drainage, Stafford Township	399	17	5	399	17	5
Wataroa Bluff Track	194	4	8	194	4	8
Wangapeka Track, Rolling River–Kiwi Creek	149	19	10	149	19	10
Tracks, Stewart Island	718	7	8	718	7	8
Widening Lake Mapourika–Waiho Road	782	6	8	782	6	8
Roads, Great Barrier	604	4	2	604	4	2
Riversdale–Waikaia	200	0	0	200	0	0
Prospecting-track, Lyell–Larry's	100	0	0	100	0	0
Track to New Find, Victoria Range	500	0	0	500	0	0
Extending road into bush, Addison's	100	0	0	100	0	0
Clearing rocks and easing curves, Nine- and Ten-mile Bluffs	129	6	11	129	6	11
Repairs flood-damages, South Westland	100	0	0	100	0	0
Hungerford's Bridge	444	11	5	444	11	5
Waitangi Bluff Track	99	18	9	99	18	9
Track from Cedar Creek Road to Ford and Thompson's claim	20	0	0	20	0	0
Repairs Mount Greenland Track	50	0	0	50	0	0
Ross Road, towards Ranges	199	12	6	199	12	6
Repairs pack-track, Cedar Creek	100	0	0	100	0	0
Kinsella's land, taken for Blackball Road	5	11	0	5	11	0
Maratoto to mines	149	5	6	149	5	6
Hatter's Terrace–Haupiri	200	0	0	200	0	0
Upper Waiotahi Road	492	10	0	492	10	0
Inland from Omahu	400	0	0	400	0	0
Gannon's to Painkiller	196	10	6	196	10	6
Netherton Road	28	14	6	28	14	6
Repairs, Tapu Creek Road	66	0	0	66	0	0
Repairs, Karaka Creek Road	40	0	0	40	0	0

LIST OF WORKS ON GOLDFIELDS—*continued.*

Locality and Nature of Works.	Total Cost.			Amount of Contribution paid by Mines Department.		
WORKS WHOLLY CONSTRUCTED BY MINES DEPARTMENT—*continued.*	£	s.	d.	£	s.	d.
Gravelling road through Mr. Adams's property	100	0	0	100	0	0
Gravelling Onamalutu Track	100	0	0	100	0	0
Road to Fenian Creek, Karamea	250	0	0	250	0	0
Westport and Mokihinui Railway-line to Jones's Creek	100	0	0	100	0	0
Footbridge, Notown Creek	50	0	0	50	0	0
Wood's Creek Bridge	80	0	0	80	0	0
Maori Creek Bridge	50	0	0	50	0	0
Main South Road to Mikonui Beach	15	15	0	15	15	0
River-protection works, Te Aroha	200	0	0	200	0	0
Waitekauri–Wharekiraupunga	98	8	6	98	8	6
Komata Reefs–Waitekauri	200	0	0	200	0	0
Drains, Maratoto	100	0	0	100	0	0
Repairs, Mata Bridge	300	0	0	300	0	0
Roads, Tauranga County	1,226	17	5	1,226	17	5
Re-metalling Wakamarina Road	500	0	0	500	0	0
Pakawau Bush Road	425	0	0	425	0	0
Scott's Creek Bridge	170	0	0	170	0	0
Repairs, Motueka Bridge	250	0	0	250	0	0
Richmond–Collingwood	250	0	0	250	0	0
Millerton Road	300	0	0	300	0	0
Deadman's Creek–Christmas Terrace	250	0	0	250	0	0
Denniston–Cascade Creek	100	0	0	100	0	0
Road, Bradshaw's Lead	100	0	0	100	0	0
Big Totara River Bridge	450	0	0	450	0	0
Little Totara River Bridge	350	0	0	350	0	0
Twins Road	100	0	0	100	0	0
Track up Four-mile and Nile Rivers	250	0	0	250	0	0
Road, Hampden Cemetery to schoolhouse, Murchison	300	0	0	300	0	0
Culverts, Devil's Creek	100	0	0	100	0	0
Moonlight–Paparoa	100	0	0	100	0	0
Footbridges, Cobden–Seven-mile Road	342	10	0	342	10	0
Grey River–Moonlight	500	0	0	500	0	0
Bridges over Raleigh Creek (3)	300	0	0	300	0	0
Bridge, Brandy Jack's Creek	150	0	0	150	0	0
Track up Ten-mile Creek	100	0	0	100	0	0
Road, Cobden to Warren's and Ten-mile Bluff to Barrytown	500	0	0	500	0	0
Cape Terrace Road continuation	150	0	0	150	0	0
Lake Brunner Road to Maori Creek	150	0	0	150	0	0
Hampden to Horse Terrace	3,450	18	6	3,450	18	6
Track to Adamstown	375	4	0	375	4	0
Brunnerton–Paparoa	50	0	0	50	0	0
Waikupakupa Ocean Beach to Main Road	100	8	0	100	8	0
Totara River to Farmer's Creek	194	13	0	194	13	0
Doughboy Road	300	0	0	300	0	0
Widening and repairing Lamplough Track	145	15	0	145	15	0
Extension, Gillam's Gully Track	100	0	0	100	0	0
Adair's Track, Mahinapua Road	150	0	0	150	0	0
Callery Track and Bridge	200	0	0	200	0	0
Mahinapua and South Terrace Track	250	0	0	250	0	0
Veronica Creek Track	200	0	0	200	0	0
Waipori–Berwick Road	1,976	18	9	1,976	18	9
Roxburgh-Clyde	500	0	0	500	0	0
Orepuki–Block I., Longwood	500	0	0	500	0	0
Tableland horse-track	199	9	3	199	9	3
Landing Creek Bridge	289	16	6	289	16	6
Walker's Creek Bridge	214	12	2	214	12	2
Greenstone–Teremakau	240	0	3	240	0	3
Bell Hill Road	199	9	4	199	9	4
Bridge over Kanieri River	94	5	0	94	5	0
Main South Road to Mikonui Beach	84	15	0	84	15	0
Great South Road	12,896	15	0	12,896	15	0
Deviation, Larrikin's Road	1,375	4	2	1,375	4	2
Pine-tree Road	45	10	7	45	10	7
Wire Bridge, German Gully Track	89	19	6	89	19	6
Road-formation, Waitekauri to Cross Road	271	11	11	271	11	11
Contingencies	847	14	1	847	14	1
	211,262	8	5	211,262	8	5
ROADS TO OPEN UP MINES OTHER THAN GOLD.						
Aniseed Valley to Champion Copper-mine	4,963	10	6	4,116	10	6
Richmond Hill to copper-mine	315	16	0	209	4	0
Track, Ohinemuri Coal-seam	267	3	4	133	11	8
Road, Kanieri Coalfield	600	0	0	300	0	0
	6,146	9	10	4,759	6	2
TRACKS TO OPEN UP MINERAL LANDS.						
Glory Harbour to Kopack	50	0	0	50	0	0
Port Pegasus Track	155	7	6	155	7	6
Removing snags and felling timber, Mokau River	40	0	0	40	0	0
Ngakawau Footbridge	80	0	7	80	0	7
	325	8	1	325	8	1

LIST OF WORKS ON GOLDFIELDS—*continued.*

Locality and Nature of Works.	Total Cost.	Amount of Contribution paid by Mines Department.
REPAIRING FLOOD-DAMAGES.	£ s. d.	£ s. d.
Thames Borough	500 0 0	500 0 0
ARTESIAN-WELL BORING.		
Maniototo Plains	800 0 0	800 0 0
PROSPECTING DEEP LEVELS.		
Thames-Hauraki Goldfields (Limited), Queen of Beauty shaft	50,500 0 0	25,000 0 0
Thames-Hauraki Goldfields (Limited), Queen of Beauty shaft, inspector's fee ..	500 0 0	500 0 0
	51,000 0 0	25,500 0 0
RESUMPTION OF LAND FOR MINING.		
Resumption of J. Holmes's land at Kumara for a tailings-site	300 0 0	300 0 0

Summary of Works.

	£ s. d.	£ s. d.
Roads (subsidised)—		
Bay of Islands County	2,092 0 0	1,351 0 0
Coromandel County	18,346 3 9	11,050 15 10
Te Aroha Town Board	334 0 0	167 0 0
Thames County	13,184 15 11	7,546 17 5
Thames Borough	2,255 19 2	1,388 0 0
Ohinemuri County	7,357 17 9	3,863 19 1
Piako County	20,944 2 3	13,879 6 10
Katikati Road Board	468 0 0	234 0 0
Hutt County	959 16 6	435 17 0
Marlborough County	1,715 4 0	933 18 8
Waimea County	520 0 0	260 0 0
Cqllingwood County	2,431 1 8	1,294 9 10
Buller County	9,688 1 4	5,489 3 4
Inangahua County	17,252 14 8	10,380 17 10
Grey County	18,919 4 0	11,676 8 2
Westland County	10,558 15 6	6,596 6 1
Taieri County	499 15 0	333 3 4
Lake County	2,651 6 1	1,532 14 6
Tuapeka County	13,895 7 8	8,203 7 2
Wallace County	1,309 6 0	662 19 8
Maniototo County	518 10 0	332 0 0
Vincent County	1,532 0 0	850 0 0
Fiord County	300 0 0	200 0 0
Waitaki County	41 12 0	20 16 0
Southland County	2,355 0 0	1,426 7 4
	150,130 13 3	90,109 8 1
Diamond and other drills	5,170 11 4	3,428 11 4
Wharves	435 15 9	285 15 9
Aids to prospecting	65,306 8 8	22,414 2 4
Water-races	32,452 17 8	29,567 5 4
Drainage- and tailings-channels	23,529 5 0	18,505 0 0
Aid towards treatment of ores	1,342 8 9	742 8 9
Roads wholly constructed by Mines Department	211,262 8 5	211,262 8 5
Roads to open up mines other than gold	6,146 9 10	4,759 6 2
Tracks to open up mineral lands	325 8 1	325 8 1
Repairing flood-damages	500 0 0	500 0 0
Artesian-well boring, Maniototo Plains	800 0 0	800 0 0
Resumption of land for mining	300 0 0	300 0 0
Aid towards construction of telephone-lines	60 0 0	50 0 0
Prospecting deep levels	51,000 0 0	25,500 0 0
	548,762 6 9	408,549 14 9

RETURN showing the VALUE of the SALES of WATER, and EXPENDITURE on, and COLLATERAL ADVANTAGES derived from, the Working of the WATER-RACES constructed and maintained by GOVERNMENT during the Year ending 31st March, 1899.

Name of Water-race.	Value of Sales of Water and Channel-fees.	Expenditure on Maintenance.	Profit or Loss.	Cost of Construction.	Total Cost of Construction.	Percentage on Capital invested.	Average Number of Men employed.	Approximate Amount of Gold obtained.	Value of Gold obtained.	Average Weekly Earnings of Men after deducting Value of Sales of Water and Channel-fees.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.			Oz.	£ s. d.	£ s. d.
Waimea	694 16 1	841 18 2	147 2 1*	138,631 11 1	205,140 6 9	..	42·75	2,122	8,275 16 0	3 8 0
Kumara	2,711 14 5	2,174 3 11	537 10 6	44,543 17 6		..	70·66	4,671	18,216 18 0	4 8 0
Kumara Sludge-channel	..	..	..	21,964 18 2		..	..	..	..	..
Nelson Creek	..	..	..	..	90,722 10 8	..	..	..	..	..
Argyle	..	..	..	..	15,151 15 3	..	..	..	..	..
Mikonui	..	..	..	..	25,927 4 6	..	..	..	..	..
Mount Ida	1,496 9 0	1,231 14 0	264 15 0	69,756 9 6	69,756 9 6	..	48·42	2,895	11,145 5 0	3 13 5
Blackstone Hill	129 10 0	2 14 0	126 16 0			..	9	140	539 0 0	0 17 6
Callaghan's	191 12 6	163 12 6	28 0 0	6,027 15 6	..	..	10	491	1,914 18 0	3 6 0
Totals	5,224 2 0	4,414 2 7	809 19 5	280,924 11 9	406,698 6 8	..	..	10,319	40,091 17 0	..

* Loss on working.

GEORGE WILSON, Inspecting Engineer.

COROMANDEL SCHOOL OF MINES.—SUPPLEMENTARY REPORT.

J. MALCOLM MACLAREN, B.Sc., Director, to the UNDER-SECRETARY for MINES, Wellington.

SIR,— Coromandel, 7th June, 1899.

I have to report as follows on the work and progress of the Coromandel School of Mines during the year ending 31st March, 1899:—

The lectures continue to be well attended, and the interest in the school is being well sustained. The attendance, however, has fallen off owing to the present slackness in mining on this field, our decrease in students representing those who have left the district to seek for work elsewhere.

The following table shows the attendances for the past year:—

Name of Subject.	1898.		1899.
	Second Term.	Third Term.	First Term.
Registered Students.			
Mining	22	13	12
Mine- and land-surveying	21	16	12
Mathematics	16	5	11
Metallurgy	18	17	...
Practical chemistry	13	8	8
Theoretical chemistry	14	12	9
Assaying	17	14	12
Mechanical drawing	6	4	5
Geology	9	11	7
Mineralogy	10	7	7
Total	146	107	83
Individual students	51	41	33

No Saturday science classes for school-children are held.

Syllabus.—The syllabus of instruction is precisely similar to that of the Thames School of Mines.

Mining and Geological Excursion.—The first extended trip for the current year was carried out during Easter week, 1899. Accompanied by ten students, I visited the principal goldfields of the Peninsula, thus placing the students *en rapport* with the latest developments in metallurgy and mining. The tour extended over a week, and the following mines and localities were visited: Aroha Gold-mines—low-level tunnel and Mr. Hardy's Mill—Waiorongomai; Crown Mines, Woodstock, and Talisman Mills, Karangahake; Waihi Mill, Waikino; Waihi Mine and Mill, Waihi-Silverton Mill, Waihi; Waitekauri Company, Waitekauri; Messrs. A. and G. Price's foundry, Thames-Hauraki Mine and pumping plant, "Big Pump," and Moanataiari Mine and Mill, Thames,

In this connection I have to acknowledge the courtesy and kindness everywhere extended to the party, and more particularly to mention in this respect Messrs. E. H. Hardy, Waiorongomai; Hutchison, Karangahake; Fraser, Waikino; Morgan (School of Mines), Gilmour, and Dixon, Waihi; Fraser, Waitekauri; Greenslade, Park, and Dunlop, Thames, who so materially assisted to make the trip a complete success, both from an educational and from a social point of view.

Further geological excursions have also been held to the sedimentary rocks at Cabbage Bay, and to other points of geological and mining interest.

Geological lectures are now illustrated by the microscope, and also by the optical lantern, together with a series of some three hundred slides. A grinding-wheel for petrological purposes has also been purchased and set up.

In the surveying classes, work in the higher branches is now facilitated by the possession of a first-class Troughton and Simm's 6 in. transit theodolite.

In carrying out the work of the school, I am materially assisted by Mr. A. J. Litten, who takes charge of the class in mathematics, and also by the Rev. C. F. R. Harrison, who conducts the class in mechanical drawing. This latter class, however, is not so well attended as the importance of the subject warrants.

At the recent Industrial and Mining Exhibition held in Auckland the Coromandel School of Mines was well represented by an exhibit of minerals, &c., from the Coromandel County. This exhibit secured a first award and gold medal, and may lay claim to having been the best of its kind in the court.

During the year a considerable number of assays and analyses have been made for the public, including ordinary assays for gold and silver, assays of bullion, analyses of milks, waters, rocks, poisons, &c.

Strenuous efforts are being now made by the Council of the school to attach an experimental crushing plant to the school, and in the interests of the students, and of the district generally, it is to be hoped that their efforts will be crowned with success.

Two students from the school were to sit at the annual mine-managers' examinations held in January last, but, owing to the non-receipt of due notice of place of examination, were

unable to attend. As, however, examinations for mine-managers and battery-superintendents are in future to be held in Coromandel, candidates will be put to much less inconvenience and expense than in the past.

The result of the annual school examinations held in December last was very encouraging, considering that all the candidates, with one exception, were first-year students. Mr. C. Fraser was a candidate for a School of Mines scholarship, but was unfortunately removed from the district, and out of reach of a School of Mines two months before the examination, a factor which must have militated considerably against his success in this respect.

The following table shows the results of these examinations:—

Subject of Examination.	First Class.	Second Class.	Third Class.	Failed.	Total.
Practical chemistry (senior)	2	...	...	...	2
Theoretical chemistry (senior)	2	...	...	...	2
Practical assaying (junior)	...	2	...	...	2
Mineralogy	...	2	...	...	2
Geology (general and mining)	...	1	1	1	3
Metallurgy	1	...	...	1	2
Mining	1	1	2	...	4
Ventilation and explosives	1	1	1	1	4
Pumping and winding	1	...	1	1	3
Land- and mine-surveying	2	1	2	1	6
Mechanical drawing	...	1	...	...	1
Total	10	9	7	5	31

Mr. C. Fraser's average percentage for the scholarship was 79·2.

The Council for the current year is composed as follows: President, James McGowan, Esq., M.H.R. Vice-Presidents, Francis Hodge, Esq.; A. T. Kenrick, Esq. Council—Messrs. John Reilly, H. F. Shepherd, G. S. Clark, J. B. Rockliff, Andrew Jamieson, W. Moorcraft, T. W. Rhodes. Hon. Secretary, W. Thomas.

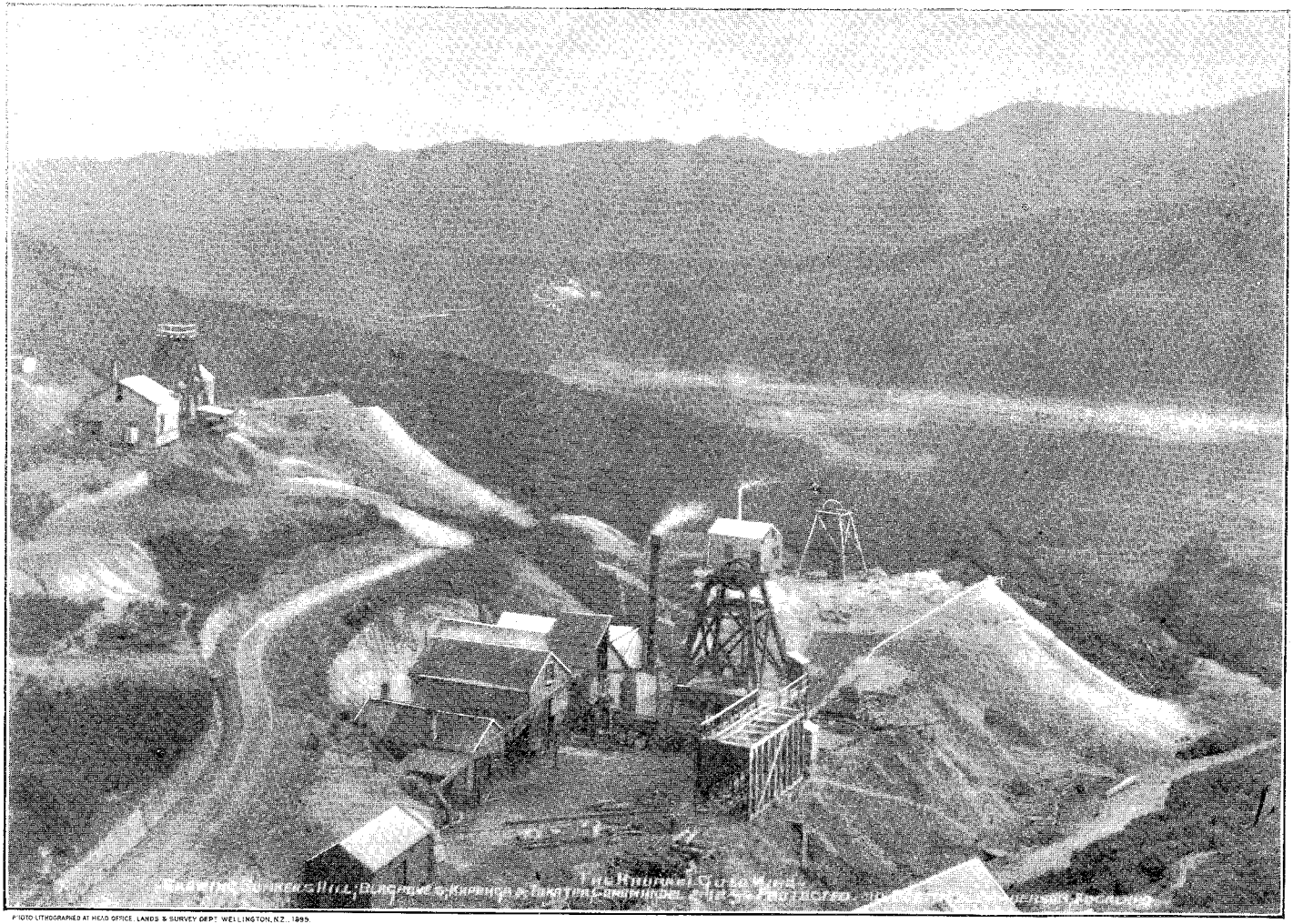
In conclusion, I have to tender my heartiest thanks to the Rev. C. F. R. Harrison and Mr. A. J. Litten for their valuable assistance in the mechanical-drawing and mathematics classes respectively; to Mr. T. Wrigley, laboratory assistant, who has so materially assisted in the determination of public assays and analyses; and finally to the Hon. Secretary and the members of the Council, who have always afforded me the greatest support and assistance in forwarding the interests of the school.

I have, &c.,

J. Malcom MacLaren, B.Sc., Director.

Approximate Cost of Paper.—Preparation, not given; printing (2,350 copies) £210 13s. 6d.

Price, 4s.] By Authority: John Mackay, Government Printer, Wellington.—1899.



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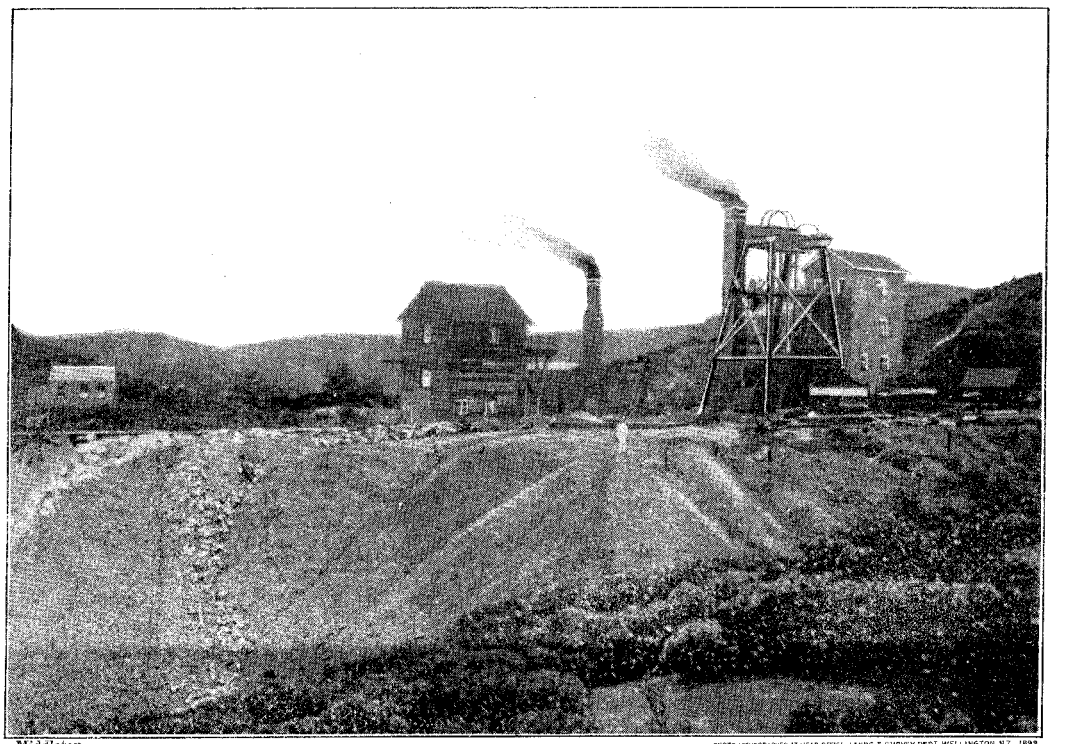
Hauraki Gold-mine,

Showing Bunker's Hill, Blagrove's, Kapanga, and Tokatea, Coromandel.



Middleton.

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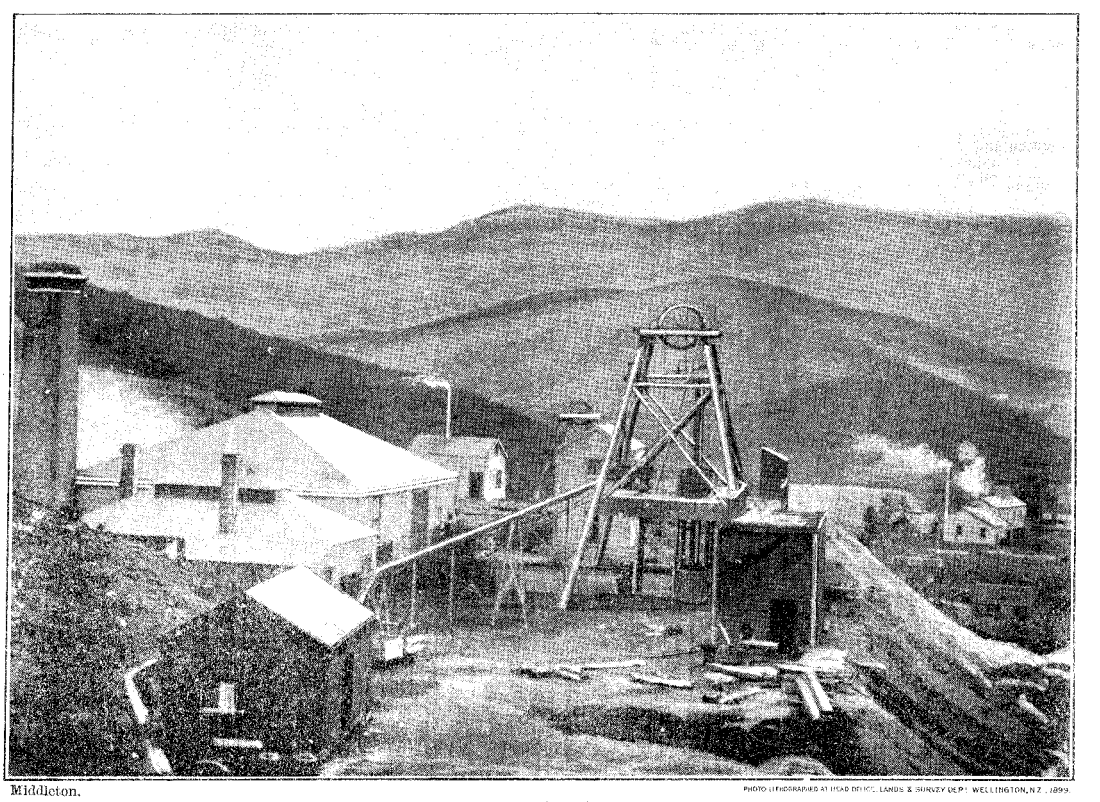
Kapanga Mine, Coromandel, August, 1898.



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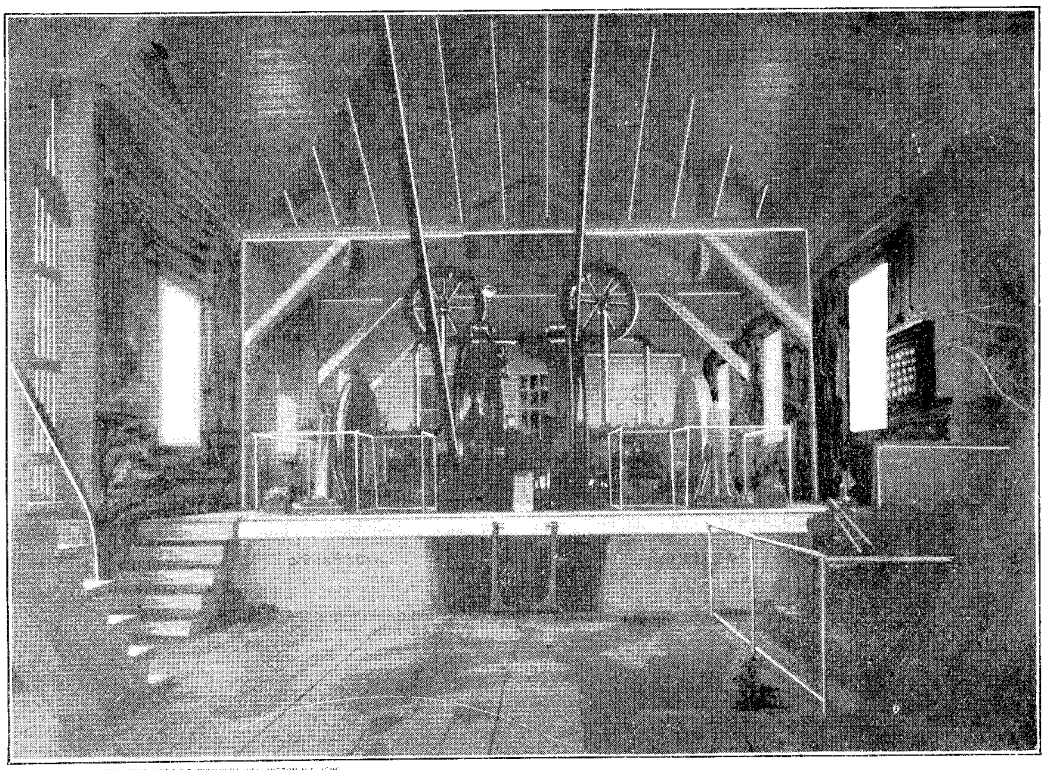
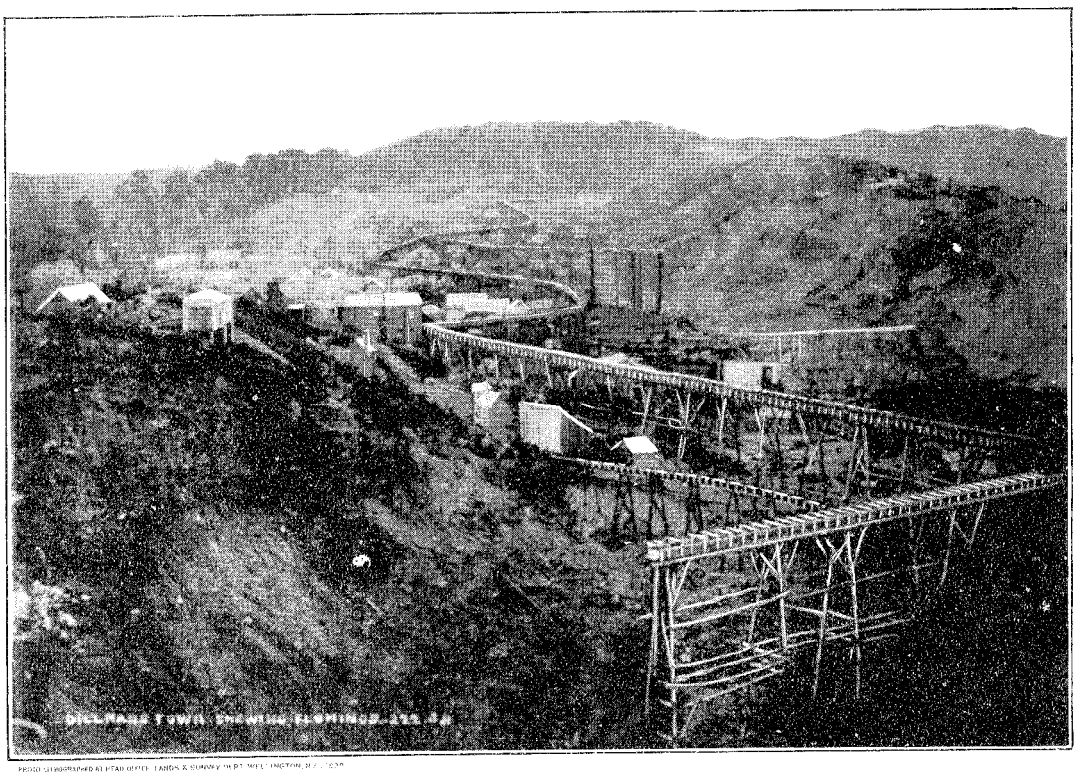
Hauraki Mine,

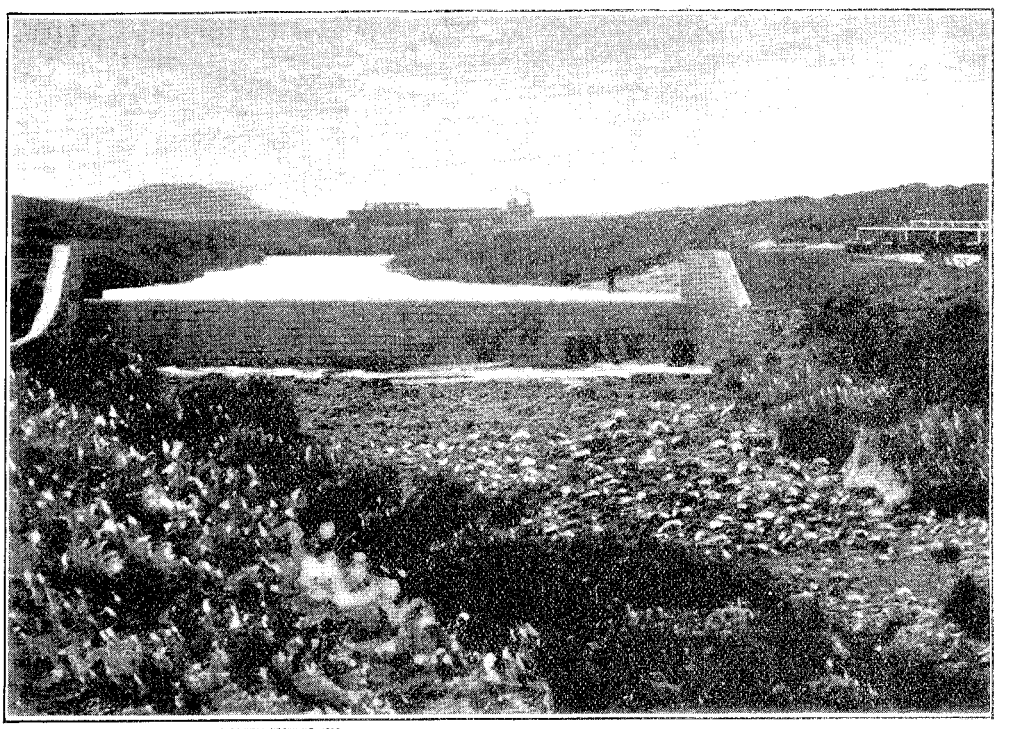
Showing Kathleen and Kathleen Crown, August, 1898.



Progress Mines—Interior of Engine-house.



Dillmanstown, showing Fluming, Kumara Water-race.



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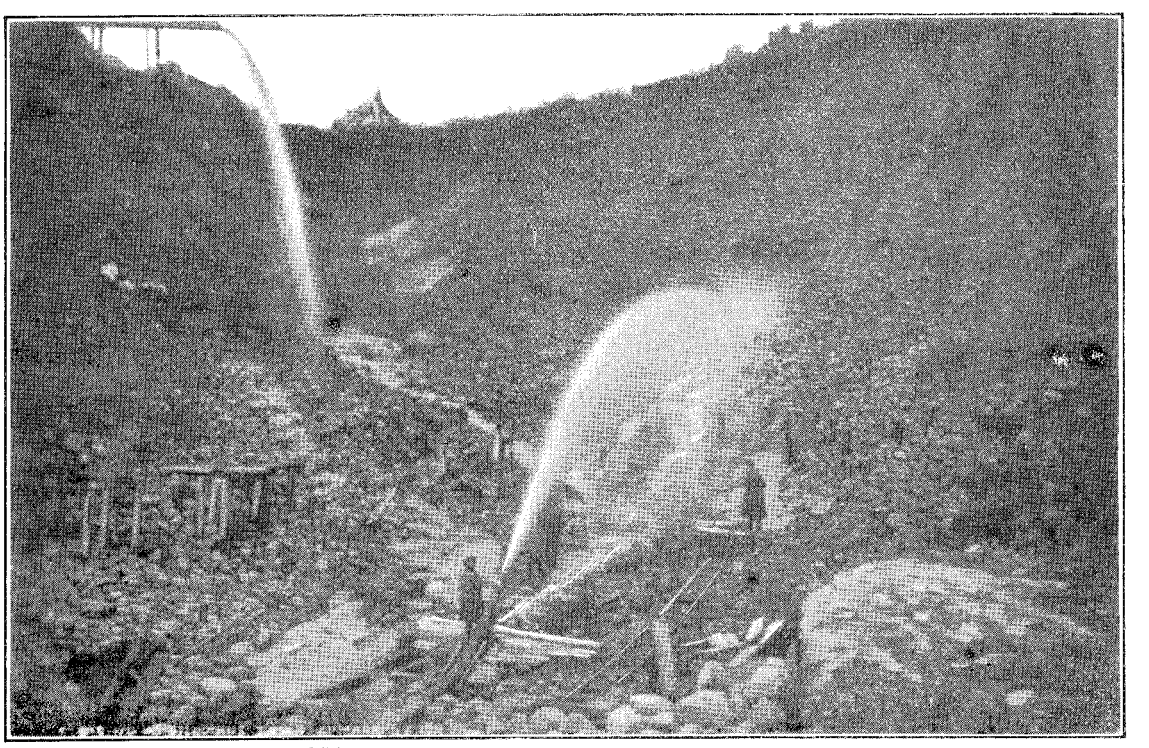
Waihi Gold-mining Company (Limited).

Masonry Dam, Ohinemuri River, at Intake of Low-pressure Race for Victoria Battery, Waikino.



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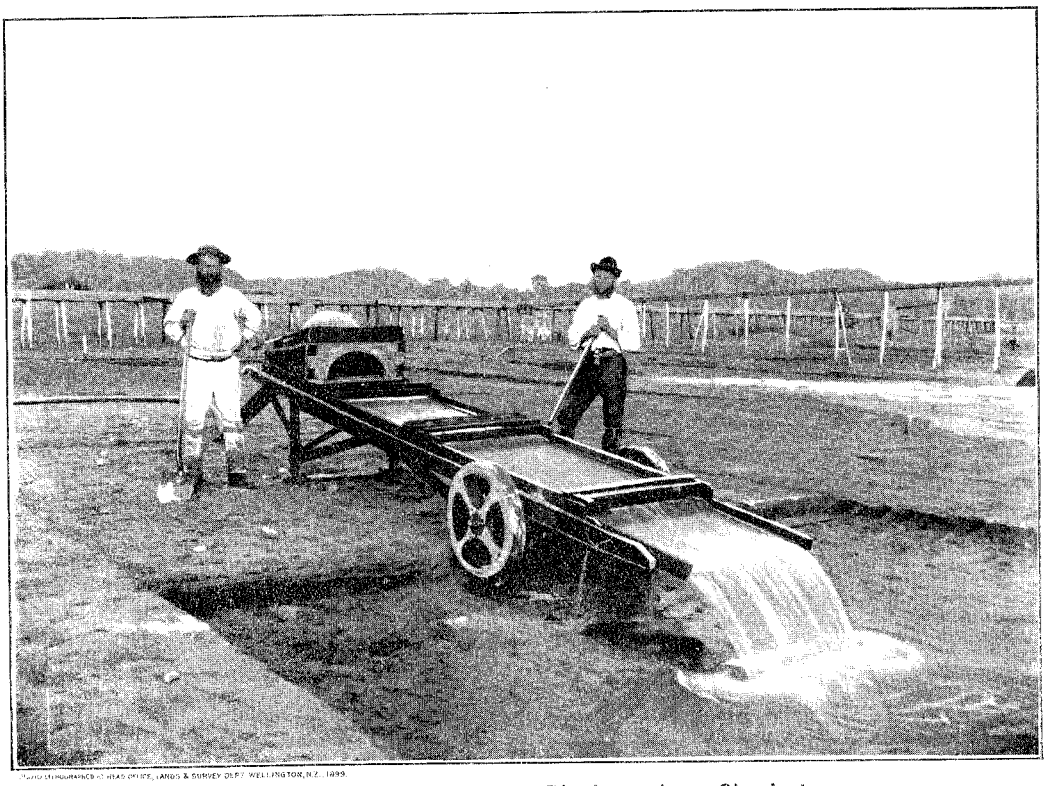
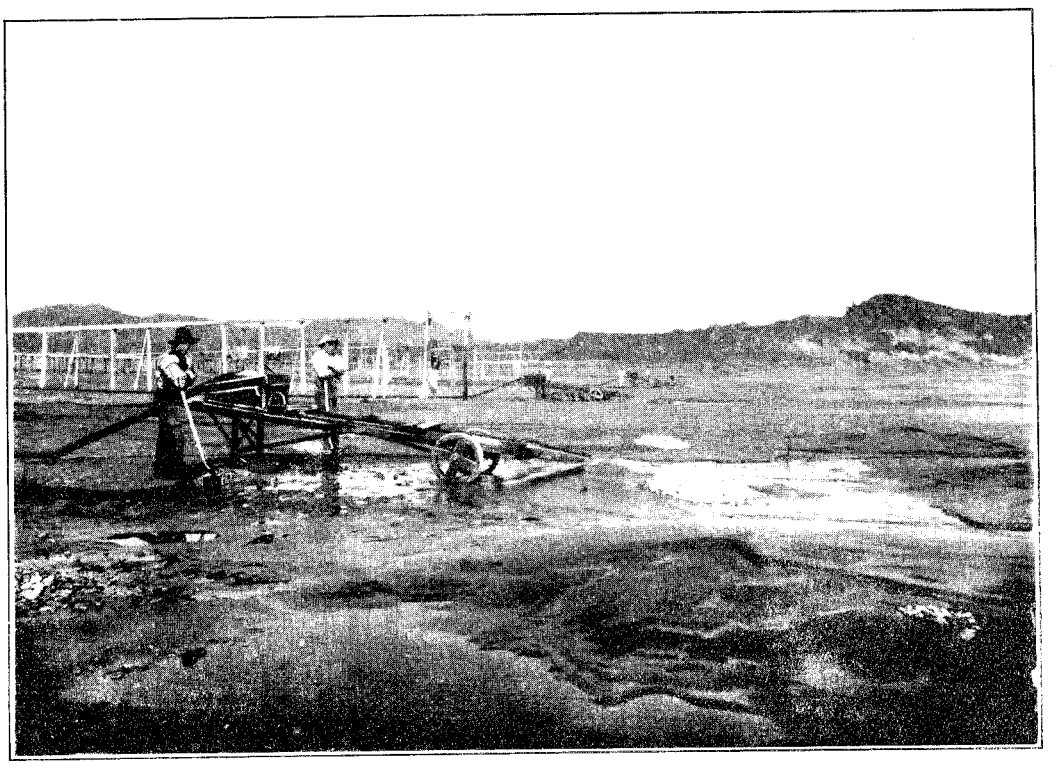
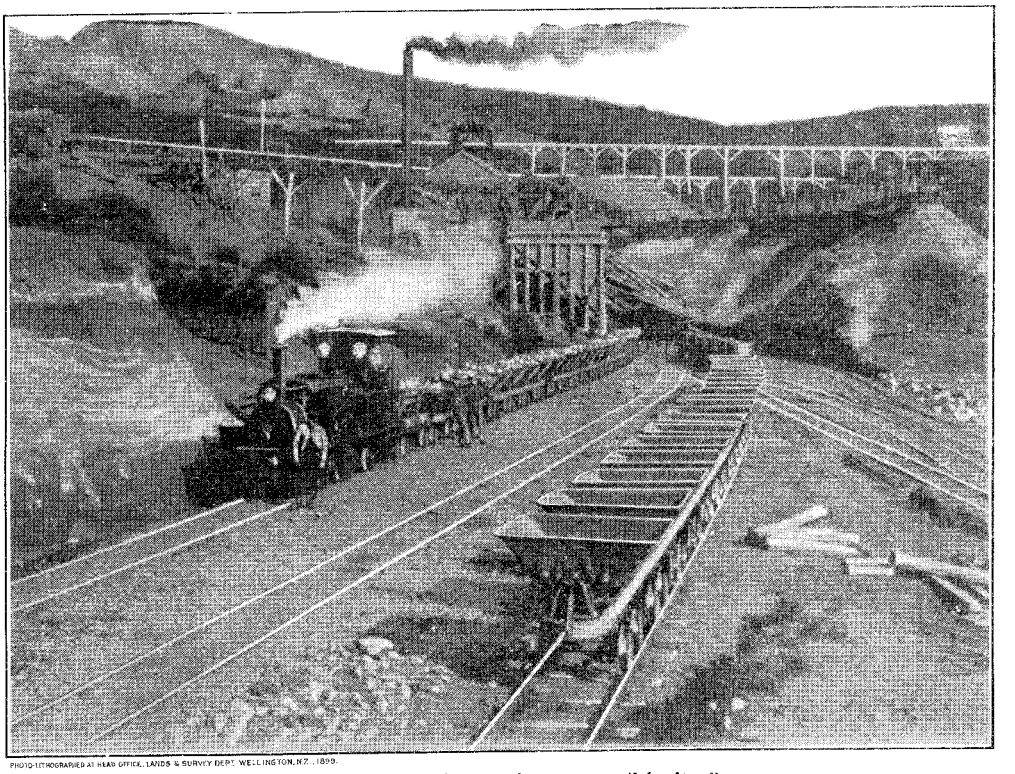
Sluicing at Dillmanstown, Kumara.



Typical Beach-combers, or Black-sanders, Charleston.



Beach-combers, Nine-mile Beach, Charleston, looking South.



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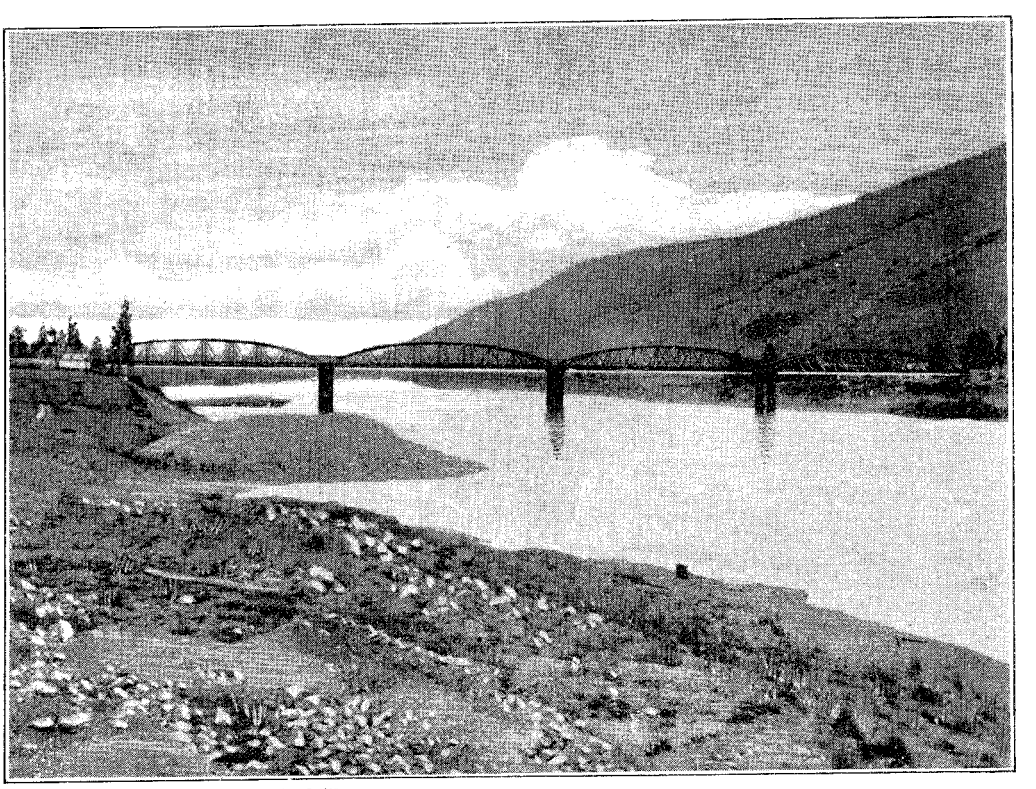
Waihi Gold-mining Company (Limited).

Siding on Railway (Waihi to Waikino), showing Hoppers at No. 1 Shaft.



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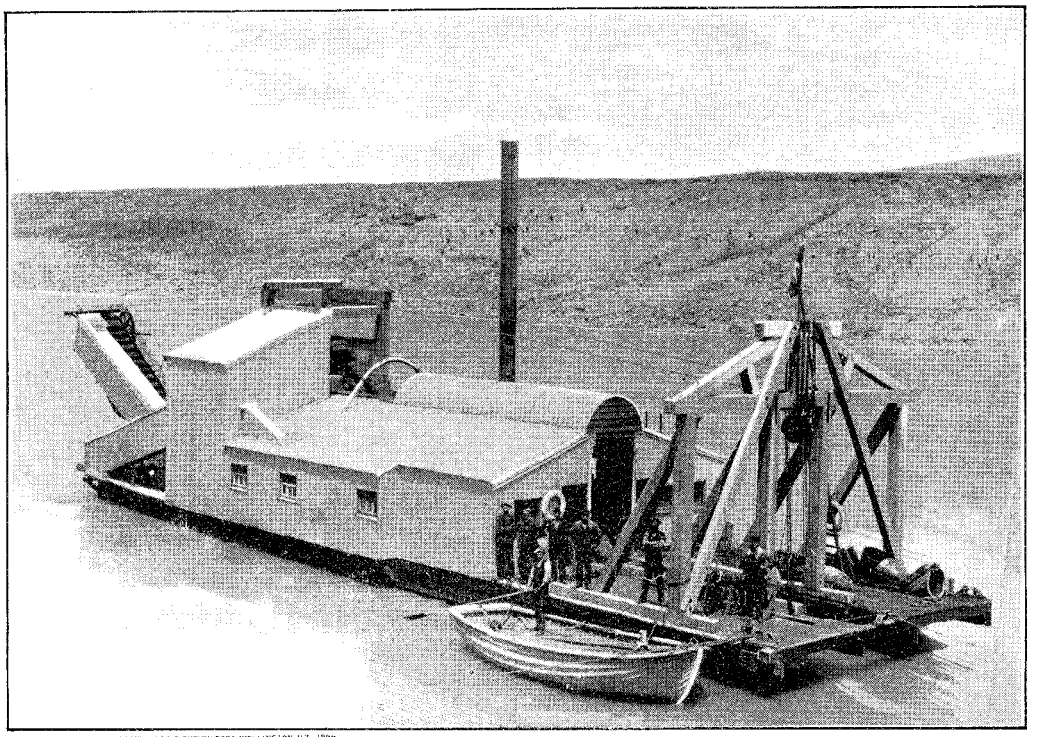
Bridge over Clutha River at Miller's Flat.



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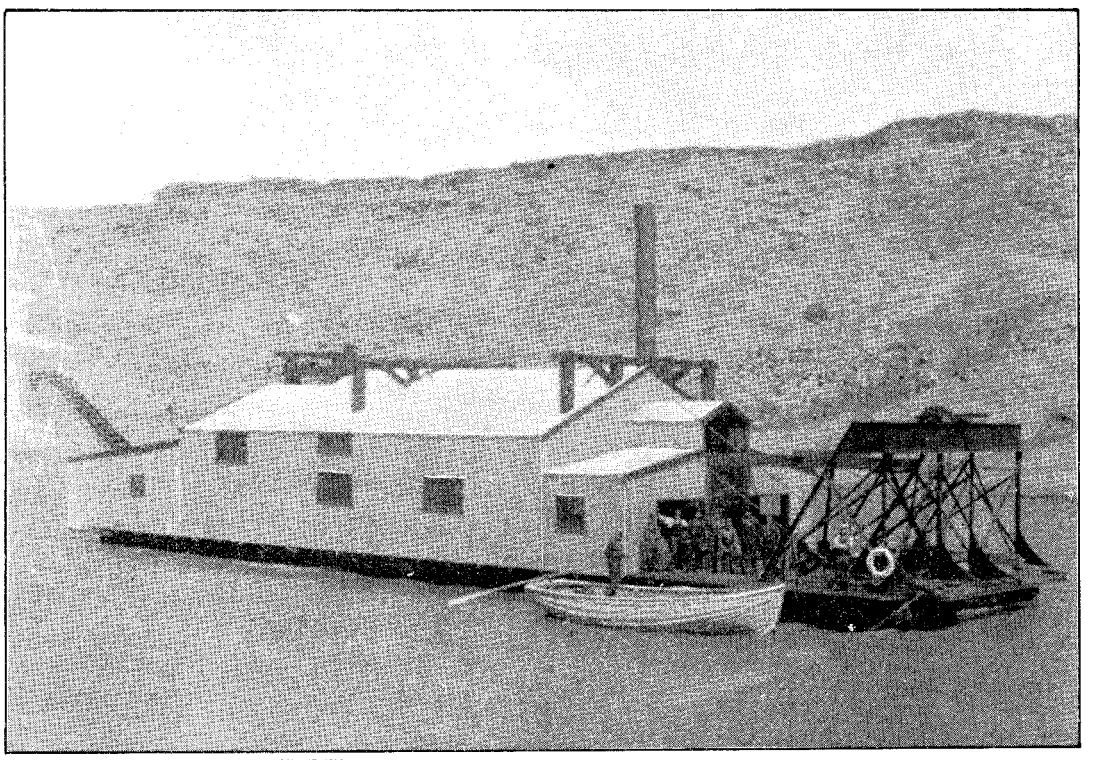
Unity Dredge, Clyde.



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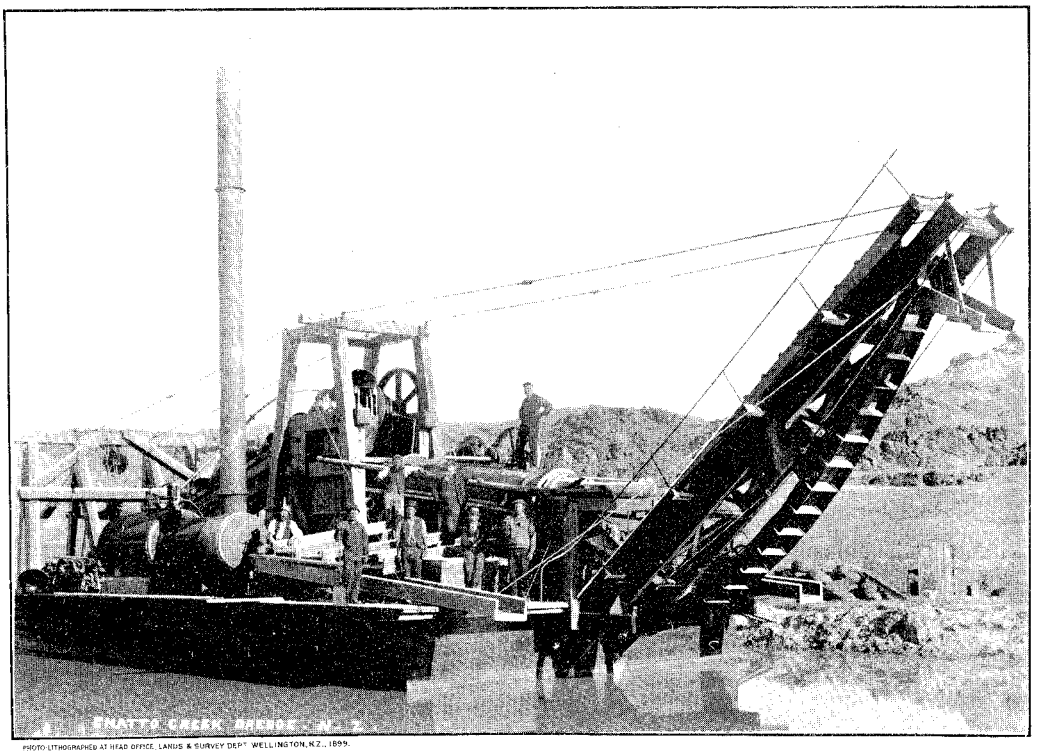
Lady Ranfurly (Electric No. 3) Dredge.



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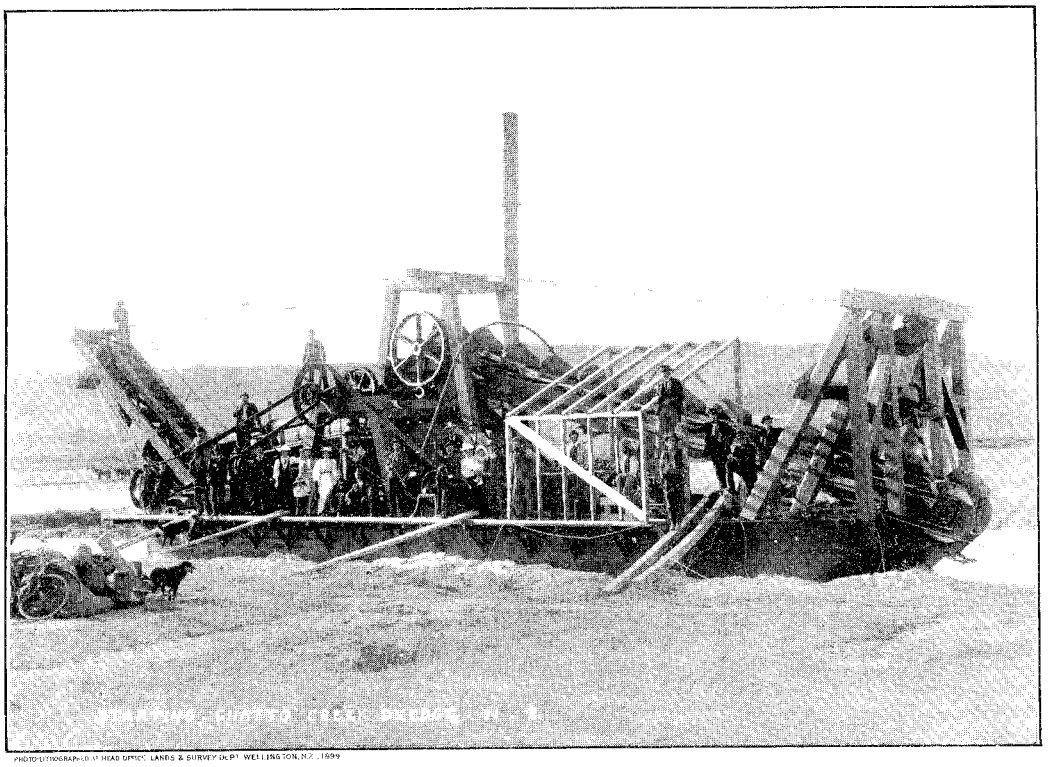
Chatto Creek Dredge.



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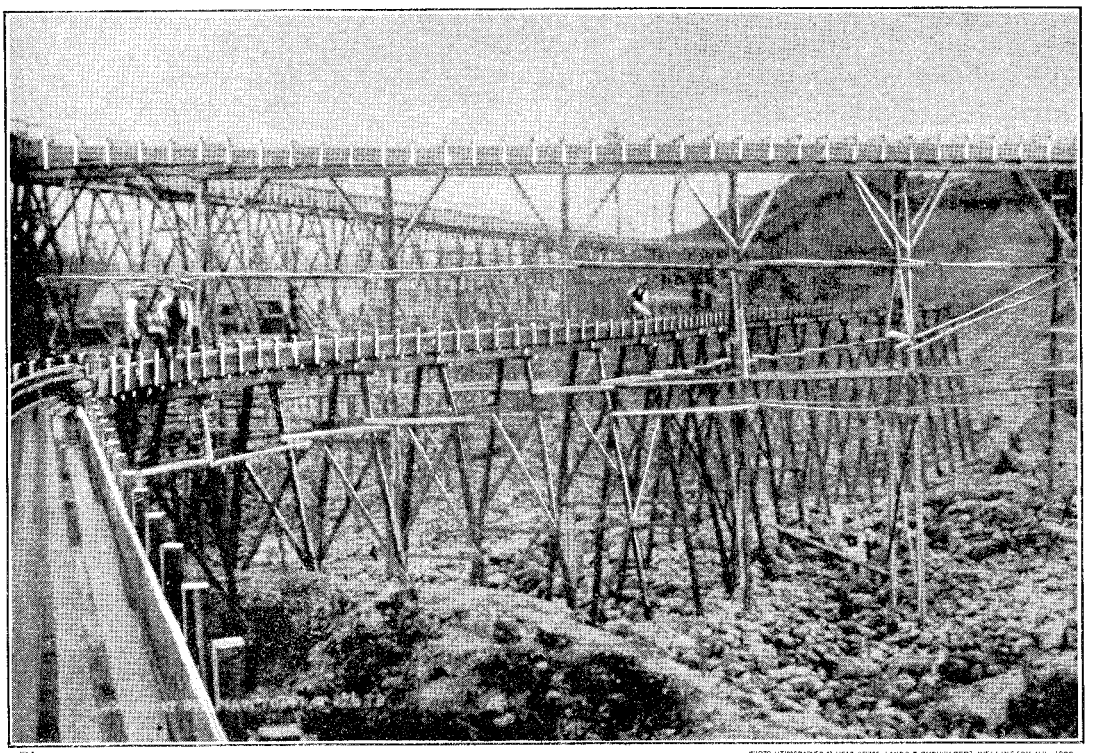
Starting Chatto Creek Dredge.



Ring.

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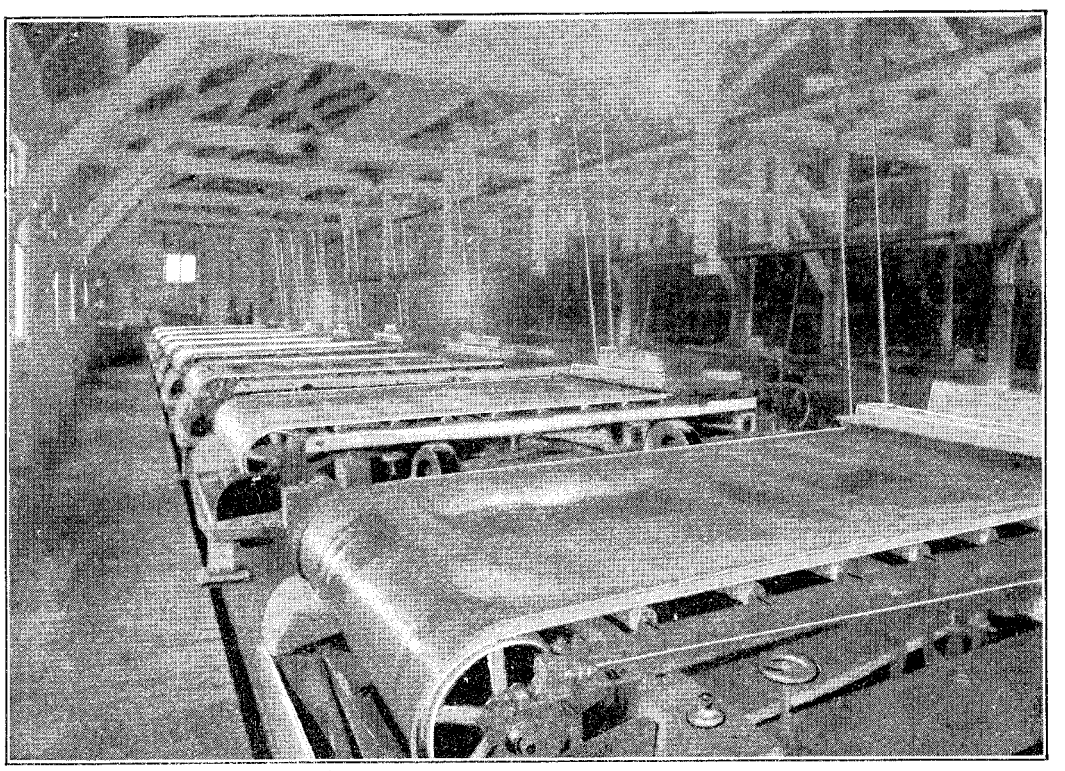
Fluming at Dillmanstown, Kumara Water-race.



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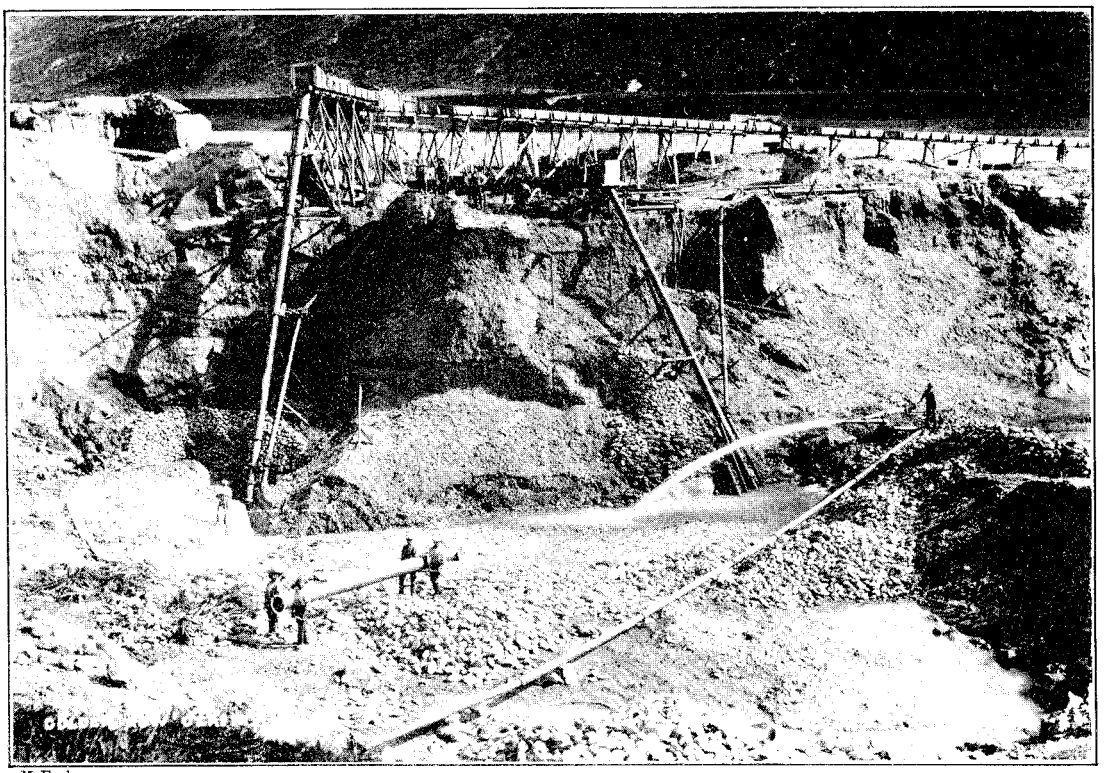
Progress Mines—Interior of Battery Vanner-room (Sixteen Tables).



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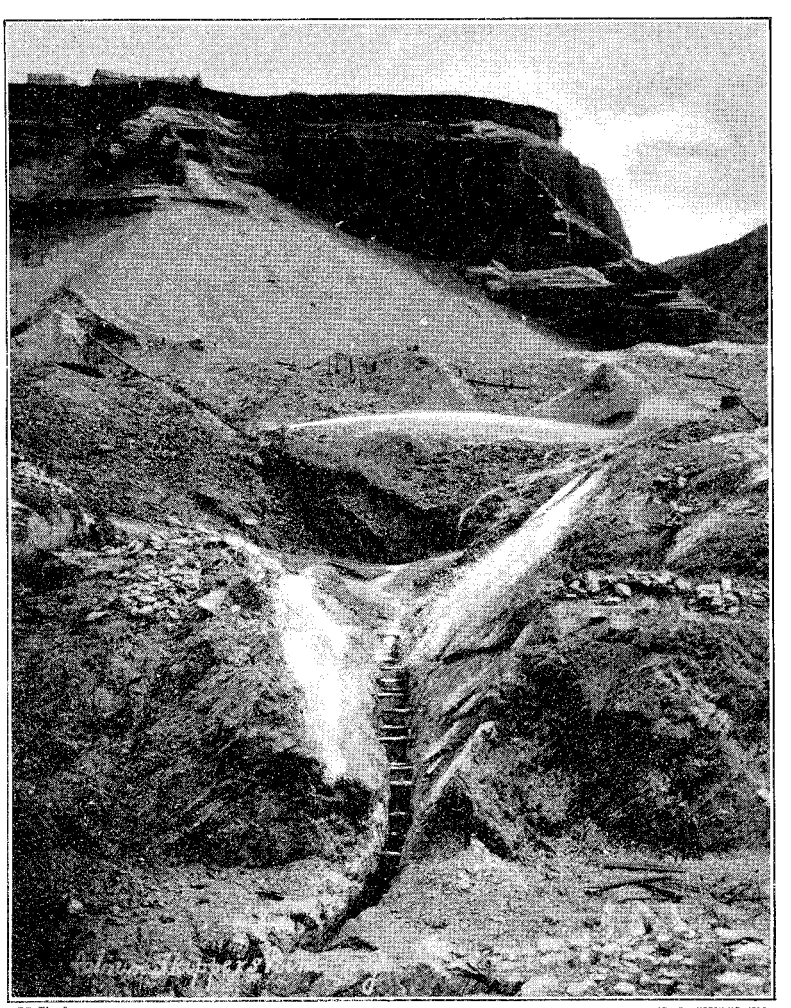
Golden Run Claim.



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Claim, Skipper's Point.