1903.

NEW ZEALAND.

INSPECTION OF COAL-MINES REPORT.

("THE COAL-MINES ACT, 1891.")

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

No. 1.

Mr. J. HAYES, F.S.Sc., Inspecting Engineer, to the UNDER-SECRETARY, Mines Department.

SIR,— Mines Department, Wellington, 11th May, 1903.

I have the honour to submit reports on the coal-mines of the colony for the year ending 31st December, 1902.

Output.

The following summary shows the output of the various classes of coal, &c., mined in each district:—

Class of Coal, &c.	Northern District.	West Coast District.	Southern District.	Total.
	Tons.	Tons.	Tons.	Tons.
Bituminous and semi-bituminous coal ...	92,761	752,285	...	845,046
Pitch-coal	...	...	25,245	25,245
Brown coal	99,284	1,531	326,357	427,172
Lignite	...	...	65,239	65,239
Oil-shale	...	...	2,338	2,338
Totals	192,045	753,816	419,179	1,365,040

Total number of mines at work, 180, only twenty-two of which employ more than twenty-one persons.

In comparison with the output of the previous year the foregoing summary shows a net total increase of 125,354 tons.

The subjoined statement shows the relative increase and decrease in the output of the various classes of coal, &c., in each inspection district:—

Class of Coal, &c.	Northern District.		West Coast District		Southern District.		Total Increase.	Total Decrease.	Total Net Increase
	Increase.	Decrease.	Increase.	Decrease.	Increase.	Decrease.			
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Bituminous and semi-bituminous coal	5,706	...	84,387	...	...	...	...	...	...
Pitch-coal ...	...	...	...	...	10,661	...	...	...	...
Brown coal ...	11,255	...	...	106	10,871	...	...	...	...
Lignite	...	...	...	...	12,290	...	...	...	...
Oil-shale	...	...	...	...	...	9,710	..	...	...
Totals ...	16,961	...	84,387	106	33,822	9,710	135,170	9,816	125,354

The approximate total quantity of coal, &c., raised from the several mines throughout the colony up to the 31st December, 1902, is 17,157,596 tons.

The number of persons ordinarily employed is returned at 803 above ground and 2,082 below ground, making a total of 2,885; but it is to be remembered that many of the men included as working above ground are engaged in actually getting coal or lignite at opencast pits or quarries, of

which there are a large number in the Southern District, many being of very small extent, and supplying fuel for private use or a limited community. The total number of persons ordinarily employed shows an increase of 131 as compared with the returns of the previous year.

In computing the average output per person employed, a further increase is noticeable — viz., 473·15 tons per person, as compared with 450·1 tons in 1902. No doubt the steady work which has been noticeable throughout the colony, together with the features referred to in last year's annual report—viz., the extensive use of coal-cutting machinery by the Westport Coal Company (Limited) and the amount of open quarry-work at lignite-pits—is responsible for the increased rate of production in comparison with the numbers of persons employed.

Accidents.

Only two accidents have occurred during the year which have been attended with fatal results. In one instance a youth was caught between two loaded tubs and received injuries from which he died two days later, and in the other case a young man was struck on the knee by a tub in motion. As the result of this apparently simple accident the injured person died three months and a half later.

The ratio of fatalities during the year is one for every 1,442·5 persons employed and 682,520 tons raised.

Of non-fatal accidents the greater number appear to have been in connection with the handling of tubs and from pieces of coal flying from the face and striking the eyes of miners. This latter class of accident, however, appears to be diminishing, the circular issued by the Mines Department (for posting up at the mines) dealing with eye accidents having evidently been of practical utility. As a further safeguard, the use of wire-gauze eye-shields is becoming more general at those collieries where "proud" coal has to be worked.

Accidents from falls of roof and side are not common, and, taken all round, there is undoubted evidence of the exercise of considerable care on the part of mine-managers to insure the safety of the persons employed.

Prosecutions.

A prosecution was instituted against a manager holding a second-class certificate for employing a greater number of persons at one time than is allowed by law under this grade of certificate. Defendant was fined and mulcted in costs.

Prosecutions of employees were also instituted by the manager of a colliery for violations of the general and special rules, and convictions obtained. It is to be hoped the action will have the effect of making the men more careful; and it cannot be too generally known by managers that where employees commit breaches of the general or special rules, which are framed for the general safety of mining operations, it is their duty to bring the offenders before a Court of justice. Some managers do not appear to understand this, and erroneously think that action can only be taken by an Inspector of Mines.

Government Collieries (State Coal-mines).

A considerable amount of my time was taken up during the year in supervising prospecting and other works at Seddonville, and also the Point Elizabeth property, near Greymouth. At the first-named place systematic prospecting by a trial drive, borings, and trial shaft-sinking proved a seam of coal averaging upwards of 14 ft. in thickness to exist under the tract known as "The Cave Area." A main tunnel to reach the coal was then commenced, and the necessary surface haulage-road surveyed and its construction put in hand.

Some prospecting was done and several preliminary surveys made at the Point Elizabeth property, in order to determine the most advantageous positions for opening into the respective sections of coal which can be won level-free, and towards the end of the year the several tunnels were commenced. Mr. A. B. Lindop (formerly of the Westport Coal Company, Limited) having been appointed general manager, I handed over both properties into his charge in December last. The completion of the partially constructed railway from Greymouth to the Point Elizabeth Colliery has been taken in hand by the Public Works Department, and good progress is being made with the work.

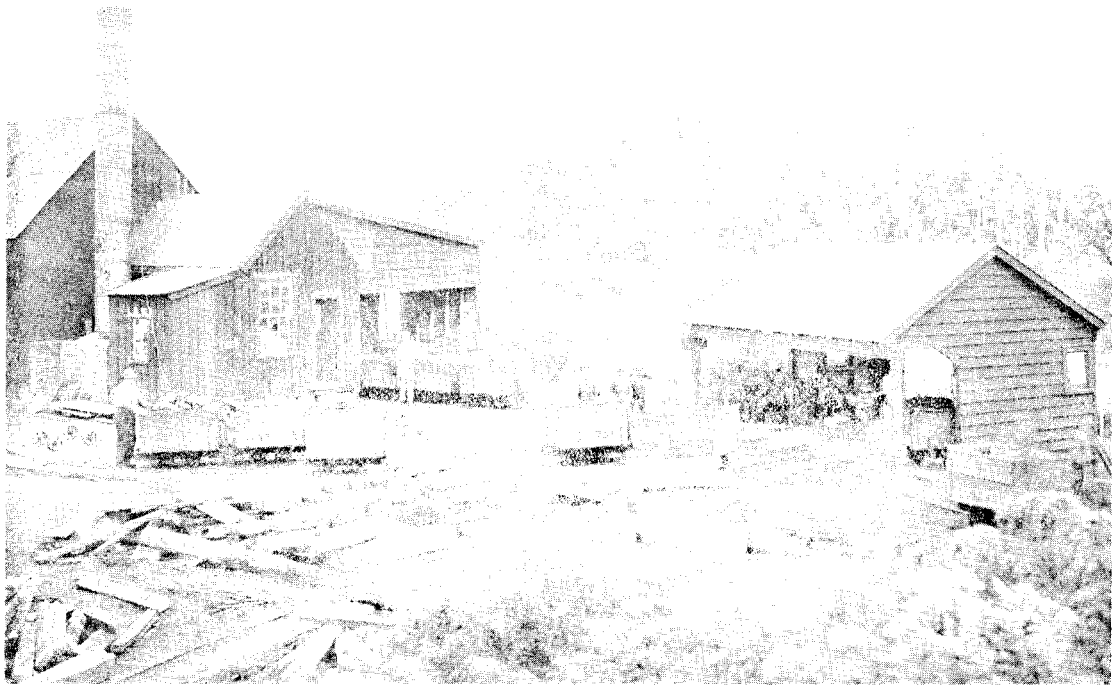
Mechanical Ventilation.

Two permanent installations have been made during the year—viz., at Nightcaps Colliery, Southland, and Millerton Colliery, near Westport, the colonial-type "Hayes" fan being adopted in each case. The fan at Nightcaps is designed for a working-speed of 200 revolutions per minute, and is 9 ft. in diameter. At my visit it was working at rather less than half the speed named, and circulating 38,000 cubic feet per minute. The airways are large, and consequently resistances are light. At Millerton the fan has a diameter of 9 ft. 6 in., and is designed for a working-speed up to 250 revolutions per minute. Its present working-speed is 150 revolutions, at which a current of some 65,000 cubic feet of air is circulated at a water-gauge of 0·5 in.

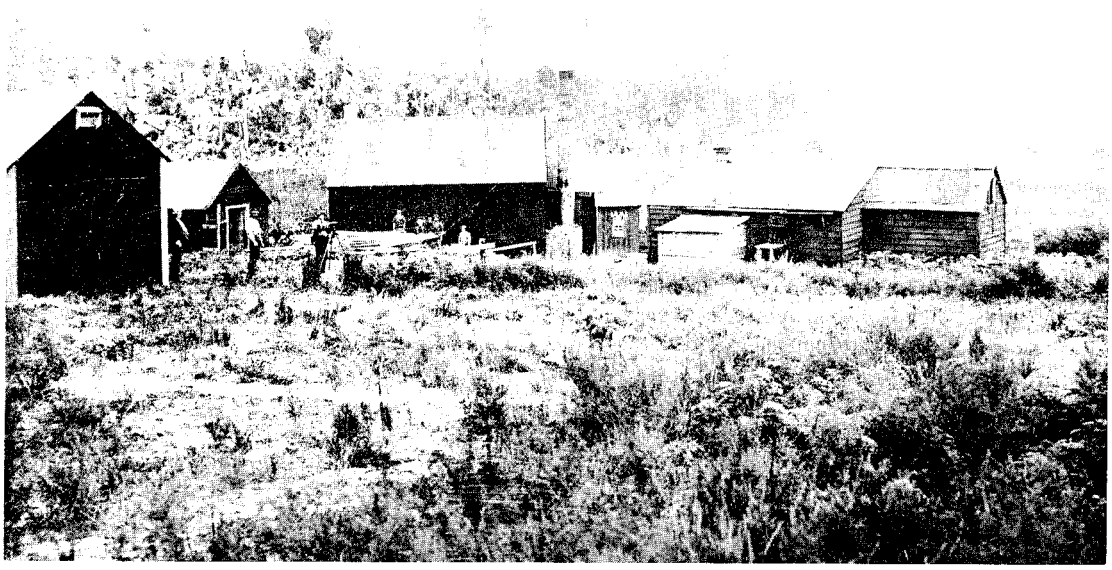
Utilisation of Soft Coal and Slack.

I have in former reports referred to the uses to which soft coal and slack may be put in the manufacture of briquettes, and am now enabled to give a description of a method of using the small and soft fuel—which goes to waste at some mines—without any other preparation than that of grinding it into powder. It will, of course, be seen that the ordinary method of hand stoking becomes inadmissible, but the means adopted appear simple, effective, and economical. The operation may be classed as one of "automatic coal-dust firing," and I am indebted to one of my engineering friends for the following description:—

For a long period efficiency and smokelessness in firing was a perplexing problem to engineers. In some degree the nuisance of intensely black smoke issuing from a factory or works chimney has been prevented or abated, but not without loss of efficiency. To attain both desiderata has



Surface Works at Hikurangi Coal Company's Mine, showing Limestone Rocks and Hikurangi Mountain in background



Page 2. Surface works, Hikurangi Coal Company's Mine, Hikurangi. C. 3v.

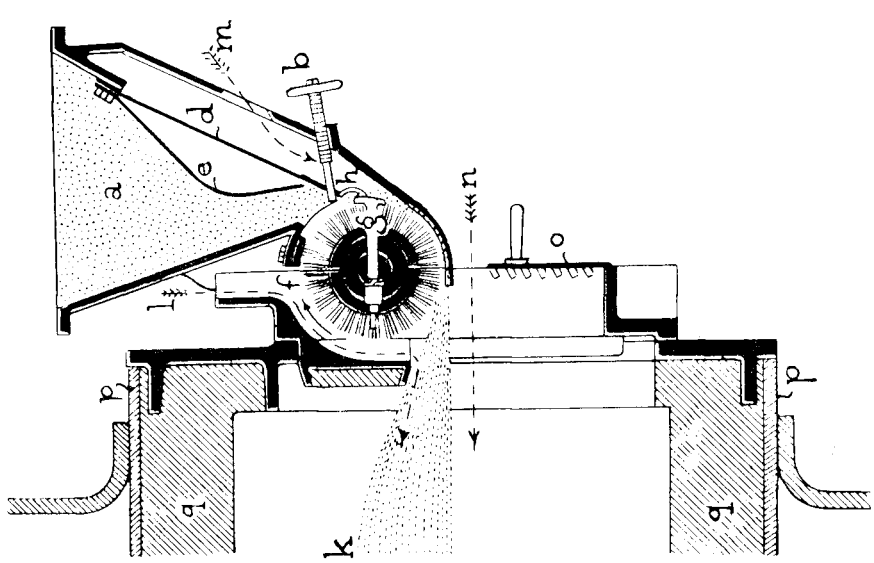
cost innumerable experiments and great expense, but their combination is absolute in the Schwartzkopff system of coal-dust firing. The idea of utilising coal-dust as the best means of securing perfect combustion is not of recent date, but it may safely be said that the principle was not accurately and economically applied until the Schwartzkopff system was discovered.

Briefly stated, the system is this: Slack of the poorest quality is pulverised to the consistency of flour, then carried along a conveyer or iron pipe and sprayed into the furnace by a revolving steel "brush." No bars or grating are needed in the furnace. A piece of common cotton-waste soaked in petroleum, ignited, and put into the furnace is sufficient to start the fire. Within a few minutes after the brush has been started the furnace attains a white heat. Steam sufficient to drive a 300 I.H.P. engine can, if necessary, be generated in half an hour; but, as this precipitancy would do the boiler no good, the "feed" can be regulated to get up steam as gradually as by ordinary hand firing. A peep into a furnace fed on the Schwartzkopff system affords a truly marvellous sight. There is a greater intensity of heat by many degrees than is possible with hand firing, yet no coal or ashes are present. Only a small quantity of white dust, which falls in a molten state to the bottom of the furnace, is to be seen. Numerous tests have proved that with the very worst slack on the market the Schwartzkopff system shows at least 30 per cent. better results in firing than by hand stoking. This is the especial merit of the system. The smokelessness is an important though subsidiary advantage which enhances the merits of the system. By it the problem of perfect combustion is solved. Hand stoking is, of course, absolutely abolished. One man can with ease look after a battery of a dozen furnaces. To large firms this item of labour-saving would mean many thousand pounds per annum.

The Schwartzkopff system was discovered by a band of German experts and professors, and has been known in Germany a few years. Its introduction into Great Britain is of recent date. A British company has been started and works erected at Haydock, Lancashire, on land adjoining the Princess Pit, Haydock Collieries. These works are really the mill for grinding slack into coal-dust. The mill is driven by a 300 I.H.P. triple-expansion engine, the steam for which is supplied by a water-tube boiler of the Stirling type, heated on the Schwartzkopff system, the efficiency of which thus being demonstrated in the preparation of its own fuel. On the private railway-siding adjoining the works are trucks containing the slack delivered from the colliery. This slack costs 4s. a ton, and, as the price indicates, it is the very poorest kind of fuel that can be bought, containing the lowest percentage of combustible material of any coal produced from the colliery. Results of tests in firing with the coal-dust from this slack are given below.

From the trucks the slack is shot into an elevator, which carries it to the mill. After going through two pre-sifters the slack is separated into two grades. The larger grade passes away and is deposited into a store-chamber; the finer grade is put through a series of sieves, where the dust already fine enough for the process is separated, and the tailings from this go into boxes. The larger grade is then drawn off into a conveyer, by which it is lifted to a series of crushers and discharged thence into the sieves, the dust fine enough for use passing through and the tailings deposited into boxes. These tailings then go into pulverisers, and, reduced to dust, are ready for use. When brought to its intended state the dust goes along a conveyer, and is put into sacks for the market. The process of manufacture is much the same as that of flour-milling. In fact, the coal-dust is as fine as fine flour. It passes through a sieve of 5,800 meshes to the square inch. If desired, the coal-dust can be delivered in covered trucks to consumers as well as in sacks.

This description refers exclusively to the mill which prepares fuel for the market, but a proportion of the coal-dust manufactured is utilised for firing the boilers that drive the works-engine, the dust being taken along a "worm" conveyer to the patent automatic stoker at the furnace. Large factories or works may have a mill sufficient for their requirements attached to the furnace apparatus, and manufacture their own coal-dust; but smaller users may find it more convenient to get their supplies from a central mill or works. The accompanying illustration shows the patent stoker, but not the conveyer which deposits the dust into shoot (*a*.)



The shoot (*a*) receives the pulverised coal. It is closed on the bottom by the bent steel plate (*c*), adjustable by the screw (*b*) and the loose flap (*d*). A fixed plate (*e*) relieves the flap (*d*) from the pressure of the powdered coal. (*f*) is a brush, the bristles consisting of steel wires. It carries in the middle the hammer (*g*), which strikes at every revolution of the brush against the nose (*h*) of the steel flap (*d*), and moves the same slightly back from the plate (*c*). As this latter is kept by the screw (*b*) in its position, a slot-like opening is made with each revolution of the brush, through which the powdered coal falls upon the brush. The coal is caught by steel-wire bristles and driven into the combustion-chamber (*k*). As soon as the hammer (*g*) has passed the nose (*h*), the flap (*d*), owing to its elasticity, strikes back against the plate (*c*). In this manner the coal-dust is kept agitated in the shoot, and consequently an absolutely regular feeding-down takes place. The combustion-chamber (*k*) is formed in the simplest manner; for example, in a flue boiler by lining the flue with firebricks for a length of 5 ft. to 9 ft., and providing a fire bridge at the end of this lining. The brick walls (*g*) attain in a very short time the temperature necessary for constant ignition of coal-dust. The first ignition of the coal-dust is effected without any difficulty by a small wood fire or by burning a little old waste soaked in petroleum. A boiler standing all night has the fire properly started in five minutes. The necessary amount of air is introduced to the furnace in the directions indicated by the arrows (*l*, *m*, and *n*), and it is quite sufficient to regulate the admission by the sliding plate (*o*). The amount of coal-dust is regulated during the firing by the screw (*b*). The further the screw is pushed back the wider becomes the distance between (*c*) and (*d*). During firing, only the regulation of the plate (*o*) and the screw (*b*) is necessary, and the only work for the fireman is the removal every ten hours of the ash-dust which, as already explained, lies in a molten state at the bottom of the combustion-chamber, but this operation does not affect the working of the furnace. One man can attend a battery of twelve boilers or even more. For driving the firing-apparatus mechanical power is necessary equal to only one-tenth of a horse-power.

Some of the advantages of the apparatus are here enumerated:—

(1.) Combustible materials and fuels of the lowest quality can be burnt. Earthy lignite, mineral coal, anthracite, or charcoal can be used with the greatest effect without any change in the apparatus. The highest percentage of ash in the coal is no hindrance in the case of the coal-dust firing.

(2.) Absolute smokelessness. It is possible, without trouble, to work with perfect absence of smoke and yet to attain an amount of carbonic acid in the waste gases nearly equal to the theoretical (calculated) maximum.

(3.) The highest calorific efficiency is obtainable from the fuel, which can be only partially attained with a grate furnace, and even with the extra cost of pulverising the coal there is still a very great saving of fuel.

(4.) Minimum wear-and-tear of the boilers, because the firing is continuous. There is no opening of the fire-doors.

What is claimed for the system has been abundantly proved by tests. The economic value of the apparatus is beyond question. Its perfect combustion produces the highest calorific efficiency from the fuel, which is impossible with ordinary hand-stoked furnaces because of the accumulation of huge clinkers and opening of the furnace-door to extract these, and the consequent inrush of excessive oxygen, which prevents perfect combustion. If the highest calorific efficiency is attained a higher pressure of steam must result. The remarkable superiority of the Schwartzkopff system is shown in the fact that better results are obtainable by it from the worst kind of fuel than from the very best coal with ordinary hand stoking. No steam-user would think of purchasing common "dant" or slack, costing only 4s. a ton, for firing his furnaces. The cheapest slack he buys is 6s. a ton, and though he has thus to pay 33⅓ per cent. more for his fuel he has to be content with at least 30 per cent. worse results than obtained by the Schwartzkopff system with the cheaper fuel. Therefore, calculating the cost of milling at 1s. per ton, which brings the price of the slack to 5s., there is still a saving in the cost of fuel of 20 per cent., plus 30 per cent. better results. The benefits and advantages do not end here, as labour, which is a considerable item of expense in the hand-stoking system, is reduced to a minimum. A large firm adopting the Schwartzkopff system would therefore effect a saving which in a very short period would cover the cost of laying down the necessary plant both for milling and stoking. The apparatus can be fitted on ships, as well as for smelting, reheating furnaces, rotary furnaces, salt-pans—in fact, for all kinds of furnaces, whether for generating steam or heating.

Tests have been made with water-tube and Lancashire boilers. The following is the result of the comparative tests between hand firing and the Schwartzkopff system recently made with a Lancashire boiler. Boiler conditions were the same in every way when fired by both systems, but the fuel used for the hand firing was slack of good quality (market price 6s. per ton), while the fuel used for the Schwartzkopff was the inferior slack, costing 4s. per ton, which had passed through the ⅜ in. mesh screen at the pit:—

Water evaporated by Schwartzkopff system per pound of fuel from and at 212° Fahr.	8·10
Hand-firing	6·68
Difference in favour of coal-dust firing	1·42 = 21·25 per cent.

It is reasonable to suppose that, working under ordinary conditions, the 21·25-per-cent. saving could still be increased on account of loss through fire-bars, &c., which was prevented during the hand-fire tests by burning the ash over again. It is also reasonable to suppose that if the calculation was worked out at per pound of combustible the percentage in favour of dust-firing would still be increased.

Recent tests have also been made with the Stirling boiler fitted at the Schwartzkopff works at Haydock, with the following results: Duration of test, eight hours; steam-pressure, 168 lb.; temperature of feed, 60° Fahr.; total fuel used, 5,264 lb.; total water evaporated, 397,230 lb.; water evaporated per pound fuel actual conditions, 7·54; water evaporated per pound of fuel from and at 212°, 9·12 lb. Gas-analysis average: CO_2, 12½ per cent.; CO, nil; O, 74; temperature, 420° Fahr. exit flue. Analysis of fuel: Moisture, 4·15 per cent.; volatile matter, 25·60 per cent.; fixed carbon, 53·75 per cent.; ash, 16·50 per cent.

The fuel used was the small screenings (Rushy Park seam) taken from slack as it passed over a ⅜ in. mesh screen, and was of the lowest calorific value. Its market price at the time of the test was 4s. per ton. At no time during the test was smoke observable at the chimney. The only indication that the chimney was in use could be traced from a very slight white vapour emitted from time to time.

*The Advantages and Disadvantages of Electricity as an Underground Motive Power.**

Steam-engines for haulage purposes were on their original adoption invariably fixed underground, and the motive power either generated in boilers at the surface and conducted through special pipe-ranges down the shaft to the engine, or the boilers were fixed underground in close proximity to where the steam was required. Either of the above systems produced a series of great disadvantages, which amounted in each case to a source of danger. For instance, the pipe-ranges in the shafts, being subjected to varying temperatures, were affected by unequal expansion and contraction, the result of which was fractured pipes or blown joints, which meant suspension of work until the evil was remedied. In course of time this was partly overcome by the introduction of expansion-joints at regular intervals in the range, though a serious loss occurred through condensation in transmission, which it may be noticed was continuous whether the engine was at work or standing. This gave rise to the introduction of underground steam-generating plant, which, needless to say, is at best bringing the attending dangers to the place where they are least desirable, as with their advent there sprung up a direct risk to underground fires, and in some cases disastrous explosions of firedamp, the nature of which is too well known to need any comment here.

Another and serious objection to the use of steam for doing work underground is the heat which it imparts to the strata, which in the ordinary shales of the coal-measures has a very deteriorating effect, making the roadways and other passages through which it is conducted very bad to keep, and consequently increasing the cost of this particular branch of labour and material. Independent of this there is also the difficulty of dealing with the exhaust steam, as in deep mines anything approaching perfect condensation would be impossible to obtain, while its efficient working-limit will probably be about one mile from the generating-point.

Hence with such objections attending the use of steam as an underground motive power it is only reasonable to expect that mining engineers, who were directly responsible for the safe and economic working of mines, should devote their time and attention to bring forth some suitable means of supplanting it. This was, in one course, to a certain extent obtained by the introduction of compressed air, to be used as a means of transmitting the work done on the steam-piston, through suitable pipe-ranges, to distant motors arranged for the purpose of hauling, pumping, machine coal-cutting, and rock-drilling.

The advantages of using compressed air for the above classes of work are that the temperature of the mine is unaffected, except about the exhaust, where it is below the normal. The air can be stored in fixed receivers and readily branched off to any point where it may be required, while after doing its work on the motor it may be employed for ventilating purposes. Compressed air has also a longer efficient range-limit than is the case with steam, as it is estimated that with carefully laid-out installations it may be used with advantage for a distance of three miles from the compressor.

The disadvantages attending the use of compressed air are the cost of providing and maintaining the compressing plant, and the low efficiency—probably not exceeding 25 per cent.—of the steam-pressure applied to the piston, this being due to cooling at the compressor and the friction set up in the pipe-range.

Another and very serious objection to the use of compressed air is the liability to ignition and explosion within the receiver adjoining the compressor. These have been of frequent occurrence, the most notable in our own country being at Ryhope in 1883, Carn Brea Mine in 1885, Newbattle Colliery in 1888, Wharncliffe Colliery in 1893, and Clifton Colliery in 1897; and, although I have no record of any of these being attended with loss of life, some idea of their effect upon the surrounding plant and other appliances coming within the line of their action may be obtained from the Ryhope case, which is in our own immediate neighbourhood, and consequently may be quoted with some degree of confidence. This explosion occurred at 10.40 p.m. on the 1st March, 1883, in which case the No. 1 receiver, fixed at the surface, was rent to pieces, and the report accompanied by a rush of flame, which attained a height of from 20 ft. to 30 ft., and though the flame rapidly diminished in volume it still continued to burn about the broken connection. Some surface damage was done, though the chief effect was confined to the shaft, where the brattice wall suffered severely, and at a depth of 762 ft. from the surface a segment of metal tubbing was blown ½ in. outwards from the pit. At a depth of 1,080 ft. several pipes were partially split open. From 1,200 ft. to 1,272 ft. the shaft was completely stripped of brattice, buntons, and other fittings. The pipes below this point were much damaged, and the No. 2 receiver, which was fixed at a depth of 1,500 ft. from the surface, was found at the shaft-bottom, while the effect of the explosion was felt at a distance of 1,000 yards from the shaft-bottom, at which point the top of an air-crossing was blown off and the ventilator for the time being partially damaged.

* A paper by Mr. W. Little, New Seaham Mining Students' Association, Durham, England.

It is not within the scope of this paper to deal with the cause of these explosions, but it may be here stated that the theory is a very feasible one, and the conditions necessary to produce them are frequently present, especially about a coal-mine. Consequently we may at once conclude that compressed air is not the simple, though rather costly, agent it is generally given out to be.

Another source of power which is very readily obtained in most mines is that due to a head of water, giving rise to what is commonly termed hydraulic pressure. This is easily transformed to do useful work on machines for hauling, pumping, rock-drilling, and, if needs be, machine coal-cutting; and though it gives a high efficiency—about 70 per cent. of the pressure employed—the repumping of the waste water greatly reduces this, and involves the application of much heavier pumping plant than what in its absence would be really needed. So that, except in cases where free drainage can be obtained, hydraulic pressure does not commend itself for use as a motive power in mines where economy with safety is becoming a very important necessity.

There is yet another, though at present a much-neglected, system of transmitting power to do work underground—viz., the telo-dynamic or wire-rope system, which, when carefully laid out to run at high speeds under comparatively small strains, has been known to give off 60 per cent. of useful work at a distance of 3,000 yards from the generator. The loss of power due to friction and other causes in a carefully proportioned above-ground transmission has been proved to be only $2\frac{1}{2}$ per cent., with an additional $\frac{3}{4}$ per cent. for each 1,000 yards added. This, it must be acknowledged, is very satisfactory, especially when its distance-limit of application is equal to that of compressed air and much beyond that of steam. It need scarcely be noticed that it would be impossible to obtain such efficient results in underground installations owing to the irregularity of the roads, which would demand the use of guiding-sheaves at the various curves, so common even in the best-laid-out mines. Nevertheless, there is no doubt but that from 30 to 40 per cent. useful effect would be gained under any ordinary condition likely to be met with underground. The only disadvantage to this system of transmitting power is the necessity of having extra ropes running in the shaft, which it may be noticed is rather an objectionable feature, especially in winding-shafts.

After having carefully considered the advantages and disadvantages of each of the foregoing systems we find that each one involves a certain amount of risk which it is almost impossible to overcome, and also that the efficient limit distance is only about three miles, which is much below what will be required in the future when the still deeper-lying coal-seams have to be won and worked; and, finally, that in the very best of the available installation the efficiency at the distance-limit may not exceed 30 per cent. of the original power applied to the generating-piston. There are other causes that are sure to arise in the deeper workings, such as increased temperature, which will tend to reduce the produce per man employed, while the great thickness of overlying strata will demand modified systems of working that will insure a uniform subsidence throughout the whole area worked. This, then, seems to suggest a general adoption of straight-faced long-wall, with machine coal-cutters employed throughout. Therefore we may look forward to a more extensive employment of machinery in mines, and the duty of each and every man who is in any way interested in mining is to endeavour to find some safe and economic means of transmitting the power necessary to give motion to these machines.

The solution to this problem seems to depend upon electricity, a force which forms the basis of the latest applied science, and is a source of energy that may be readily transformed into useful work at almost unlimited distances from its generator; it may also be split up into any number of branches, each capable of doing work at any point where it may be required. Another and very important advantage in favour of its use is the many and varied classes of work to which it may be applied. For instance, in most modern mines electricity is used for signalling on engine planes and in winding-shafts. It is also used for speaking purposes, as in the telephone—a simple instrument, which renders talking-communication possible between all points in connection; while in mines where safety lamps are used it is now considered the only means of firing shots. Again, electricity is at present being largely employed to do the heavier work of lighting, hauling, pumping, machine coal-cutting and rock-drilling, and in some few cases for winding and the driving of ventilating machinery. Consequently, in electricity we have a force that is capable of supplying all our requirements. This prevents the employment of mixed plants, which is anything but a desirable feature where the distribution of power is concerned, and should be avoided in cases where extreme danger was likely to arise from its general adoption.

Electricity for signalling or speaking purposes only demands the use of very feeble currents, usually produced by chemical action set up by causing the liquid chloride of ammonium to act upon two distinct metallic substances, usually copper and zinc, in connection with each other by a suitable wire circuit, or by substituting carbon for copper, which is done in the Leclanche cell, commonly used for this purpose in mines, and the extent through which the electric energy may be felt depending upon the length of the connecting circuit.

Shot-firing is usually done by means of a small magneto electric battery or miniature dynamo, in which case the feeble currents from the electrically excited magnets pass along the cable to the highly sensitive detonating material enclosed in the copper tube, commonly termed the detonator. Sufficient resistance is set up in the detonating material to cause a spark to pass in the high-tension arrangement, or to heat a very fine strip of platinum in the low tension, either of which is sufficient to detonate the matter and explode the charge.

As the object of this paper is to deal with currents of sufficient power to do heavy mechanical work, it is not my intention here to give more than a passing reference to those branches whose action depends upon the feeble currents set up by chemical action. Consequently, for purposes requiring large quantities of electrical energy, mechanical appliances, commonly termed dynamos, are used to generate the electricity, and are driven by some convenient power, such as a head of water or a steam-engine, the first being the most economical if naturally supplied in sufficient

quantities to do the work required of it. The work done by the prime mover upon the dynamo is converted into electric energy and conducted through carefully insulated cables to the motor from which the work is done.

The distance between the motor and the generator may be almost said to have no limit, as at distances of ten miles from 50 to 60 per cent. of the power transferred to the dynamo has been returned in useful work at the motor. This would seem to be sufficient to warrant its adoption, providing that anything approaching absolute safety could be guaranteed, which unfortunately is not so, the chief danger arising from the ready transformation of electric energy into intense heat, a feature not very desirable in coal-mines, where the ventilating-currents are liable at any time to become so charged with carburetted hydrogen as to form a highly explosive mixture, which would undoubtedly produce serious results in case of contact with sparks, such as are frequently given off from the commutators, which at regular intervals are arranged to break the current at the motor and so set up motion; sparks are also given off from broken cables, which frequently occur from falls of roof or through high-speed sets leaving the rails. Shocks are another source of accidents arising from the use of electricity in mines, and are sufficient in most cases to produce instantaneous fatal results; and, though electricity is the cause, the effect is solely due to the ignorance of those affected, consequently we may infer that with increased knowledge, due to more extended use, this source of accident would in time disappear.

The method just referred to is known as the continuous-current system, deriving its name from the fact that the flow of the current is continuous, a feature which renders it very suitable for electric lighting, when steadiness in the light can only be got by a uniform and continuous supply. As previously stated, the system involves the use of commutators at the motors, which invariably causes sparking even under ordinary working-conditions, while with excessive resistances the heat developed is sufficient to fuse and consequently destroy the working-parts.

Since the presence of commutators must invariably under certain conditions be accompanied by sparking, much attention has been given to the devising of some reliable means of preventing the sparks from coming in contact with the outside atmosphere, and so dispense with the danger of igniting gaseous mixtures; and it is very satisfactory to know that some advance has been made by enclosing the motors in gas-proof steel cases, in which are suitable doors that can be opened and closed as required for inspecting and lubricating the working-parts. These arrangements are all very well so far as the attainment of their original object is concerned, but unfortunately their adoption shuts off the working-parts from the sight of the person in charge, and so admits of damaging effects going on unknown to those whose duty it is to prevent them.

Sparks arising from broken cables can scarcely be said to incur so much danger, for the simple reason that they are to a great extent carried along the main intake airways, where explosive gas, even in infinitesimal quantities, may never be expected to be present. Consequently, the chief danger from this source would be the liability to fire any combustible material, such as a very sensitive coal, timber, or canvas, any of which might form a primary cause to serious secondary effects. The protection of conducting-cables has also received some attention, such as having them enclosed in wood casing or in iron tubes, the latter of which is preferable, though it offers some trouble to the locating and repairing of any damaged part, which at times must be necessary. This case is by no means general, nor can it be said to be actually necessary, but simply a precaution. I have known two extensive plants used for underground haulage, pumping, and coal-cutting, where the cables were simply of the best insulated type, and conducted together along the side of the roadway to the point required, and though these have been in use for some years there has never been one single accident traceable to them.

The continuous-current system of distribution is the one which up to the present has been mostly employed in this country, and as these are costly to replace they may be expected in many cases to remain, even in the face of the more modern multiphase or alternating-current system, which has been largely introduced in America and on the Continent. In this system the current is transmitted alternately to the motor as required, and so dispenses with the commutators, and gives almost absolute freedom from sparking even under the most extreme conditions of unequal loads, which would cause the continuous-current motor to destroy itself. Again, in the latter system the conductors which carry the high-tension currents revolve and consequently cannot be insulated, while in the alternate-current system these are stationary, and so admit of perfect insulation, thus limiting the risk of sparking to the switches and broken cables, both of which exist in the first system. Alternate currents do not commence the load so readily as continuous currents, neither are they so applicable to perfect lighting, while the force of shock from the alternate system is about one and a half times more powerful than that of the continuous system; hence we see that even the latter has many disadvantages, each of which offers a fair field for the inquiring student.

The great advantage of the alternate system is that currents of almost any voltage may be produced, and by the use of transformers reduced to any voltage required by the particular class of work to which it is to be adapted. Consequently, in it we have an ideal system for the formation of central power-stations from which the supply necessary to meet the wants of a fairly large district may be drawn. This has been carried out on a rather extensive scale in America, where nature has abundantly supplied a cheap and efficient motive power in the numerous water-falls, thus requiring little more outlay than that incurred in laying out the generating plant, which are used to create currents of from ten to twenty thousand volts, for distribution at the required tension to meet individual wants. Some idea of the economic aspect of the system may be drawn from the fact that the Niagara Electric-power Supply Company are prepared to supply power for continuous night and day loads at the rate of £3 12s. per horse-power per annum, and calculations have been made in which it has been shown that the company can afford to distribute power within a radius of two hundred miles at a less cost than it can be generated by users with

the highest class of steam-engines using fuel at 12s. per ton, while for small loads up to 500-horse power they can safely compete up to a distance of fifty miles, a feature which must be admitted is sufficient to demand the attention of all who are responsible for the generating and distribution of power to do useful work.

Previous to the conclusion of this paper I may perhaps be excused for stating that, although we have some very able electric engineers capable of designing and erecting excellent installations to do all classes of work that it is possible for any motive power to do, we do not in this country seem to take the same interest in the theory of production and transmission of electric currents that is taken by our scientific brethren of America and those of many European nations, where mining forms an important branch of their national industry.

With respect to the spark problem, it may be noticed that some very elaborate experiments have been carried out in Belgium to prove the risk to firedamp explosions, which may be said to be the one great disadvantage which prevents the general adoption of electricity as a motive power in mines. The result of this inquiry was that under given conditions the spark may be produced without exploding the most sensitive gaseous mixture, a feature which was obtained by joining up by a secondary conductor the two points between which the spark passes, when it was found that with the resistance at a high value the current-breaking spark invariably caused an explosion. The corollary to this is that when the spark takes place in a single circuit, the breaking of which completely cuts the current, explosion is the inevitable result. On the other hand, explosions are more easily avoided the nearer the ratio of resistance approaches unity, while both above and below this value there is, as it were, a boundary-line within which explosion is avoidable. Hence the solution of the spark problem seems to depend upon the finding of this boundary-line and of carefully adapting the working-conditions to it in such a manner as to insure its permanency, a feature which alone would warrant the general adoption of high-tension electricity to do work in deep and dry coal-mines, which invariably have a continuous and in some cases a sufficiently heavy natural discharge of firedamp to render the currents in many instances more or less foul, and the consequence would be that the introduction of electricity would, in the event of certain damage to its parts, or from extreme irregular working-conditions, increase the risk of explosions, a feature to avoid which is ever the chief consideration of those who are responsible.

Therefore, in making a general summary of the advantages and disadvantages of electricity as a motive power applicable to general underground work in mines, we find that in it we have a force that is easily conducted to any point or points required—these may be at any reasonable distance, say up to ten miles, from the generator—will do any class of work that it is possible for any other power to do, and gives off an efficiency of from 40 to 60 per cent. of the power transmitted to the dynamo, while the first cost and general maintenance would be less than a compressed-air installation fixed to work at its much shorter distance-limit. Against this we have the risk of sparking and the liability to persons receiving shocks. Consequently, in concluding this paper I would advise every mining student to make the study of electricity an important branch of his educational curriculum, when the possibility would be that Britain may produce one man to do for electricity that which George Stephenson accomplished with steam, and so place it upon a sound and safe basis for use under any conditions that may occur either above or below ground.

Examination for Mine-managers' Certificates.

The papers used at the examinations held in the beginning of February, 1903, are appended.

Schedules.

The list of persons holding certificates of service and competency as coal-mine managers is appended, as are also the statistics of output, persons employed, &c.

I have, &c.,

JOHN HAYES,

Inspecting Engineer.

The Under-Secretary for Mines, Wellington.

No. 2.

Mr. JAMES COUTTS, Inspector of Mines, to the UNDER-SECRETARY, Mines Department, Wellington.

SIR,— Inspector of Mines' Office, Thames, 7th February, 1903.

I have the honour to furnish herewith the following report on the coal-mines in the Auckland District for the year ended the 31st December, 1902, in compliance with section 67 of "The Coal-mines Act, 1891":—

Kawakawa Mine.—The operations in this mine have been chiefly directed to working out pillars near the outcrop under Carraway's Hill. On account of the pillars being small and the covering of the coal having settled down from the surface around the pillars, some of the men are required to be continuously employed driving through the fallen ground, exploring for pillars to keep up a regular supply of coal. A natural result is that a large amount of timber is required to keep the men safe, thus adding considerably to the cost of production, but as the coal is easily worked it just about pays expenses. It is true the amount of coal raised from this mine is only very limited; still it is a boon to the district, affording, as it does, a supply to the locomotives on the short line of Government railway and the Northern Steamship Company's boat trading between Auckland and the northern ports. Six men were employed during the year, and the quantity of coal raised was 3,640 tons. The mine was inspected twice during that period, and was found to be safe and the ventilation good.

Hikurangi Coal Company.—The manager is still directing the operations in the mine to that portion that lies on the eastern side of the railway-line. The level southwards has been driven as far as the seam extends in this direction at this level, and the men are now engaged in driving a few of the bords to the outcrop and splitting pillars. Similar work is being done on a section on the north side of the main incline. A new dip has been started from near the winding-engine shed, with the object of at some future time driving a haulage-road under the railway to open up the coal on the western side of the line. This dip at the time of my visit had been put down on the coal to within a few feet of the railway reserve. The water was then being pulled up the dip in tanks, but before much work is done here it will be necessary to erect an engine for pumping purposes, as a quantity of water will eventually be met with as the work proceeds. The company has been very successful during the year, although the output shows a slight decrease on the previous year. Still the profit on the year's operations was sufficient to enable the directors to declare the usual dividend, which must be highly encouraging to the shareholders. There was an average of fifty-four men employed, and the output of coal was 39,119 tons. The mine was inspected twice. The ventilation was good on both occasions, the workings safe, and abundance of timber and props at the mine to secure the workings as required.

Northern Coal Company (late Hikurangi Collieries, Limited).—This mine is worked from an adit level driven in from the side of the hill. The operations during the year have been mostly confined to development-work and mining coal on a portion of the property situated about half a mile in a north-easterly direction from the old mine which was worked out during the previous year. A horse tram-line has been constructed from the head of self-acting incline to the new workings, a distance of 42 chains. The coal—as far as it has been opened up—is of good quality, but is a good deal broken and disturbed by faults. It averages about 5 ft. 6 in. in thickness, but owing to faults being frequently met with the amount of coal obtainable from a given area is very uncertain. As the seam here is above water-level, it gives the company a natural advantage of being in a position to place the coal on the market at a small cost, and at a profit. The mine was inspected twice during the year. The ventilation was good, and the works generally carried out in a safe and satisfactory manner. An average of twenty-eight men was employed, and the output of coal for the year was 7,946 tons, an increase of 4,160 tons over the previous year.

Phœnix and West Bryan's.—Those two mines, which adjoin each other, are worked conjointly on behalf of Mr. S. C. Brown and others. The work in progress during the year has been confined to splitting and taking out pillars. In the West Bryan's section all the payable coal in sight has been extracted, and in the Phœnix the amount of coal opened up is very limited. Without prospecting-work is carried out and a new discovery is made outside the faults that have been met with, the prospects of producing coal in payable quantities for a lengthened period is very remote. A start has been made to put down a dip incline near the railway for the purpose of opening up some coal that is said to exist in this section of the property. An average of nineteen men were employed, and the output of coal was 9,901 tons. The workings were safe and ventilation good at each inspection.

Ngunguru Mine.—Operations in this mine have been steadily carried on during the year. Work in the "A" district (which was formerly the principal workings to the rise) has been confined to taking out the pillars, which will soon be exhausted. Some of the coal left in near the outcrop is thin, and will not pay to work. In the "B" district (to the dip) the work carried on has been chiefly directed to taking out pillars, which are nearly worked out. The "C" district (to the north of the workings mentioned), which was termed a new discovery last year, has opened up much better than the manager anticipated. The seam of coal has averaged 4 ft. 6 in. in thickness, and it is from this section that the largest part of the output has been obtained during the year. An average of forty-eight men have been employed, and the output of coal for the year was 18,017 tons, a slight increase on the previous year's production. A plentiful supply of props, &c., is always on hand at the mine, and every care is taken for the safety of the men. The ventilation was good when the mine was last inspected.

Kiripaka Mine.—The work in this mine has been confined to drawing pillars, which are rapidly becoming exhausted, although a larger amount of coal has been obtained from the pillars than was expected. This was partly owing to careful management and the use of a large quantity of props and other timber. There are now only a few pillars standing near the entrance of the adit level, which will soon be worked out, and should a new discovery not be made outside of this portion of the property the output will soon come to an end. An average of thirteen men have been employed, and the output of coal was 14,138 tons.

Union Collieries, Limited (late Maramarua-Miranda).—This mine was worked in a small way by Mr. William Tattley up to the month of June, when it was formed into a company, Mr. Tattley being retained as manager. Attention has been directed towards developing the mine and installing additional plant and machinery to enable the output of coal to be increased and handled more economically than hitherto. Since the company was formed several new cottages have been built near the mine for the workmen to reside in; another new horizontal Tangye boiler of 25-horse power has been placed in position on the mine; three new barges have been built, of a carrying-capacity of 57 tons of coal on a 3 ft. 6 in. draught, for conveying the coal by water from the mine to the Government railway (a distance of eleven miles), where a new wharf and railway-siding are in course of construction. The operations in the mine are still of a limited nature, and will be until some of the things mentioned are completed, the work being confined to opening up what appears to be a promising area of coal between the old Miranda Coal Company's winding-shaft and Foote's old workings. A good deal of trouble was experienced in dealing with the water, which percolated through the coal from the old workings referred to. It has now, however, been

drained off in Foote's section; but there is yet a considerable amount of water in the old Miranda Company's shaft which will have to be dealt with as the workings are extended to the dip. An average of seventeen men have been employed at this mine, and the output of coal was 3,923 tons during the year. The mine was inspected twice during the same period, and was found to be safe and the ventilation good.

Mangapapa-Mokau Mine.—It was fully expected that this mine would have been worked more energetically by the new syndicate than it had been done in the past, but there has been very little improvement in the working of the mine, and only a very slight increase of the output of coal over the previous year. There has always been a considerable amount of trouble in getting the mine-manager to carry forward the ventilation, also to work the levels and bords uniformly, and thus avoid encroaching on the pillars. In some instances one bord will run into another, leaving a triangular pillar, and this, together with a seam of stone in the centre of the seam, varying from 3 in. to 1 ft. in thickness (which keeps fritting away), makes the pillars of no use for the purpose for which they are intended. However, a change in the management is taking place, and no doubt some of the things that have been complained about will receive more attention in future. An average of fifteen men have been employed, and the output of coal for the year was 4,250 tons, an increase of 737 tons over the previous year.

Taupiri Coal-mines (Limited).—This company's operations during the year have been directed to the extension of the various works that were in progress at the end of last year.

In the Taupiri Extended section thirty-two men were employed for the first six months of the year, but latterly only eight men were employed. The work has consisted chiefly of opening up and developing the mine on that portion of the property situated on the west of the air-shaft and under the Waikato River. A large quantity of coal is now opened up, but, as sufficient coal is being obtained from the other sections to supply the demand, there has been no necessity to push on work here for the present.

Taupiri Reserve: The work carried forward in this section has been directed in extending Nos. 3 and 4 levels and working the bords from them, but the management has decided not to extend the No. 4 level in a north-westerly direction any further for the present, and contemplates opening up the coal lying to the north-east of the main adit incline from No. 4 level.

Ralph's Taupiri: In this section the work is now confined to extending the levels and workings on the company's property on the western side of the Waikato River, the coal obtained from here being of excellent quality. It has been proved by boring that there is a large area of coal in the direction they are at present working, which will enable the company to supply the market for a considerable time to come. In this section the men have been riddling the coal in the workings. This practice has caused considerable dissatisfaction, and frequent complaints have been made to the manager. The company have consequently decided to erect a new screening plant, which has been imported from England, and is now being erected on the surface between the shaft and the Government railway-line. This will be a very complete plant; but, owing to the bank-head being too low to enable the screening to be done by gravitation, elevator-belts will be used to carry the coal to a sufficient height, so that it can be cleaned and separated into four classes.

The average number of men employed by this company on the different sections has been 173, and the output of coal for the year 89,263 tons, an increase of 13,521 tons as compared with the previous year.

Harrison's Taupiri Mine.—This mine is situated on the outcrop of Ralph's old workings, and as the coal available was only confined to a small area it soon became exhausted, and has been closed down for some time.

Drury.—Mr. Wallace had some men prospecting for coal on the Hinua Range in the early part of the year. The seam of coal was cut through in several places, where it was found to be from 4 ft. to 4 ft. 6 in. thick, but as capital was not forthcoming to further develop it the work was stopped.

Ohinemuri.—There was a little work done on the coal lease granted on the Waihi side of the Karangahake Gorge, but as no coal was discovered the work was stopped, and I am informed that the lease will be surrendered.

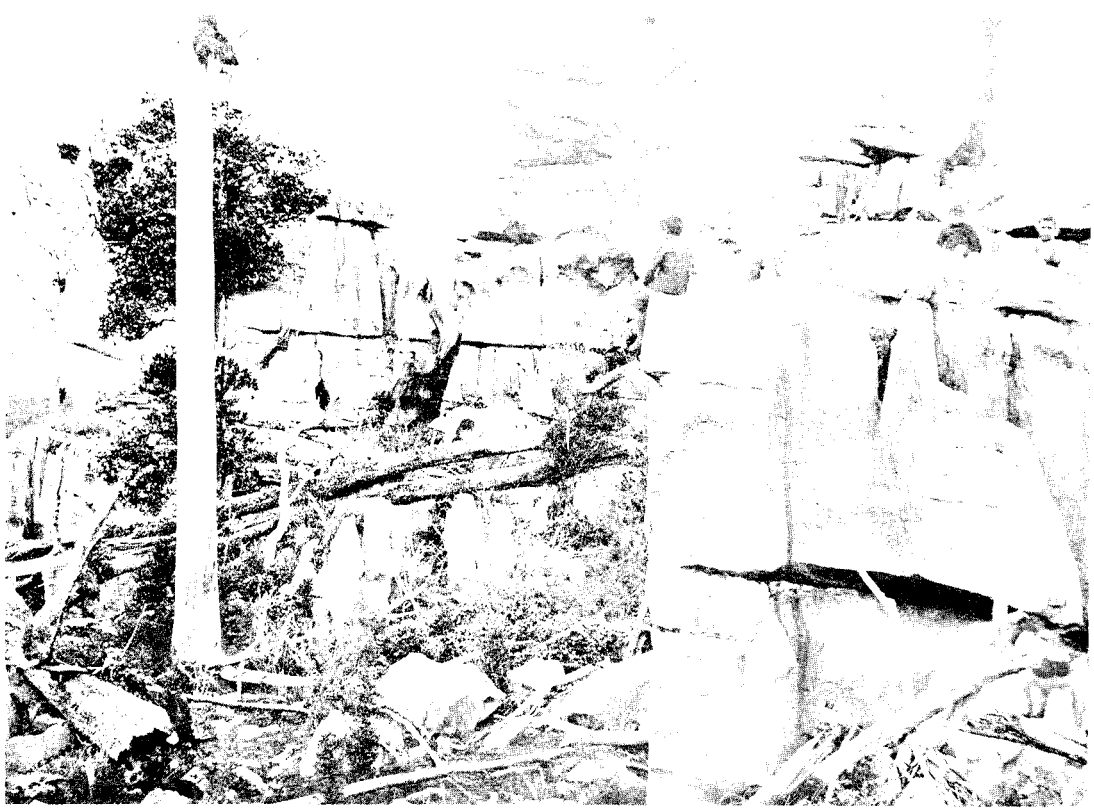
The total output of coal won from the mines in this district for the year ended the 31st December, 1902, amounted to 192,045 tons, an increase of 16,961 tons as compared with the previous year, made up as follows:—

	Output for 1901. Tons.	Output for 1902. Tons.	Increase. Tons.
North of Auckland ...	... 87,055	92,761	5,706
South of Auckland ...	... 88,029	99,284	11,255
	175,084	192,045	16,961

ACCIDENTS.

The following are the names of persons injured in the mines north of Auckland who sent in claims to be placed on the Coal-miners' Relief Fund, the number of days they were absent from work, and the amount of money received: William Sillicks, West Bryan's, foot injured, 8 days, 16s. 8d.; James McCormick, Ngunguru, strain, 12 days, £1 5s.; B. Cusini, West Bryan's, hand injured, 35 days, £3 12s. 11d.; Thomas Fife, Ngunguru, finger broken, 12 days, £1 5s.; James Blue, Phœnix, arm injured, 14 days, £1 9s. 2d.; Richard Hamilton, Hikurangi Coal Company, finger injured, 16 days, £1 13s. 4d.; Adam Girvan, Hikurangi Coal Company, head injured, 78 days, £8 2s. 6d.; Charles Skeels, Phœnix, sprained ankle, 12 days, £1 5s.; Thomas Hopkin, Ngunguru, bruised leg, 23 days, £2 7s. 11d.; Herbert Hutton, Northern Colliery, bruised hand, 14 days, £1 9s. 2d.: making a total of 224 days, £23 6s. 8d.

Railway siding, Hikurangi Coal Company's Mine, Hikurangi



Face p. 10 Sub crystalline Rocks overlying the Coal-measures at Hikurangi, near Whangarei. C. 3A

Only one case calls for special remark—viz., that of Adam Girvan. He was assisting to fill wagons on the railway when he slipped off the top of a loaded truck on to railway-line, seriously injuring his head, and was off work seventy-eight days.

In the mines south of Auckland (Huntly) thirty-seven men were injured, and were absent from work 540 days, the sick-pay from the Relief Fund amounting to £56 5s. This money was paid through the Waikato Medical and Accident Society, who also pay an equal amount to the miners in terms of clause 6 of the amended regulations for the management and administration of funds and moneys under section 69 of "The Coal-mines Act, 1891."

There were no fatal nor yet what might be termed serious accidents in this district during the year.

I have, &c.,

JAMES COUTTS,
Inspector of Mines.

The Under-Secretary, Mines Department, Wellington.

No. 3.

Mr. ROBERT TENNENT, Inspector of Mines, Westport, to the UNDER-SECRETARY, Mines Department, Wellington.

SIR,— Inspector of Mines' Office, Westport, 17th March, 1903.

I have the honour, in compliance with section 67 of "The Coal-mines Act, 1891," to report as follows on the West Coast coal-mines for the year ending 31st December, 1902:—

Enner Glynn Coal-mine.—(26/12/1902): Trask and Hurly's syndicate are sinking a prospecting-shaft on ground owned by James Newport, situated on the north bank of Brock Street Valley. The shaft, 5 ft. by 3 ft., was sunk to a depth of 15 ft., and timbered throughout. Wise and Bennett, late of Enner Glynn Coal-mine, put down a shaft in the same locality about two years ago, with unfavourable results.

Belgrove Prospecting Syndicate.—(15/12/1902): During my last visit two men employed on behalf of a Wanganui syndicate were prospecting at the foot of the hill country which forms the eastern boundary of the Wai-iti Valley, about seven miles southward of the Belgrove Railway-station. The party had driven a crosscut 15 ft. through a series of crushed coaly and foreign matter, which was cut off by a strongly defined wall of roof-formation. Other surface works disclosed nothing of an encouraging nature. It is understood that operations have since been suspended.

Motupipi Coal-mine.—(19/8/1902): A small trial shipment of coal was sent to Wellington, but nothing further has been done at the mine.

Shakespeare Bay.—For some time past prospecting has been periodically carried on by a local syndicate, but operations are at present suspended.

Taitapu.—Mr. N. L. Buchanan, attorney for the Taitapu Gold Estates (Limited), has recently directed his attention to prove the extent and quality of a coal-seam located on the west bank of the Paturau River, and about five miles south of the West Wanganui Inlet. The thickness of the coal-seam as proved in two different faces is 12 ft. The analysis by Dr. Maclaurin, Government Analyst, is as follows: Fixed carbon, 41·40; hydrocarbons, 40·25; water, 5·65; ash, 6·70. This is a good caking coal, forming a fairly hard coke. The sulphur is very low, and, although the ash is somewhat heavy, the coal is good.

Pakawau Coal-mine.—(17/12/1902): This mine is not now working. Some tunnelling and ditching were recently carried out by a prospecting syndicate, but, so far, further developments have not been effected.

Puponga Coal-mine (owners, Puponga Coal Company; Mr. Sydney George Hayward, attorney for the company).—(17/12/1902): Owing to certain differences having arisen between the late attorney and the company, progressive developments have been temporarily suspended. Mr. James Bishop, consulting engineer and acting-manager for the company, has recently drafted plans and estimates for the construction of haulage tram-line and loading-jetty. These works are intended to be put in hand at an early date. A contract has been let to drive the low level in the "Annie Taylor" section of the property. Five men employed.

Cape Coal Prospecting Syndicate.—Nothing further has been done on this property since report of last year.

Mokihinui Coal-mine (Westport Co-operative Coal Company).—(5/11/1902): Operations have been confined exclusively to the extraction of pillars in both sections of the Hut seam, the district being bounded east and west by fault-lines. Subsequently to total exhaustion of the lower pillars, the pumps were withdrawn, natural drainage being available for the upper districts, which at time of writing are wholly exhausted. Regarding the fire in the exhausted Big Face area, there is practically no notable change, the fire having assumed a smouldering condition. Reports are kept to date, and absence of accidents has been a marked feature during the year.

Seddonville Colliery (A. B. Lindop, manager).—Regarding the development of this "State coal-mine" property, the various works in connection therewith are being energetically pushed forward, and gradients affecting endless-rope-haulage requirements (conformable with the undulated contour of the country) are being carefully determined in order that economy and reliable operative results may be ultimately obtained. The rock tunnel, efficiently timbered to 10 ft. by 7 ft. in the clear, is making satisfactory progress, the driven distance on the 31st December being about 12 chains, leaving a further distance of 12 chains or thereabouts to cut the coal-seam. The formation met with in the tunnel consists of an unbroken intrusion of fine-grained granite, which has afforded favourable conditions for driving. Efficient ventilation is induced by fan, driven by oil-engine. The ventilating-shaft, now down 60 ft., is presently suspended, awaiting the erection of steam winding machinery, which is now under construction. Other important works are receiving prompt attention.

Millerton Colliery (owners, Westport Coal Company; George Fletcher, mining manager).—(6/11/1902): In point of productiveness and general efficiency the developments as originally drafted for the successful issue of this colliery have been worthily and consistently maintained, whilst the pressing trade demands which still necessitate continuance of double shifts is sufficient guarantee in itself to prove the suitable qualities of the coal for export or otherwise. The increase of tonnage was 69,371 as compared with the preceding year; total output for 1902, 276,750 tons.

Mine Creek.—The underground development in connection with this area has already attained important dimensions, while the East and West winning-headings continue to be actively pushed on, exposing an unbroken face-line of active operations and splendid quality of coal. From a commercial and economical standpoint one of the most prominent features which nature has afforded for the working of this coal-seam is its suitability for coal-cutting machinery, which is now exclusively employed, compressed air being the power used for all underground mechanical appliances in the colliery. Timbering of faces and roadways is diligently and efficiently performed by the company's officers. The East dip solid working has been exhausted to boundary fault-lines; thus operations are confined exclusively to the extraction of pillars by miners, exceptional care being demanded on the part of workmen and officers to avoid risk in the removal of these thick seam pillars. Probably the most notable feature in connection with recent development is the efficient system of ventilation now permanently established. Prior to the alterations effected the air-currents circulating the whole areas were controlled by a "Scheile" fan situated at Mine Creek. This installation has recently been supplemented by a "Hayes" fan, 9 ft. 6 in. diameter (placed near the entrance to No. 1 mine), which circulates at a speed of 145 revolutions a constant air-volume of 60,000 cubic feet per minute, with a water-gauge reading of $\frac{4}{10}$ in. The principle involved practically provides for the ventilaion of two separate mines, whereby direct intake currents are distributed into the respective ventilation districts. The duty of each fan is therefore directly confined to its own division of workings, separated by 38 chains of haulage-road. Brickwork has been exclusively used for stoppings and air-crossings in Mine Creek area, and the intake currents are taken through adit tunnels direct from day. The aggregate circulating ventilation averages upwards of 120,000 cubic feet per minute. A fourth boiler of the Babcock and Wilcox type will shortly be added to the plant. Electric light is installed in all surface works. Reports and other provisions of the Act are strictly kept up to date. Eight inspections were made during the year. The disused workings were travelled and examined with safety lamp, and were found clear of gas, thoroughly ventilated, and in good order. At time of writing, contracts have been accepted for the construction of a main haulage-road between the "big brake" and Mine Creek workings, at an estimated cost of £12,000.

Denniston Collieries (owners, Westport Coal Company; J. Dixon, mining manager).—In the matter of coal-production these mines have maintained their efficiency during the annual period just ended. The gross tonnage mined therefrom contributed 243,336 tons, being an increase of 17,143 tons over the preceding year. Of the tonnage mined, 74 per cent. is due to percussive pick-machines actuated by compressed air, while the remaining 26 per cent. was won by miners at tonnage rates.

Coalbrookdale Mine (29/10/1902): No change of practical importance has taken place during the year. With the exception of a few places to the west of Cascade section, where the coal-seam has diminished in thickness, the general contour of the faces maintains a fair height and usual good quality of coal. In further extension of operations, and in view of winning the coal in the Wareatea lease, a special place has been started on a southerly bearing, which, when completed, will probably be utilised eventually for endless-rope-haulage purposes. It is in contemplation also to sink a shaft in connection with the solid workings, in view of securing reliable ventilation whilst pillar-extraction is progressing.

Munsie's: The solid workings are practically finished to the outcrop east of the rope-road, operations being now confined to the extraction of pillars. A dip is now being driven to the south-east, and, so far as developments have extended, height and quality of coal-seams have proved that future results may be considered encouraging. Drainage and haulage are effected by mechanical appliances actuated by compressed air, the power being conveyed from the Coalbrookdale installation through a pipe-line 40 chains in length. Ventilation is induced by fan at the Cascade Mine, and by furnace at Munsie's.

Ironbridge Mine (30/10/1902): The development of the Dundee dip section is proving satisfactory. Downthrow faulting has, however, recently intercepted the dip-heading face, whereby the coal-seams are displaced some 26 ft. Meantime, crosscutting of the fault-line has been postponed, awaiting connection with the drainage-tunnel. This connection was recently effected, and development is now in progress to win the lower measures. The drainage system established to unwater the deepest sections of the Ironbridge workings commenced from the north bank of the Waimangaroa River. Prior to the holidays temporary connection with the workings was effected by an uprise from face of rock tunnel, at a driven distance of 28 chains. By this means two pumps were directly relieved, while siphons are in temporary use to drain the dip. To finally reach the lowest calculated level the tunnel will be driven a further distance of 10 chains, as exhaustion of the pillar areas now standing depends wholly on the successful completion of the drainage scheme.

Big Pillar District: Extraction of these valuable pillars has been successfully dealt with, as regards both safety and economy. The great thickness of coal-seam necessitates special care on the part of workmen and manager to avoid danger.

Kiwi: The solid and pillar sections of this district are exclusively worked by miners. The mine is well timbered and ventilated.

Extensive tunnel and bridge works are in progress to deviate the Ironbridge main haulage-line from a given point in the mine to a central loading-station on the Coalbrookdale main line. This conjunctive system of loading and hauling is calculated to simplify operations and maintain a more uniform and increased output; but more powerful machinery will be required. Further, in addition to the present working-fan, a ventilating-shaft 86 ft. in depth by 100 square feet in area is sunk and connected with the main dip works. A 7 ft. diameter "Schiele" fan is in course of removal and re-erection.

Reports and other provisions of the Act are strictly attended to and kept to date throughout both the Denniston collieries; also, more extensive systems of ventilation are steadily proceeding. During the year six inspections have been made of the collieries. No serious accidents have occurred.

Mr. Dixon kindly furnishes the following: Since keeping a record of shots fired from the 1st September to the 31st December, 1902, the facts are as follows: 18,903 shots fired; coal won as a result, 81,662 tons, yielding an average of 4·32 tons per shot. In addition there were 110 shots fired in stone. The percentage of miss-shots was satisfactory, being only 0·24 of a shot per hundred. This is exclusive of all our blasting in water-drive and deviation work, and therefore refers solely to coal-winning.

Coal Creek Coal-mine (George Walker, lessee).—(4/12/1902): The lessee has intrusted the working of this valuable property to two miners, who take a special interest in the safety of the mine, and procure a first-class coal, suitable for household or steaming purposes. The coal is chiefly used for dredges on the Buller River.

Whitecliffs (Job Lines).—(4/12/1902): Owing to non-demand for the coal the mine has been shut down during the past six months, otherwise the mine is in good order.

Flaxbush Coal-mine.—(3/12/1902): There are three miners employed getting steaming-coal, chiefly for the supply of Mokoia and Feddersen's dredges. The thickness of coal-seam varies from 2 ft. to 2 ft. 6 in., and, being highly inclined, is worked in a similar method to a quartz reef. Timber is freely used, and ventilation maintained by rises direct to the surface.

Langford Coal-mine.—Further effort has not been made to reopen this mine.

Bourke's Creek Coal-mine.—(13/10/1902): In consequence of the rise pillar-working being totally exhausted to the mine-mouth, output of coal has been suspended for several months pending fresh development. The lessees, however, have recently reopened their low-level rock adit in view of working the deeper areas.

Archer's Freehold.—(16/10/1902): With respect to the working on this property there is practically no change of importance, mining operations being confined to the adit level, while ventilation is carried forward by rises driven direct to the surface as the face proceeds. Output has increased materially as the superior quality of the coal secures a ready market, the small coal being used on the local dredges.

Coghlan's Freehold.—(16/10/1902): This mine was recently opened near the cap of the hill, and the coal conveyed by a self-acting incline to the main road. Quality and thickness of coal-seam are similar to those on Archer's property.

The Crown land property recently disputed between Archer and Coghlan is not being worked at present.

Lockington's Leasehold, Bourke's Creek.—Regarding the progressive stage to which the development of this leasehold has attained, it may be said that construction of tram-lines and driving of rock tunnel to win the coal-seam are practically carried out on the deferred-payment system, as the works stated were at a standstill, the miners having struck work on the morning of my visit. According to Mr. Lockington's statement, 12 chains of tram-lines and 100 ft. of rock tunnelling are required before the coal can become a marketable product.

Blackadder's Leasehold, Reefton Town Belt.—The development of this leasehold comprises a rock tunnel, driven from the eastern boundary, intersecting the coal-seam at a distance of 100 ft., but further operations have been suspended in this direction pending the results disclosed from the western side. Unfortunately the western slope of the Town Belt forms a huge slide, and, although driving has been extended 285 ft. into the hill, solid country has not yet been met with.

Murray Creek Coal-mine.—(14/10/1902): Notably, the change which transfer of ownership has effected in the development of this open-faced property reflects credit on the present owner, as some thousand tons of valuable coal has been mined and utilised for steaming purposes at Murray Creek battery. This mine was formerly worked for household fuel only, the small coal being sluiced into the creek for want of a profitable market.

Phœnix Coal-mine (John Knight, owner).—(14/10/1902): In view of extending the low-level district of working to connect with the originally worked rise districts, the fault-line intersecting the lease has been cut in order to facilitate trucking and ventilation. Effective ventilation is carried forward by holings into the rise level. These workings are in good order, and the coal, which is of superior quality, finds a ready market.

Lankey's Creek Coal-mine.—Nothing further has been done on this leasehold since the claim was "jumped."

New Inkerman Coal-mine.—Stoping is continued on the adit level, and the coal is used exclusively for steaming on the gold-mining company's property.

Dent's Creek.—(14/10/1902): This lease was surrendered recently.

Progress New Mine.—(14/10/1902): The supply of steaming-coal for the company's works has been chiefly won from pillars which are now nearing exhaustion. Provision is made, however, for the maintenance of output from a newly opened section of the lease. Timber is freely used, and the removal of pillars is effected without loss.

Loughnan's Coal-mine.—(14/10/1902): Construction of dray-road and tram-line has been continuous, to admit of working the coal-seam on the new leasehold, conditions and quality being favourable.

Burning Coal-seam at Boatman's.—The Mines Department having granted authority to extinguish the fire, the drainage of the *pakihis* and Flower's Creek was speedily effective, and the full supply of water turned into the burning mass, which when visited (26/1/1903) was practically extinguished. Owing to the excessively dry season the water-supply has not been constant.

Blackball Colliery (owners, Blackball Coal Company, Limited; James Leitch, mining manager).—(25/11/1902): Notwithstanding the disadvantages incidental to the removal of pillars under soft friable roof, coupled with the varied difficulties experienced in the early part of the year from underground fires resulting from spontaneous ignition, the output has been exclusively from the extraction of pillars. This is the highest recorded for any annual period, showing an increase of 20,446 tons over the preceding year, and a proportionate excess of tonnage as compared with the original calculations for area exhausted. Previous to the removal of pillars, outbreak of fire in the solid working was suppressed generally by water under heavy pressure; but subsidence of the strata eventually cut off all means of water-supply as the exhausted areas gradually retreated homeward. Under these conditions a continuous system of walling was necessarily enforced, whereby the heated areas were effectually sealed, these precautions being effected by crib-log and stone-built stoppings packed between the walls with loose clayey matter to a width of 15 ft. Fortunately, the system adopted has not only proved effective in suppressing further spread of fire, but any resultant gases exuding through the stoppings are diffused without any perceptible detriment to the ventilating-currents.

Dip Area: Mechanical and other preparatory works in connection with the development of the dip areas are now engaging the attention of the management, in order to maintain the output as the pillars in the rise workings become exhausted. These works are now in a progressive stage of efficiency, and a coal-seam of splendid quality has been exploited to a distance of 350 yards to the dip of the main level. In addition to the progressive works stated, increased facilities for haulage and ventilation will be provided by a duplicate rock tunnel 10 ft. by 7 ft. in the clear—driven on an angle of 10°—to strike the coal-seam at a calculated distance of 9 chains, at a point half a chain west from the parallel of the present haulage-tunnel. On completion of the haulage, pumping, and ventilation installations the dip headings will be vigorously driven to the boundary, on 1-in-12 gradients, to a distance of 110 chains, whilst the upper developed top-seam section will be opened out and worked on long-wall principles. This projected line of development will enable the company to work the field homeward from the dip boundary, and thus provide approved precautions against the possibility of fire from spontaneous ignition. The endless-rope-haulage installation, capable of raising 500 tons per day of eight hours, is early expected from England. These engines comprise 15 in. diameter double cylinders, with 30 in. stroke, fitted with all the latest devices and improvements relative to modern haulage. Boiler and electric pumping installation are complete. Reports to date and other requirements of the Act are strictly enforced. Systematic timbering is made a special feature in the workings. Seven inspections were made during the year. No serious accidents reported.

Brunner Mines (R. Alison, mining manager).—Although these mines have worked single shift during the whole year under gradually exhausting pillar areas, output has been steadily maintained, showing a gross tonnage of 116,714 tons. John Coulthard is now responsible mine-manager for the whole area.

Brunner Mine (14/11/1902): Apart from the ordinary routine of operations in opening out the old disused headings in order to exhaust the pillars effectively, fresh developments at this colliery are events which practically belong to bygone days, as output is, and has been for several years past, exclusively from pillar-extraction. In fact, the question arises, how has the mine kept going so long? The colliery has certainly had a longer life than it was credited with some years ago, but this is due principally, if not entirely, to the fact that soft coal, which was originally left standing in pillars for want of a market, has within the last few years attained a commercial value. It is owing to the careful extraction of these pillars and sending out loose coal and slack formerly left in that the output has been so long maintained.

To further extend the present dip working and win the pillars direct to the goaf of the original dip, a low-level water-channel was driven from the edge of the river, by which the desired area has been efficiently unwatered to a depth within easy access of the haulage; also, in the rise districts facilities have been further provided to carry out the continuous exhaustion of the Ladysmith and Coolgardie districts conjointly. The bank-head, with the usual brake appliances, was recently shifted down to a lower level on the self-acting incline. The timbering of this incline tunnel has been thoroughly overhauled and put in good repair. Ventilation, induced by a "Scheile" fan over the whole areas, gives an average reading of 20,000 cubic feet per minute. Reports are kept to date, and there were no serious accidents. Seven inspections were made.

Tyneside Colliery (James Armstrong, mine-manager).—This old pit was recently unwatered and opened out, the workings standing in the same good order as when shut down. Screening, loading, and other surface plant are nearing completion. There were six colliers getting coal when the mine was last inspected. Travelling-road to the workings is provided by adit tunnels. Coal is raised through a brick-lined vertical shaft 90 ft. in depth.

Point Elizabeth State Coal-mine (A. B. Lindop, manager).—The operative mining developments comprise the driving of Nos. 1, 2, and 3 rock tunnels in view of winning the main or exhibition coal-seam; while the No. 4 tunnel started recently on the north bank of the Seven-mile Creek is calculated to win the upper seam. Regarding the regularity of thickness and quality of the last-named seam, reliable data are afforded in the coal-tunnel opened and worked by Kane on the

western boundary of the coalfield. Driving of Nos. 1, 2, and 3 tunnels is through compact marine deposit, the sides and roof of which practically insure absolute safety without the aid of timber. Ventilation is induced efficiently in Nos. 1 and 2 drives by fans driven by oil-engines, and at No. 3 by water-blast. The railway-works have furnished employment to a considerable number of men, while attention is being directed to determining the various sections of haulage tram-line. Reports are kept to date.

Kane's Coal-mine.—Cancellation of this tunnel license under the Mining Act was granted at the Warden's Court, Greymouth, on the 1st December, 1902.

ACCIDENTS AND FATALITIES.

Brunner Mine.—(8/1/1902): Edward Smith sustained fracture of leg by fall of coal at face. (9/1/1902): Charles Seaton sustained fracture of knee while turning his truck on a flat-sheet.

Millerton Mine.—(10/1/1902): Charles Murray had his thumb bruised while undoing a haulage-clip. (15/5/1902): John Prout sustained internal injuries whilst lifting a heavy cap-piece. (10/7/1902): Edward Callaghan had his little finger bruised (necessitating amputation) by a truck up-ending. (11/7/1902): Mark Fraser, while jigging a loaded truck, sustained fracture of right leg by chain dragging it against the brattice-prop. (20/8/1902): Whilst Thomas Mitchell was running out a loaded truck from the foot of west incline heading, a running truck, striking him on the knee, inflicted injuries which terminated fatally on the 3rd December, 1902. (28/8/1902): Whilst Joseph Kennedy was clipping the loaded trucks at Mine Creek haulage terminal he was jammed between two full trucks, causing injuries which terminated fatally two days after. Verdict: "Accidentally killed."

Denniston.—(11/9/1902): William McFarlane, winchman, sustained fracture of the skull by winch-handle reversing on the middle brake, Denniston incline; injuries not serious.

GENERAL REMARKS.

Comparing the ratio of production and consumption from industrial and commercial standpoints, it may be said that the principal factors which have contributed to increased production are the rapidly increasing export trade to oversea ports, and the increased industrial activity and steady growth of population. Stimulated by these facts, the Westport Coal Company are actively pushing progressive development in drainage, haulage, and ventilation, conducive to further increase of output with economy and safety; whilst the Blackball Coal Company are expending largely in procuring up-to-date plant in order to develop their extensive dip areas. The system adopted by the latter company to win these areas is to drive the winning-headings direct to the dip boundaries and exhaust the field homeward, thus minimising the risk of spontaneous ignition.

It is satisfactory to note that the gross tonnage (753,816) raised from the West Coast inspection district, compared with the preceding year, shows an increase of 84,281 tons. A review of the potentialities of the active producing centres justifies the prediction that, unless existing conditions are changed by unforeseen causes, the increase in the rate of production will be continued throughout the present year.

I regret to report the death of two young persons from accident in Millerton Colliery.

FOREIGN TRADE.

Westport Coal Company shipped 52,740 tons to ports outside the colony, being an increase of 20,504 tons on the preceding year.

I have, &c.,
R. TENNENT,
Inspector of Mines.

The Under-Secretary, Mines Department, Wellington.

No. 4.

Mr. E. R. GREEN, Inspector of Mines, to the UNDER-SECRETARY, Mines Department, Wellington.

Office of Inspector of Mines (Southern District), Dunedin,
30th March, 1903.

SIR,—

In accordance with the requirements of section 67 of "The Coal-mines Act, 1891," I have the honour to transmit the following report on the coal-mines in the Southern District for the year ending the 31st December, 1902:—

CANTERBURY.

Springfield Colliery, Springfield (J. Taylor, permit).—(15/9/1902): Since last visit a creep has occurred over the northern section of workings, where pillars had been partially robbed. The lower level and air-shaft at bottom being affected, timbers crushed by squeeze are being renewed. Only fireclay and coal for the pottery-works being won. (9/10/1902): The recent crush now almost settled. A new road is being cut through the pillar to air-shaft bottom, also new travelling-road and airway being made through old workings to the rise from Campbell's heading. Ventilation throughout the mine fair.

Victoria Mine, Springfield (Luke Greening, permit).—(15/9/1902): The cross-measures drive cut a 4 ft. seam of coal, having an 18 in. band in the middle. The seam is being worked long-wall, and the band forms convenient stowing. The dip is being driven in fireclay of good quality, the clay being railed to Christchurch for manufacturing purposes. Mine well timbered and in good working-order.

P. Campbell and Son, Springfield (P. Campbell, permit, manager).—(15/9/1902): Reopening Jackson's *Eureka* Mine, which was closed many years ago. The dip incline is 3 chains to the face, but the coal-seam is only from 18 in. to 23 in. in thickness, and is being worked long-wall. On the east side of the dip the coal is altered and cut out by a basaltic intrusion. Mine well timbered and air good.

Homebush Colliery, Glentunnel (manager, J. C. Campbell).—(16/9/1902): The new dip off the main haulage level is down 5 chains to the face in coal of excellent quality. Pillars in the old mine continue to be skilfully extracted, from 90 to 95 per cent. of the seam being won. Timber used in abundance, most of which is drawn and used again. The false roof in some of the places requires and receives close attention. Through long experience the men are well aware of the nature of the roof, and, exercising due care, accidents are rare. (10/10/1902): This visit was paid in consequence of an accident to John Marsh (bruised shoulder and arm by a fall of coal from side of pillar on the 30th ultimo). Marsh had been wedging a fall of coal from the pillar when a lump came away from a false back, inflicting injuries mentioned. Timber plentifully used.

St. Helen's Colliery, Whitecliffs (H. Levick, permit).—(16/9/1902): The new low level at 73 yards cut an 8 ft. seam of coal, thus giving the place a new lease of life. A half-yard band of dirt in the centre of the seam provides convenient stowing, coal being worked on the "blocking-out" system. Levels in the seam are driven right and left, and a rise drive to surface provides for return airway. (10/10/1902): The 8 ft. seam thinning to north. Mine well opened, and almost the whole of the seam being extracted; levels being driven to boundary of district, and coal blocked out coming back. Timbering efficient; air good.

Brockley Pit, Glenroy (Henry Lee, permit).—(16/9/1902): The south level had been driven 70 yards to a roll and stopped; the north level is driven 25 yards; average thickness of seam, which is vertical, 3 ft. Timber, having been light in first instance, has proved inadequate to withstand pressure from sides, and is being renewed gradually. An uprise for air is 40 ft. to the surface.

MacFarlane's, Staveley (Llewellyn John).—(15/10/1902): Two trial drives on north bank of Taylor's Stream had proved failures. Prospecting-drive on south bank is in 174 ft. in vertical measures, abutting limestone formation. Strata passed through, dark clays with bands of sandy clay and running sand. Drive well timbered. Coal, when found, is required for lime-burning purposes.

Mount Somers Coal-mines, Mount Somers (Andrew Thompson, manager).—(18/9/1902): No. 1 or old mine: Only one man now employed here getting steam coal. I had to draw the manager's attention to the careless manner in which blasting-powder was being handled. No. 2 mine: The levels are being pushed on in good, clean coal, bords off same being worked 8 ft. to 10 ft. high, coal being strong; roof standing well. Dip of seam, south 1 in 4½. Air-shaft for return required. Owing to second outlet being on same level with intake and natural ventilation only, air-current comparatively stagnant.

Orr and Harris, Mount Somers (John Harris).—(18/9/1902): An area on Crown lands recently granted on the south bank of Chapman's or Woolshed Creek. Prospecting-drive is in 4 chains in a 5 ft. seam of coal alongside a "roll." The main seam has not yet been struck, but is expected to be found at an early date.

Rutherford's Mine, Albury (J. M. Willetts).—(19/9/1902): The old level is now used as a water-level, a rise crosscut being used for haulage-way, and a pair of headings being driven off it to communicate with an air-shaft to be sunk in the near future, original air-shaft being in a state of disrepair.

NORTH OTAGO.

Awakino Pit, Kurow.—(10/7/1902): No one about. Mine-mouth fallen in. Coal has recently been taken from the creek-bed, where 4 ft. to 5 ft. of gravel stripping lays coal bare.

Shanks's Pit, Wharekuri (A. Shanks).—(10/7/1902): Heat and damp from lower levels (old workings) squeezing through the joints of the coal. The seam being vertical, although 40 ft. in thickness, only about one-third of the coal has been won.

Otiake Coal-pit, Otiake (Simpson and Cunningham).—(10/7/1902): The prospecting-shaft has collapsed, and is now filled up to the surface. An adit level (timbered) had been driven through sandy clay seams, and at 3 chains the coal-seam was struck, and found to be 18 ft. in thickness (vertical). Strike, north-west and south-east. An air-shaft is required, sinking about 60 ft. For many years no work had been done on this seam, which was formerly known as Porter's Pit.

St. Andrew's Colliery, Papakaio (T. Nimmo, permit).—(9/9/1902): Three men drawing pillars; mine well supplied with props. Main road and return airway to furnace in good order. Air good; report-book to date.

Prince Alfred Colliery, Papakaio (J. Willetts).—(9/9/1902): The pillars are now drawn back to the haulage-road, and this mine is nearly finished. Timber well set; air good. A prospecting-drive being put in to the adjoining hill is well timbered.

Ngapara Colliery, Ngapara (W. Nimmo, permit).—(11/9/1902): Manager absent in town for the day. Three men employed. Seam thick and strong. Mine in good order. Shots are now fired at the end of each shift, thus avoiding pollution of air formerly complained of.

McLeod's Kartigi (C. E. Twining).—(10/9/1902): Prospecting on the rising ground forming the northern bank of Trotter's Creek. Several small seams have been driven on, but not sufficient work yet done to prove or estimate the value of the field.

Shag Point Colliery, Shag Point (Thomas Shore, manager).—(17/2/1902): Water out at last, after five months' baling and pumping. The new under-sea seam is driven on 30 ft. to north side of level. Three new feeders were struck at intervals of 2 yards, making the total flow of water from the seam 24,000 gallons per hour by admeasurement. The roof to the seam is composed of quartz conglomerate, hard and solid, except for the cutters or joints whence the water flows. Water still strongly brackish. I examined the mine, and found that it had not been much affected by the flooding. Air good; plans and report-books to date. (8/4/1902): Proprietors having decided to discontinue operations, pumps and plant have been drawn, and dismantling operations are almost completed. Some of the plant is being removed to the Lovell's Flat Mine. (8/7/1902):

Nothing doing here now. Water in shaft rising slowly, at the rate of about 5 ft. per week. Surface of water is at 220 ft. below sea-level. (10/9/1902): Negotiations pending for opening the old mine and winning pillars said to have been left in, and estimated to yield several thousands of tons of coal. (16/10/1902): New cross-measures drive started 2 chains west of main shaft, dipping inland at 1 in 4. Drive, 6 ft. by 6 ft., timbered. Spoil being tipped into shaft to strengthen bottom. (16/12/1902): Dip drive at 200 ft. struck the seam, which was found split by a stone band. A level is being broken away south, in expectation that the seam will make in that direction. Surface of water in shaft, 158 ft. from surface, or 116 ft. below sea-level.

Allandale Colliery, Allandale (A. S. Gillanders, manager).—(2/4/1902): Air at intake, 6,500 cubic feet per minute. No. 3 seam: Three pairs of men drawing pillars. No. 2 seam: Making uprise airway to No. 1 seam, and preparing to draw pillars. No. 1 seam: Long-wall workings on the south side and bord and pillar on north side of level. The seam is opening out on good coal. Air dull in two places, which would be through in two days, and free circulation established; otherwise air good throughout the mine. Timbering well attended to; roadways in good order. Trial bore on site of proposed new ventilating-shaft is down 214 ft. (8/7/1902), (C. H. Westfield, manager): Air at intake, 7,200 cubic feet per minute. No. 3 seam: Pillars nearly finished. No. 2 seam: Only a few men taking out the last of the pillars. No. 1 seam: Main body of the men in north workings. All places systematically timbered. Air good, except in No. 3 seam pillars. The main intake requires cleaning up a bit. The north level is gradually swinging round from north to north-east, apparently passing round the rim of an inverted basin. Thickness of main seam is becoming variable. At an upthrow fault on the north level coal pinches from 6 ft. to 2 ft. 6 in. (9/9/1902): Men idle to-day. Mine in good order all over. New air-shaft, 8 ft. by 4 ft. inside the timbers, is down 111 ft. (17/12/1902): New air-shaft, now completed, is 280 ft. in depth, and provides fresh air to the faces, the main engine hauling-plane forming upcast as formerly. Airways, travelling-ways, and working-places in good order. Rules posted; report-books and plan to date.

SOUTH OTAGO.

Fernhill Colliery, Abbotsford (James Gray, manager).—(18/4/1902): Working-places in good order; stoppings on old mine-workings tight and standing well. Mr. Gray is taking the precaution of driving narrow under the Silverstream Water-race. (3/9/1902): The new mine-workings being in the solid places are standing in good order. Surface "plumps" on the old mine area continue to increase in number and size, several being quite close to the Silverstream Water-race. Mr. Gray informed me that the Dunedin City Corporation were considering the matter of laying a pipe-line siphon to cut off that portion of the open race over the colliery-workings. This would be a decided benefit to all concerned. The fire in old workings is kept damped down. Stoppings in good order and well attended to. Thomas Gray, banksman, sustained fracture of left forearm on the 8th September while trying to prevent a box of coal tipping up. Gray could easily have stepped aside and avoided injury.

Freeman's Coal Company, Abbotsford (R. Hill, manager).—(18/4/1902): No. 1 mine: Work being gradually brought back toward the main dip; pillar-extraction being successfully conducted; roof in bottom places low, but safe, and well timbered. Air good; plan and report-books to date. No. 2 or new mine: Level face in 10 chains; back level kept well up. Air good. (3/9/1902): No. 1 mine: Robbing and retreating. A high percentage of coal has been won from this mine, which is now rapidly drawing to a close. Leakage of damp from the waste is considerable, and close attention is given to the ventilation of the working-faces, notwithstanding which the air in the bottom places was polluted to some extent, but was cleared in my presence by a rearrangement of the brattice. No. 2 mine: The level is now connected with Zander's shaft. Air excellent. This mine is being driven to open and work a block of virgin ground which had been well proved by the former workings. (23/10/1902): No. 1 mine: Only two pairs of men now working here, the few remaining pillars being almost exhausted. Air good. Rules posted; reports and plan to date.

Walton Park Coal Company, Walton Park (J. Kenyon, manager).—(4/7/1902): Old workings well stopped off with tongued-and-grooved wood stoppings kept well plastered with damp clay. The work consists entirely of drawing pillars and dropping head-coal, and is kept well outside the one-chain limit of the railway reserve. Air good at working-faces and on travelling-ways. (23/10/1902): Pillars continue to be drawn safely, the line of stoppings in front of the waste being well attended to. The safety barrier of 1 chain between the present workings and the railway reserve strictly maintained, otherwise all coal being drawn and the surface broken, cover being not more than 50 ft. to 60 ft.

Jubilee Colliery, Saddle Hill (J. Campbell, manager).—(2/9/1902): Mine-workings in good order. A new entrance having been made on the north side of the property, length of draw now considerably shortened. Timbering where necessary well attended to, and ventilation satisfactory.

Saddle Hill No. 1, Saddle Hill (W. H. L. Christie, manager).—(4/7/1902): Mine in good order generally, and ventilation satisfactory. The dip is being extended, and preparation made for obtaining pillar-coal from some old workings in the vicinity.

Saddle Hill No. 2, Saddle Hill (W. H. L. Christie, manager).—(4/7/1902): Air at working-faces not quite satisfactory, and a new upcast shaft is to be sunk at an early date. New tramway and railway-siding accommodation has been provided, and the proprietors are now in a position to place a considerably increased output on the market.

Burnweil Colliery, Saddle Hill (A. Harris, manager).—(13/5/1902): Recent heavy rains had caused flooding of the mine. Surface "plumps" in a hollow had allowed storm-water direct access into mine. Vertical steam-boiler and "Snow" pump having been placed in position, water is now overcome. The coal-seam is 20 ft. and upwards in thickness; roof strong and safe. Mine in good order; report-book to date.

Glenochiel Colliery, Saddle Hill (D. Bryce, permit).—(13/5/1902): Work consists of robbing pillars and roof-coal in old mine. Damp from fire still troublesome, notwithstanding considerable area of roof fallen and sand down. New mine-entrance well timbered. Dip progressing slowly.

Mosgiel Colliery, Saddle Hill (James Sneddon, manager).– (13/5/1902): A "sit" occurred on the 9th and 10th instant, and the lower dip pillars became lost and pump buried, due, no doubt, to recent wet weather and water percolating through surface breaks where pillars had been drawn. Only a few roadside pillars remain to be worked consistent with safety, and the mine may be considered as nearly worked out. Report-book and plan to date.

Riccarton Coal Company, East Taieri (M. Neilson, manager).—(13/5/1902): Air at intake (7,500 cubic feet per minute) ample, but not conducted to faces. At 2½ chains from brow of dip a trough is met, and meantime the seam is rising against the general direction of dip. A local disturbance probably.

Lauriston Colliery, Brighton (J. R. Walker, owner).—(2/9/1902): Roof bad, and places being now driven narrow or timbered. Care exercised, and no risk taken.

McColl's Pit, Brighton (D. L. McColl, owner).—(2/9/1902): No one about. Mine-entrance locked. Only small amount of trade evidently.

Fairbairn's, Akatore, Taieri Beach.—A pair of levels are driven about 1½ chains, and stenton through. I can find no previous record of this pit, which the owner informed me had been worked in a small way for a number of years. About 450 tons altogether had been taken out for local requirements.

Bruce Mine, Milton (A. Young, owner).—(26/9/1902): Mine in good order. Not much doing.

Strip-and-at-it, Milton (N. Hardwick, owner).—(26/9/1902): Mine in good working-order, but trade insufficient to induce owner to continue working.

Fortification Railway and Coal Company, Akatore, Milton (A. Harris, manager).—(14/2/1902) The old mine return airway having become closed by a heavy fall, the men had been withdrawn and a contract let for winning coal from the new mine It appeared that the mine-manager, Mr. A. Harris, had been employing more than twenty men under his second-class certificate, and, a prosecution having been decided upon, the Magistrate inflicted a fine of £1, and costs £3 16s., for breach of the Act on the 15th January, and for a similar breach on the 24th January he was fined 10s., with costs £1 10s. The new mine will form a more convenient outlet to railway, which is rapidly nearing completion. Loading-bank, also hauling engine and boiler being erected. (16/6/1902), (Thomas Barclay, manager): The branch line from Milton Railway-station, five miles and a half in length, is now completed. New mine: The roof is tender in places, and wide bords require centre props. Steps are being taken to improve the ventilation. Brattices and air stoppings had been allowed to get into a state of disrepair, consequently air deficient in the far-in places. Return airway and upcast shaft in good order. (26/9/1902), (M. Straw, manager): The crosscut dip drive is being advanced rapidly and bords broken away. The coal is being worked to a parting 5 ft. from the floor, leaving a sound roof of 2 ft. of coal overhead. Sufficient timber not being used in the pillar-workings to the rise, but, a supply having come to hand, this defect would be remedied. Rules posted; report-book and plan to date.

Glenledi Pit, Milton (N. McGilp, owner).—(16/6/1902): No one about the mine. (26/9/1902): No one about, but a start has been made to get coal again from the old opencast face.

Adam's Flat Mine, Adam's Flat (J. Reid, owner).—(26/9/1902): 8 ft. of overburden being stripped preparing for the incoming threshing season.

Paskell's Pit, Adam's Flat (J. Paskell, owner).—(26/9/1902): Face fallen in. Coal has not been taken out for some time.

Wallsend Pit, Lovell's Flat (R. Hewitson, owner).—(18/6/1902): Stripping kept fairly well back from the face.

Lovell's Flat Colliery, Lovell's Flat (James Carruthers, manager).—(9/4/1902): Dip 400 ft. to face, in good coal. Roof in bords cutting, and timber freely used. North level in 15 chains; thickness of coal remains at 5 ft.; breast of work only 2 chains up to the soft coal, which is gradually cutting places out. North heading at 8 chains; coal not improving. South-level face is promising in appearance. Air good, and timbering well attended to. Plan and report-books to date. (20/6/1902): The fire in south-side old workings occasionally gives trouble, but is carefully watched and watered as required. As on the occasion of my last visit, the seam continues thin in north and south levels, and the dip prospects remain good. Ventilation good throughout. (25/9/1902): An air-flue with furnace has been built on the surface, leading from the mouth of the second-outlet shaft. Underground the dip workings, where most of the men are employed, are generally in good order. A large quantity of timber is used in the bords, and an adequate supply kept below for use as required. Rules posted, and report-books to date. A fire broke out on the pit-bank on Sunday, the 12th October, which destroyed the buildings, loading-bank arrangements, and pit-head framing. In consequence, the pit was closed for a few weeks while repairs were being effected. The cause of the fire has not been discovered.

Tuakitoto, Lovell's Flat (Dunlop, owner).—(20/6/1902): The ground landlord taking out coal for own use only.

Benhar Coal-mine, Benhar (James McLeod, permit).—(18/6/1902): Mine in good order. New dip workings in lower seam have been opened since my last visit. Coal strong and roof safe. Air good.

Mount Wallace Pit, Stirling (D. Shaw, lessee).—(18/6/1902): Extension of main dip being continued in strong hard coal.

Taratu Coal Company, Kaitangata (Joseph Shore, manager).—(28/8/1902): The company recently formed is prosecuting active operations. A branch line of railway eight miles in length is being brought in from Lovell's Flat Railway-station to the mine. Coal outcrops to the surface

are frequent on the property, and two of these are being driven on to north and south side of main gully. The main south level is 5 chains to the face in coal all the way, bords being broken away to right and left, and an air-drive for return being driven to daylight. The seam is giving off water heavily. Fortunately the mine is self-draining. (12/12/1902), (H. C. Longstaff, manager; C. E. Twining, supervising engineer): Main south level driven 9 chains; seam practically level; roof being jointed; props are regularly set in bords. The north level, which is driven about 1 chain to the face, is standing at present. Boring operations are being conducted up main gully, eastward of present workings. The branch railway-line is completed, and the loading-bank is being erected.

Kaitangata Colliery, Kaitangata (G. H. Broome, manager).—(11/2/1902 and 13/2/1902): Air-volume at intake, 21,600 cubic feet per minute. McDougall's heading section: Robbing being well conducted. Air good. No. 4 dip section: North-going places stopped on No. 6 fault. In five places roof bad, and timber kept well up to the faces. No. 3 dip workings finished and winch removed. No. 2 dip section: Working-places, return airway, and main return airway to furnace, all in good order. No. 2 heading: Return becoming small, but owing to the angle at which No. 6 fault lies there is only a small corner of coal left to work out. (10/4/1902): Air at intake, 18,980 cubic feet per minute. McDougall's section: Robbed back to within half a chain from wheel. Drum-level section re-opened; also Penman's heading, where eight men are working on pillars. No. 1 heading: Four men on pillars. No gas. No. 2 heading: Four men. A little gas in Gribben's place. No. 4 dip: Drawing pillars on both sides of the dip. No. 2 dip: All on safety lamps, a blower of gas and water having been struck in the low level. Ventilation: Air warm in pillars in McDougall's section, otherwise fair throughout the mine. Timber: Adequate supply throughout, but required closer to faces in several instances. The fire behind brick stopping on main haulage-road is warming up at the old place, and is to be opened and watered to-night. (13/6/1902): A new cabin has been constructed on the main stone drive for deputies' use. McDougall's section now robbed back to the top of the heading. This work has been successfully conducted, but not without difficulties inseparable from winning the utmost from expiring workings. On careful computation it is estimated that about 85 per cent. of coal in this section had been extracted, a creditable record when it is considered that the seam averaged 30 ft. in thickness. The strong nature of the roof and the softening floor causing "heave" facilitated extraction of remnants of pillars. Large quantities of black damp generated (the product of incipient combustion) were retained by successive rows of stoppings which had been put in at regular intervals. Roof and floor now meet throughout the district robbed. A contract having been let, the stone-drive extension to crosscut the measures eastward is now being prosecuted, present intention being to cut Nos. 5 and 6 faults. No. 4 dip workings clear of gas. No. 6 dip has been started to win a patch of main seam to the dip of stone drive. Main return airway at No. 2 heading requires attention, otherwise airway to furnace in fair order. Brick wall cool, having been partially renewed by ash stopping. (17/6/1902): No. 2 dip: Blower decreasing in force, but water now a steady flow, and is no doubt the growth from shaft-workings. Gas making off soft and faulty coal at faces up against No. 2 fault. Air stoppings required on top level to force whole of current available round the faces of the working-places. J. Gadsby, miner, having inadvertently passed a lamp-station notice with a naked light on his head, the mine-manager subsequently laid an information for breach of Special Rule 74, when Gadsby, who pleaded guilty, was convicted, and mulcted in costs 7s. McDougall's heading section: Stopping on heading just finished, and the section now completely stopped off. North-section pillars on level being brought back. I could not find gas, but, it being occasionally reported, only safety lamps are being used. An ash stopping required at disused stables return to prevent loss of air by leakage. Owing to the comparatively large number of eye accidents from proud or flying coal, causing septic poisoning, the management have provided rectangular gauze protectors, about 6 in. by 5 in., to protect the eyes and faces of workmen; mesh equals 64 per square inch, bound with soft leather at bottom and top, and having tapes for fastening to cap or head. These protectors are served out by the deputies, and when not in use are hung on a prop convenient to the face. (18/6/1902): No. 2 dip: Stoppings having been put in top level, body of air now confined to circuit. Working-faces all clear of gas, which, as it makes, is diluted and conducted direct to the return. Examined north side, No. 2 heading districts, and return airway, which requires attention in places. A new underground magazine for explosives has been made at a convenient point off the main stone drive. (5/8/1902): Air at intake, 22,680 cubic feet per minute. McDougall's section finished; stoppings in, and now drawing pillars in the heading. North side: Nos. 1 and 2 headings will be finished this week and stopped off. All men on safety lamps in this section. No. 4 dip: Only three men now working in the bottom bord. Return airway from north side in fair order, two repairers being at work. The main return airway to furnace requires, and is receiving, attention. An explosives-magazine has been erected on the hillside, well away from the mine-mouth. Detonators are kept stored on the surface in a separate magazine. (2/7/1902): No. 2 dip workings clear of gas and in good working-order. No. 4 dip: Air dull in bottom bord. (27/8/1902): Air at intake, 21,600 cubic feet per minute. No. 2 dip: The coal in this district has ever been soft, and considerable waste resulted. Working-bords are now stopped off, and a few hard-coal pillars are being brought homeward. North section: Nos. 1 and 2 headings are stopped off at bottom. No. 4 dip: The last of the pillars are being taken out. Return airways in good order, having been recently cleaned up. (4/9/1902): No. 2 dip: The only men working here were drawing plant. No. 4 dip nearly finished, only two stumps of pillars left. Air fair. No. 2 dip: Bottom level cut off by rising water. Three pairs of men splitting pillars near the roadside. (2/10/1902): Air at intake, 20,250 cubic feet per minute. McDougall's heading section finished. Penman's heading section: Only two pairs of men working on pillars. Air warm, but no gas. North section: Pillars on roadside being brought rapidly back; all stop-

pings well attended to. (18/11/1902): Stone-drive extension in 320 ft. to face. The drum-heading and north-side workings being rapidly exhausted. Brick wall cool, having recently been partly renewed with ash stopping. The main return airway to furnace in good order. The weight which had for some time been felt on stone drive and centre heading appears now to be settled. (19/11/1902): Air at intake, 21,060 cubic feet per minute. No. 7 dip, started off Duncan's level, is down 120 ft. to face in good hard coal. No. 2 dip: Pump drawn and water rising slowly. The three pillars being split are well in, and nearly up to the fault. (2/12/1902): A slight ignition of gas occurred on the 24th November at the top of No. 7 dip. Ralph Barclay, miner, was assisting his trucker, having naked light on head, when the ignition occurred. The ignition was very slight. Barclay was slightly burnt on the neck and arms; off work one week in consequence. On making inquiry into the matter, I learnt that John McCaughern, deputy, had passed Barclay into work without having previously examined the place with a safety lamp. The mine-manager subsequently took proceedings against McCaughern for breach of General Rule 40, section 33, "Coal-mines Act, 1891." Defendant pleaded guilty, and was fined in the sum of £1, with costs £2 2s. McCaughern held the reputation of being a careful and reliable man. Stone-drive extension at 380 ft. struck 6 ft. seam of coal, being upper part of Shore's or 18 ft. seam, which is here split by a band of clay 6 ft. in thickness. The seam is lying at an easier angle than usual, about 1 in 6. Coal good quality. (11/12/1902): The north side now cut off back to No. 1 heading, rails lifted, and stoppings in on level and at overcast. Stone-drive extension: The 12 ft. seam forming the under-part of the 18 ft. seam has been struck, and, lying at 1 in 8, is somewhat flatter than the upper portion of the seam lately cut, indicating a reversal of the general dip of the seams to the eastward of the crown of the seaward range of hills. At my suggestion the manager, Mr. Barclay, has served out copies of the pamphlets of general and special rules to all the officials at the mines, with a view to the men being examined as to their knowledge of the Act in regard to their several duties. Rules posted. Mine-manager's, underviewers', deputies', and enginewright's report-books invariably well kept. An adequate supply of lamp-station notices are kept on hand and posted as required. It is to be regretted that for a considerable period notices posted in certain districts in this mine had been mutilated by some evilly disposed person or persons, and every effort has been made to discover the offender, but without success.

Kaitangata Colliery, Old Mine.—(12/6/1902): After being closed down for some fifteen years on account of fire, and reopened several times unsuccessfully, the old gully mine has been again reopened and black-damp drained off. The fire, long dormant, broke out afresh and fanned up on fresh air getting to it. Water having been laid on under pressure, the fire is now under control, air coursing freely and circulation good all over those parts of the mine we explored. Roof generally standing remarkably well, most of it remaining just as it had been left years ago. There appears to be a fairly large quantity of head, bottom, and pillar coal available. Timber in dry places standing good and sound, probably having been preserved in the atmosphere of CO_2. I could find neither gas nor damp in the mine. (18/6/1902): Between forty and fifty men now working steadily on pillars and head-coal. Air good; no gas to be found. (6/8/1902): Inner section: Old upcast shaft has been opened and now being used, pillars being drawn and tops dropped. Outer section: Old dip being reopened, compressed air laid in, and winch being erected for haulage. (5/9/1902): Examined carefully, but found no trace of gas anywhere; extensive falls reaching to surface where pillars are taken out not only form vents for escaping gases, but gravel running into old bords helps to support roof and maintain roadways, and renders the work of drawing pillars more safe than would otherwise be the case. Air good. (3/10/1902): Robbing in the old dip now finished and rails lifted. Pillars being brought rapidly back in the old workings. Several places fallen high and roof ugly-looking, but kept closely watched, and at present hard sounding. (19/10/1902): Air dull in two of the inbye pillars, which are almost finished. Robbing has been successfully conducted, and nearly the whole of the pillars and roof-coal are being recovered.

Castle Hill Mine, Kaitangata (G. H. Broome, manager).—(12/2/1902): In Nos. 1 and 2 working-places the roof cuts up, and requires timbering to the face of every place. The main seam workings were in good order, as were the return airways to the furnace. I found no gas, although a little is occasionally reported as being found in No. 7 bord, No. 1 dip; it was all clear to-day. Report-books kept up to date. (11/4/1902): The gauge of all roadways had been recently altered from 2 ft. 2 in. to 2 ft., and endless-rope haulage extended to bottom of dip; tension-wheel now situated at the 2,900 ft. mark. The main stone cross-measures drive—or extension, as it is called from this point—is being driven horizontal, and pushed forward steadily by three shifts of men. Face now at 200 ft. past tension-wheel. Work in coal confined to Nos. 1 and 2 dips in 11 ft. seam. Mine in good order. Air good; no gas. (19/6/1902): Air at intake, 28,800 cubic feet per minute. No. 3 dip being opened in the 11 ft. seam, off north level. No gas at face, but a little in pot-holes along the roof of the level, coal from main seam now being lowered down jacky pit. The seam going south is pinching in and contracting between two faults, and, unfortunately, is not opening up the body of coal expected. The stone-drive extension at 5 chains is stopped on a blower giving off gas and water freely, and is being allowed to bleed off before work is resumed. (3/7/1902): Examined Nos. 1 and 2 dip workings. I found two miners named Barris and Mackie working with naked lights inbye a lamp-station notice in No. 2 dip. The face was clear of gas, but the notice had not been taken down. I drew the manager's attention to the men working inbye the notice, when they stated that the deputy had served out safety lamps in the morning and told them that they could use their naked lights after an hour's work. This statement was denied by the deputy, M. Greene, and the manager subsequently prosecuted the men for breach of Special Rule 74, when the Magistrate convicted and mulcted defendants in costs, 9s.

each. I also drew the manager's attention to the necessity of having closer attention paid to the timbering of several bords in the dips. (7/8/1902): Air at intake, 30,480 cubic feet per minute. Traversed the main haulage roadways, working-places, dips, levels, and return airways to furnace, and found all in good order. Also examined the old workings so far as I could get into them, and found all clear. Coal proud in new seam (supposed to be Kaitangata main seam) and in the No. 2 dip. The men are wearing gauze shields for protection to their eyes. (20/11/1902): Air at intake, 31,890 cubic feet per minute. The main extension is standing in an 8 ft. seam of coal, and is being allowed to "bleed," as gas giving off freely. Gas is also making in the advancing places in No. 3 dip, north side. Air conducted to faces by brattice and stentons put up at regular intervals as rapidly as possible. Due precautions taken; only safety lamps used, and lamp-station notices posted. (10/12/1902): Work in Nos. 1 and 2 dips now discontinued. Coal-getting confined to No. 3 dip, north-level section, in the 11 ft. seam, and the shaft-workings main seam. Gas making, more or less, in all the advancing places in the solid. Lamp-station notices posted, and air conducted to faces by brattice. Roof cutting badly in north level and No. 3 dip bords, and timber kept close up to faces. A slight ignition of gas occurred in Geary's bord on the 5th December. The deputy, M. Greene, having discovered a trace of gas at the face in the morning, posted a notice outbye. About an hour later D. Wilson, roadman, passed the notice with a naked light on his cap, when a very slight ignition occurred. I saw the notice, which was dirty and discoloured. After due consideration the mine-manager instituted proceedings against the deputy, and also M. Carson, underviewer, for not having a proper caution-board posted, as required by Special Rule 14 in the appendix to the Act. Defendants pleaded "Not guilty," but the Bench inflicted a nominal penalty of 2s. 6d., with £1 12s. 6d. costs, against each. On the 9th December Robert Russell had been buried for a few minutes under a fallen set of timber and overlying crushed coal, which came away while he was setting a false prop to the set. Russell escaped with a few bruises. The manager reported that a safety lamp had been returned to the lamp-cabin having three holes deliberately driven through shield and gauzes, as though with a pick. The person having used the lamp during the shift had not been identified.

Longridge Mine, Kaitangata (Nesbit Mackie, permit).—(21/11/1902): A new mine opened in the bush on a ridge about two miles below Kaitangata Township. McAllister Bros. had formerly worked the seam on the opposite side of the ridge. Seam 4 ft. in thickness. Coal from the mine carried by tramway to main road.

Wangaroa Mine, Kaitangata (James Smith, owner).—(28/8/1902): No one about to-day, but from appearances the mine is being regularly worked, and is in good order. The toll-bar erected last year remains in position.

Mainholm Mine, Waipahi (Fred Lischner, owner).—(4/5/1902): This mine continues to be worked in a systematic and consequently remunerative manner. A splendid face of coal 22 ft. in depth is being worked. A considerable area is kept stripped in advance of the working-face.

Central Otago.

Coal Creek Collieries Company, Coal Creek, Roxburgh (R. Newell, permit).—(6/2/1902): The seam is strong and thick, and the places are driven high and wide, fair-sized pillars being left. Ventilation good. (11/3/1902): Mine in fair order. (31/5/1902): Mine in good order, but I found that the manager was overstepping the mark by employing more men than his permit allowed. (30/6/1902), (J. Barber, manager): Toward the opencast workings the faces meet the clay roll. Air good in all the faces. The freehold is being prospected slowly. (4/10/1902), (W. Barclay, manager): All the working-faces in the mine are driven to the floor of the seam and up to a "roll" towards the open face; several of the larger pillars are being split. Seam being some 80 ft. in thickness, there is a great quantity of coal overhead which is intended to be worked opencast eventually. (14/11/1902): The prospecting-drive on the company's freehold has reached the coal-seam. Mine-workings in good order.

McPherson's Pit, Coal Creek, Roxburgh (M. McPherson, lessee).—(6/2/1902): Opencast pit; in good order. (4/10/1902): 18 ft. of coal is being taken up in the bottoms in the second bench and 8 ft. to 10 ft. in the upper bench. The drainage-tunnel is acting satisfactorily, and keeps the lower workings dry. There is a considerable percentage of soft coal in the seam, which is carted out of the pit and burnt on the waste-heap.

Craig's Perseverance Mine, Coal Creek, Roxburgh (James Craig, permit).—(6/2/1902): Mine in good order, and ventilation good. (30/6/1902): Coal still being mined from the second level. The mine is kept free from dross, and is in good working-order. (4/10/1902), (A. Craig, permit): The places are driven 9 ft. wide, the pillars being left 7 yards square. The hydraulic hauling and pumping plant continues to give satisfaction.

Gully Pit, Roxburgh (Gourley and Rennie).—(4/10/1902): No one about; pit full of water.

Perseverance Colliery, Alexandra (R. Finlay, owner; Ed. Evans, permit).—(11/2/1902): Owing to illness the proprietor has not been able to devote his attention to this mine, which is consequently suffering from mismanagement; and, as the workings are becoming more extensive, the necessity for the services of a skilled man become more apparent every visit. Roof tender and hard to keep, and the bottom is also swelling somewhat. Timbering not being sufficiently attended to. (19/2/1902): As in the adjoining mine (Lett's), it is found that the dip is flattening and inclined to rise from the trough. The soft seam at 6 ft. from the bottom makes a bad roof, and, timber being costly, the alternative is to drive bords narrow, not more than 8 ft. to 9 ft. in width, when with care the roof arches naturally. I had to draw the manager's attention to dross being left too thick in places—a source of danger from spontaneous ignition in the event of falls from the roof occurring. (3/4/1902), (James Pollock, manager): Attention is being paid to the maintenance of the dip, which is being

driven 7 ft. in width, and is now 16 chains to the face. Bords are now being broken away 6 ft. in width, and gradually widened out to not more than 9 ft., in the hope of maintaining the places without much timber. Ventilation good; air stoppings in good order. (2/7/1902), (J. Frame, manager): The mine is in fair order and ventilation good, but the water being allowed to rise in the dip must ultimately have a bad effect, as the bottom is naturally inclined to swell. (9/10/1902): There are indications of a weight coming on the pillars in the worked bords, and the poplar timber used makes very inferior mining timber. The return airway is in a bad state of repair, but the ventilation is fair at this date. A small duplex "Tangye" pump is being placed in the dip for unwatering the mine. (11/10/1902): The return airway is being put in a state of repair, and the renewal of timber where necessary in the working-places is receiving attention. (11/11/1902): Owing to smooth partings in the roof and a little weight on pillars the sides are difficult to maintain. An adequate supply of timber had not been procured in time, and the roof, where the bottom is soft, had fallen somewhat. The return airway, owing to falls, is not in a proper state for a travelling-way. Mr. Finlay unfortunately continues in a bad state of health, but I impressed upon his manager the necessity for immediate steps being taken to remedy the condition of the mine.

McQueenville Coal-mine, Alexandra (R. Lett, owner; J. Howie, manager).—(11/2/1902): Examined the working-places, also the old workings, and found the mine in a very satisfactory condition. (9/10/1902): Mine in good order generally, but ventilation rather dull. The manager is absent on leave, having met with an accident to his chest by falling forward on the corner of a box in the mine. Mr. Carson, of the Alexandra Coal Company's mine, is acting as supervisor during Mr. Howie's absence.

Drummey's Pit, Alexandra (J. Drummey).—(11/11/1902): No one about. The pit-bank looks as though no work had been done for some considerable time.

Alexandra Coal-mine, Alexandra (W. A. Thomson, owner; M. O'Connell, permit).—(11/2/1902): Horse haulage is proving inadequate, and the water is steadily gaining and rising up the dip. (19/2/1902): This mine has latterly not been conducted satisfactorily, water being allowed to rise, and is now three bords up in the dip. The owner announces his intention to put down a steam-pump and hauling-engine to replace horse haulage hitherto in vogue. Owing to the manner in which the frontage of this area has been worked entrance to the field behind is becoming restricted, and I have notified Mr. Thomson that improvement in his methods of working is urgently required. (4/7/1902): Mine standing full of water; nothing doing. (9/10/1902), (James Pollock, manager): A 16-horse-power "Marshall" boiler has been erected at the mine-mouth, and a pump and hauling plant are being procured. (11/11/1902): A duplex "Snow" pump, capacity 8,000 gallons per hour, had just been started. A 12-horse-power combined haulage-engine and drum, with reversible and clutch gear, is being procured.

Alexandra Coal Company, Alexandra (William Carson, manager).—(8/2/1902 and 10/2/1902): Boreholes regularly put up 7 ft. in the roof at intervals of 20 ft. Mundy's heading (where the dredge crossed) is now filled for a length of 32 ft. with bags of gravel, faced with a building of timber in the front. Air good; mine in good order. (30/4/1902): The seam is 28 ft. in thickness, of which about 8 ft. is being worked, ample pillars being left. The parting between the bottom coal and the brown coal is regular and well defined throughout the pit, and regulates the height to which bords are being driven. All places are being driven to lines, and, the sides and roof being strong, the workings look very well, a fall from roof or sides being unknown in the pit. The seam lies almost flat, but a trough running north-west and south-east traverses the workings, forming a convenient lodgment for water. (3/7/1902): Mine in good order; ventilation fair. (11/10/1902): A record of the quantity of water pumped having been kept, it is found that the average quantity continues—viz., about 50,000 gallons per diem, there being no perceptible increase. A new winding-rope has been put on, and a 20-horse-power "Marshall" boiler is being installed to replace the vertical boiler at present in use. Rules posted, but torn, and require to be renewed. (12/11/1902): Bore-holes in the roof are consistently attended to, one of the men being appointed for that purpose. After careful examination I could find no trace of water at any of the holes, and from all appearances the seam appears to be most regular in its deposition. The seam is lying practically horizontal, and is immediately overlaid by free gravel, which is undoubtedly waterlogged to the level of the Clutha River, which is cutting into the bank on this area as rapidly as dredging operations are being prosecuted. The Molyneux Hydraulic Gold-dredging Company holds the surface of this area as a special claim.

Undaunted Pit, Alexandra (D. H. Mathias, permit).—(11/2/1902): The dip is being extended and bords broken away. The dross is being allowed to accumulate. Ventilation fair. (9/7/1902): Workings in good order. (9/10/1902): The dross shows no sign of heating. As a precaution the heavier accumulations have been cut into and turned over. Dip 150 ft. to face. Bords broken away at 10 yards centres. Four men employed.

Rivers's Pit, Alexandra.—(11/11/1902): Mr. Rivers having applied for cancellation of his lease, acting under instructions I re-entered upon the area this date. The shaft is filled in to the surface. Mr. Rivers informed me that the only work done was a drive 2 chains east under the Manuherikia River, and a level driven 100 ft. south from the shaft. On the men going to work one morning the shaft was found full of water to river-level. Mr. Rivers spent a good deal of money trying to bale the water out, but, being unsuccessful, finally gave it up and abandoned the pit.

Cambrian's Coal-pit, Cambrian's (C. Dungey, lessee).—(9/1/1902): The man at work in the pit was undermining the face. Not much doing here. (9/12/1902): A new pit being opened on the face of the hill overlooking the township. I requested Mr. Dungey to remove gelignite and detonators from the abandoned pit.

Welshman's Gully Pit, Cambrian's (J. McGuckin, lessee).—(9/1/1902): Water formerly used for stripping is diverted and now being used for alluvial-gold mining. Only bottom coal being lifted at present. (9/12/1902): An attempt had been made to win this coal by underground mining, but is now abandoned, and opencast working reverted to. Stripping overlying the coal (some 20 ft. in depth) is not being kept back from the working-face in a proper manner. I drew Mr. McGuckin's attention to this, and subsequently wrote him on the subject.

Blackstone Hill Pit, Blackstone Hill (Robert Thurlow).—(11/1/1902): Two men are engaged draining and reopening the pit. (10/12/1902): Face 5 ft. of stripping overlying 15 ft. of coal. Coal is being left underfoot, the small pump in use being unable to cope with the water under that level. Thurlow was slightly burnt in the pit on the 13th May. After lighting a fuse he threw the match away, and it fell on the bag containing the blasting-powder.

G. Price's Coal-pit, Blackstone Hill (G. Price, lessee).—(20/2/1902): Only coal for private use now being taken out.

Hawkdun Station (Private Pit), St. Bathan's.—(9/1/1902): No coal has been taken from this pit for several years.

St. Bathan's Pit, St. Bathan's (J. Enwright).—(11/1/1902): Stripping kept well back from the working-face. Pit in good order. (10/12/1902): The recent wet weather is blamed by the owner as being the cause of the pit not being in such good order as on the occasion of my previous visit.

Rough Ridge Coal-mine, Idaburn (M. Beck, manager).—(11/1/1902): Overburden not well stripped back, and coal-face being undermined. Mr. Beck promised to attend to the stripping at once. (20/2/1902): I found two men working under an overhanging face 35 ft. in depth. I warned the men of their danger, and advised them to remove to another part of the pit pending the face being made safe, and subsequently notified the owner of the dangerous method of working. (23/4/1902): Revisited the mine on this date, when I found that stripping had been taken well back, and the pit made safe and in very fair order. (10/12/1902): The mine is being worked on somewhat better lines than formerly. The stripping is now carried well ahead of the working-face. Three men employed.

McLean's Coal-pit, Idaburn (L. McLean, lessee).—(11/1/1902): Nothing doing. The pit has evidently not been worked for some time. (10/12/1902): This pit still idle.

Idaburn, Idaburn (J. White, lessee).—(11/1/1902): Overburden not being kept back from the coal-face, which was being undermined. The owner promised to attend to the stripping at once. (20/2/1902): White and another man were working under an overhanging face fully 20 ft., which was cracked and nearly down. I got the men to come up and take the loose down. (23/4/1902): Revisiting the pit on this date, I found some attempt had been made to strip in advance, but still insufficient attention paid to this important matter. The pulsometer pump in use is too small for the growth of water this wet season, and operations are considerably hampered thereby. A larger pump will be a necessity before dip coal may be won. (10/12/1902): Pit now in good working-order.

Border, Rough Ridge (G. Turnbull, lessee).—(11/1/1902): On this date the pit flooded. (23/4/1902): Work much hampered owing to wetness of season. Pit being in creek-bed, protective works have been carried away by successive freshes, and pit flooded. The two "Douglas" hand-pumps worked by water-wheel not being able to cope with the water, a certain thickness of coal is being left on the bottom. Stripping well attended to. (4/12/1902): Pit in good order.

Gimmerburn, Gimmerburn (C. Docherty).—(12/1/1902): Coal being worked to water-level only, the stripping being heavy. Coal now being taken out for private use only.

Reilly's Area, Kokonga.—(13/1/1902): Three prospecting-drives had been put into the terrace from the river-side, but are now abandoned, and nothing doing.

Commercial Coal-pit, Upper Kyeburn (C. Archer, permit).—(12/12/1902): Since last visit the dip has been extended to 110 ft. A low level is now being driven 9 ft. high by 12 ft. in width, with an average roof of 9 ft. of coal overhead. Following the usual custom, the overlying gravel is run into the level to enable the head-coal being won. Mine in good order. Ventilation fair.

Dairy Creek Coal-pit, Clyde (R. Robertson, permit).—(8/7/1902): Mine in very good order. Coal strong, and very little timber required. Ventilation good. (13/10/1902): A new hauling-rope has been put on. North-side workings stopped on a fault. Mine well conducted.

Clyde Collieries, Clyde (G. F. Turner, manager).—(8/7/1902): The mine is in good order. Ventilation good. Reports to date. (13/10/1902): The seam is intersected by small faults and clay bands, which give considerable trouble. A "break" struck in the seam gave off sand with water until checked. The dip-face is at 340 ft. from the mine-mouth. Workings in good order. Air good.

Gibbston Coal Company's Pit, Gibbston (J. Hodson, manager).—(26/5/1902): The mine is in very fair order. Air-courses clear; ventilation good. Quite 50 per cent. of the seam is soft and inferior, but appears to improve in quality to the dip. The tram-line, one mile and a half in length, from the engine-house to the depot, at the foot of the mountain, is working satisfactorily. Owing to the configuration of the surface and to avoid cuttings, which would become blocked with snow in winter, there are twenty-six separate grades and one curve on the line. A jig 350 yards in length connects the mine-mouth with the head of the tramway. (28/10/1902): The upper portion of the seam known as the "3 ft. band" is now being worked, the lower level is being reopened, and there is a large body of coal available to the rise.

Doolan's Creek Coal Company, Gibbston (M. Begg).—(28/10/1902): A new road some two miles in length has been constructed from the saddle to the mine. A level 6 ft. by 4 ft. has been driven some 60 ft. on the strike of the seam. The coal is of good quality, and it is unfortunate that the mine is situated in such an inaccessible place. The proprietors are hopeful that the quality of the coal will more than make up for the enhanced cost of placing it on the market under the circumstances.

Cardrona Mine, Cardrona (R. McDougall, owner; D. Scurr, manager).—(21/10/1902): Stripping being sluiced away ahead of the working-face. It is intended to open out at a lower level at an early date.

Cromwell and Bannockburn Collieries Company, Bannockburn (Thomas Barclay, manager).—(2/5/1902): Kawarau Colliery, Bannockburn: The new dip mine driven from outcrop is 70 yards to face; coal faulted and inferior. From surface indications the ground is somewhat troubled on this part of the area. (5/11/1902), (A. S. Gillanders, manager): An old mine-entrance on Shepherd's Creek has been reopened, and a dip is being driven. At 20 yards a fault was struck carrying running sand. The dip is now being turned in the coal to avoid the fault. A steam boiler and hauling plant have been erected on the pit-bank, as, the coal being of good quality, development is being steadily pursued.

Excelsior Mine, Bannockburn (T. Barclay, manager), (3/5/1902): Pillars are drawn to the rise. The level and airway pillars are being saved to provide for air-return from new dip. The engine and boiler from Pryde's old mine have been brought down and re-erected here for haulage and pumping purposes. The duplex "Tangye" pump, 7 in. by 5 in. by 12 in. (5,000 gallons per hour), easily keeps water under. (5/11/1902), (A. Gillanders, manager): Four levels are broken away off the dip extension, 10-yard pillars being left. Roof good, except on the south side of the dip, where it is inclined to fret a little. Ventilation good; report-book to date.

Bannockburn Coal-mine (T. Barclay, manager), (3/5/1902): Upcast air-shaft unfenced and upper timbers require renewal. Coal good at face of low level, seam opening up well. Air good. (5/11/1902), (A. S. Gillanders, manager): A new drive has been put in to win the rise pillars and save length of haulage. Air somewhat warm, but work being carried on safely. No work had been done in the lower workings for some months past. (5/12/1902): Hugh Donnelly and Frederick Jones, miners, were lighting the smithy fires to sharpen picks when an explosion of dynamite-caps occurred, inflicting wounds on chest and abdomen. Mr. Gillanders, mine-manager, being of the opinion that the caps were wilfully, if not maliciously, placed in the fire, brought the matter under the notice of the police. Inquiries were made, but without succeeding in obtaining sufficient proof to suspect any one of the deed.

George Jeffrey's Area, Bannockburn.—(2/5/1902): Four trial shafts have been sunk without result. The outcrop of the seam does not extend eastward so far as was anticipated. (5/11/1902): Nothing doing at present. The prospecting-shafts have been filled in.

Cairnmuir Pit, Bannockburn (Crow and Anderson).—(5/11/1902): I have been unable to see any work that may have been done at this pit during the year.

Charles Angel, Bannockburn.—(5/11/1902): Opencast. Coal for private use only being taken out.

Nevis Coal-pit, Nevis (C. Scott).—(31/10/1902): An effort is now being made to win the coal left on the bottom. A water-supply available for stripping is used as required.

Ryder's Pit, Nevis (C. Scott).—(4/11/1902): Seam now being worked opencast, owners having purchased an acre from Mrs. Holmes, the adjoining tenant.

Clough and Allen's, Nevis (Mrs. A. Holmes).—(4/11/1902): No work has been done in this pit during the year.

Gunion's, Nevis (R. Gunion).—(31/10/1902): No work has been done on this area so far by Mr. Gunion.

Ritchie's, Nevis (J. Ritchie).—(4/11/1902): Only a small quantity of coal has been taken out for private use. The pit will probably be opened next season for the supply of coal to a dredge at the Nevis Crossing.

SOUTHLAND.

Pukerau Coal-mine, Pukerau (C. O'Hagan, permit).—(3/5/1902): Mine in very fair order. Ventilation good. A windmill pump for unwatering the mine is working satisfactorily.

Nelson's Pit, Pukerau (J. H. Nelson).—(3/5/1902): A heading has been driven from the opencast face; being in a gully, a considerable amount of dead-work has been undertaken in clearing away slips and reopening the drainage-tunnel.

Mason's, Pukerau (A. Mason).—(3/5/1902): Coal taken out for private use only; 7 ft. coal, 5 ft. stripping.

Milne's Pit, Pukerau (A. Milne).—(3/5/1902): Coal taken out for private use only; 7 ft. coal, 6 ft. stripping.

Whiterigg Mine, East Gore (J. Hope, permit).—(1/5/1902): Mine in good working-order, but the mine-entrance requires to be trimmed and retimbered. (13/8/1902), (William Patterson, owner): The mine-mouth had been retimbered and made secure. I found more blasting-powder in the mine than was required for the day's supply, and advised the manager to reduce the quantity. A 6-horse-power oil-engine has been placed in the mine to provide motive power for the pump, but the owner's intention is to put in a steam pumping plant, when the coal will be mined to the dip.

Heffernan's Pit, East Gore (J. Boyd).—(1/5/1902): The main drive has been taken in 90 ft. at water-level. The mine-entrance is in an unsafe condition. I advised the manager to exercise more care in the handling of powder, which was being kept in an open cask at the mine-mouth. (30/8/1902): The mine-entrance has been made safe, and the mine is in fair working-order. Air good.

P. Healy (Private Pit), East Gore.—(1/5/1902): Only a few tons per annum are taken out for own use.

H. Smith's Pit, East Gore.—(3/5/1902): Coal taken out for private use only; 7 ft. coal, 8 ft. stripping.

A. McDonald's Pit, East Gore.—(1/5/1902): Coal taken out for private use only; 7 ft. coal, 4 ft. stripping.

Robert Smith's Pit, East Gore.—(3/5/1902): Coal taken out for private use only; 14 ft. of coal, 3 ft. stripping.

Sarginson's, Gore (A. Reinke).—(1/5/1902): Coal now being supplied to dredges. Coal 7 ft.; stripping 2 ft. in depth.

Green's Pit, Gore (J. J. Smyth).—(1/5/1902): Ventilation good, and mine in fair order. Preparations are being made to obtain coal from the dip.

Knapdale Mine, Knapdale (R. Irvine).—(29/8/1902): Only coal for private use now being produced.

Harvey's Pit, Chatton.—(29/8/1902): Pit still idle.

Perkins's, Chatton (A. Perkins).—(2/5/1902): Face 12 ft. of coal, with 8 ft. of stripping, which is kept well ahead.

Pacey's, Chatton (R. Pacey).—(2/5/1902): A bench of 12 ft. of coal is being taken along with the stripping, which is here 8 ft. of clay, bottom coal being left for future requirements.

Otama Pit, Otama (Private Pit), (T. Graham).—(30/8/1902): Coal for own use only.

Cross's, Otama (Private Pit).—(30/8/1902): Coal for private consumption only being taken out.

Hunter's, Otama.—(30/8/1902): Pit smothered by slip; no one about.

Thorndale Mine, Waikaka Valley (E. C. Orchard and Sons).—(1/5/1902): Pit in good order. 10 ft. of coal overlaid by 6 ft. of stripping.

Johnston's Pit, Waikaka Valley (W. Johnston).—(1/5/1902 and 28/8/1902): Pit in good order, and stripping kept well in advance of the working-face.

Ritchie's Pit, Waikaka Valley (T. Ritchie).—(28/8/1902): A new pit on Johnston's farm, which has been opened to supply a dredge in the vicinity.

Reed's Pit, Waikaka Valley (R. Reed).—(1/5/1902): Having worked the pit out to the boundary, Reed is now prospecting for coal on the opposite side of the main road. (28/8/1902): The new pit is in good working-order. Face 10 ft. of coal, with 8 ft. stripping, which is kept well back from the face.

McGill'sPit, Wendon Valley (J. McGill).—(30/4/1902): Stripping attended to, and pit in good order. J. McGill, jun., sustained burns to arms and face on the 16th July by an explosion of blasting-powder, caused by accidentally dropping a lighted match into a quantity of loose powder in the pit.

McDonald's, Wendon Valley (J. Dwyer).—(30/4/1902): Mine in fair order, and ventilation good. (25/10/1902): Coal continues hard, and roof strong. All coal is got by shooting, loose blasting-powder being the explosive used. An accident occurred in the mine this morning, whereby Alexander Graydon sustained fracture of left leg, and Joseph Tikey face and arms grazed and body bruised, by flying coal from an unexpected third explosion in the face. Two shots had been fired, and two explosions occurred. The men had returned to work, when a third explosion took place. Presumably some of the grains of powder had dropped into an open moist back crossed in the hole, and smouldering embers had ignited it. I recommended the proprietor to adopt the use of compressed powder, by use of which such accidents would be prevented in future.

Edge's No. 14, Waikaka.—(30/4/1902): The pit has been closed down owing to the coal becoming soft and inferior in quality. A new mine is now being opened adjacent to McDonald's pit. I drew the miners' attention to the careless handling of blasting-powder at the pit.

Busbridge's, Wendon Valley (J. Busbridge).—(29/4/1902): The coal-face is opened out at the foot of a steep hillside, and the pit is smothered by slips. Pit almost inaccessible, being three miles from the formed road. A small trade done during harvest season, and winter stocks laid in by the neighbourhood.

Stevenson's, Wendon (J. Stevenson).—(30/8/1902): A new pit opened recently. A 7 in. centrifugal pump driven by traction-engine is used for unwatering the pit. Stripping 5 ft. in depth, and seam (unbottomed) 10 ft. in the face.

Radford's Pit (Carmichael's), Wendon (E. and P. Radford).—(30/8/1902): The water-supply for stripping being inadequate, the undertaking has not proved remunerative, and the pit is not now being worked.

Waikaia Collieries Company (late Monaghan's Pit).—(12/5/1902): Opencast on the hillside. Very little coal had been taken out to date.

McIvor's (late Goldie's), Waikaia (R. McIvor).—(12/5/1902): Sluicing off overburden, and recovering blocks of coal left when the seam was driven out.

McIvor's, Landslip, Waikaia (W. McIvor).—(12/5/1902): Stripping removed by sluicing.

Muddy Terrace (Shale-pit), Waikaia (T. F. Goldie).—(12/5/1902): The shale is being worked and used as fuel. Pit in good order.

No. 1 Pit, Landslip, Waikaia (A. McKinnon).—(10/5/1902): Seam 7 ft. in thickness, with a strong stone roof above. In the old workings the roof and pillars are still standing.

Argyle Pit, Waikaia (J. and T. Baxter).—(12/5/1902): An effort had been made to win the coal by driving, but the drive had collapsed, and stripping has been again resorted to. The water-supply is too light for the purpose of stripping adequately, and the pit is consequently in a dirty state.

Waimea Pit, Longridge Village (G. Larsen).—(30/8/1902): The pit formerly worked by A. Smith is worked out, and Larsen is prospecting on the site of an old pit higher up the valley.

Pyramids Pit, Mandeville (E. MacAllister).—(30/8/1902): Coal for home consumption only now taken from the mine. Roof strong, and workings standing well.

Waimumu Coal-pit, Mataura (C. P. Sleeman).—(21/1/1902): The manner in which this pit is worked affords an object-lesson in opencast working. Stripping well ahead of the working-face. (25/8/1902): The working-face is fully 80 yards in length. Stripping, 12 ft. of gravel. Average

depth of seam, 15 ft. The drainage-tunnel is 1,100 ft. in length, having 8 ft. of fall, and continues to keep the pit water-free. A trial drive, 10 ft. high by 10 ft. wide, had been driven some 40 ft., and proved the seam to maintain its thickness and quality. The owner has, however, decided to continue working opencast in preference to driving. The output of coal from this mine for the year 1902 amounted to 9,452 tons 10 cwt. Average number of men employed, nine.

Bogside Coal-pit, Mataura (H. Brown).—(21/1/1902): Pit being well worked, and stripping kept back from the face. The drainage of the pit is rather heavy for the small steam pumping plant in use. (25/8/1902), (Mutch and Hurst): Pit now standing full of water, but the owners intend reopening at an early date.

Beattie and Coster's Pit, Mataura (W. Coster).—(21/1/1902): Stripping kept well back from the face, and pit in good order. (25/8/1902): Seam maintains its thickness of 16 ft., with 10 ft. of stripping. The face is fully 50 yards in length, and the stripping is kept well in advance of face.

Mutch's, Mataura (J. McGilvray).—(27/8/1902): Mr. McGilvray has bought Mutch's property. Some 80 tons of hæmatite per annum is supplied to Mataura paper-mills. The coal-pit is shallow, and is now full of water.

Duthie's Pit, Waimumu (J. Duthie).—(22/1/1902): Negotiations are pending with a syndicate to purchase the pit and furnish coal-supplies to dredges in the Waimumu Valley. Working-face, 150 ft. in length; seam, 10 ft. 6 in.; stripping, 12 ft. A clay band 3 ft. in thickness underlying the seam is resting on a lower seam of coal, which is not being worked. Pit in good working-order. (26/8/1902), (W. J. Williams and Son): A tramway three miles in length has been constructed to the Waimumu Valley, and the requirements of the district are amply provided for.

Lambert's, Edendale (R. H. Lambert).—(22/4/1902): Three men at work getting coal for the Two Creeks dredge. Stripping about 6 ft.

Nightcaps Colliery, Nightcaps (J. Lloyd, manager).—(28/2/1902): Development-work extending on the north-east boundary underground, and the opencast working on the outcrop. Air a little dull in the new dip and the new rise heading, elsewhere good. New fan-ventilating shaft just completed; depth, 65 ft. by 6 ft. diameter, brick-lined; foundations for fan being laid. Mine throughout in good order; requirements of the Act well observed. Plan and report-books well kept. (25/4/1902): Mine in good order throughout, roadways and air-courses clear, and an adequate supply of timber kept on hand. Air rather dull, but a subsequent visit to the ventilating-furnace disclosed the fact that the furnace-man had been neglecting his duties. No. 2 mine in good order, and timber-supply unstinted. (30/10/1902): The new low-level drain, to dispense with pumping in the mine, is 16½ chains to the face; total length of drain when finished, 28 chains. The drain is timbered throughout, and is ventilated by a 2 ft. diameter fan driven by an overshot water-wheel 6 ft. 6 in. diameter; air-pipes 7 in. diameter, laid to the face. The mine throughout is in excellent order, and plant well above present requirements. Stripping kept well back on opencast workings. All underground working-places well provided with timber, and air conducted to the faces. A 9 ft. diameter "Hayes" fan, recently erected, is belt-driven by a 9-horse-power horizontal engine; boiler, tubular, 12-horse power. The fan is designed to run up to 200 revolutions per minute, and when put to work was found to circulate 51,030 cubic feet at 152 revolutions. This being in excess of requirements, the working-speed has been reduced to 100 revolutions per minute, at which speed a most ample ventilation is maintained. Air conducted direct to faces; air stoppings and doors being in an efficient state, little or no loss from leakage occurring.

H.B. Coal-mine, Nightcaps (T. Kelly and W. Reid).—(28/2/1902): The new lessees, having renewed timber where required, have put in a number of extra props on the level. Air conducted to the faces, but the upcast shaft should be enlarged at the bottom. (26/4/1902): The seam is not thick enough to allow of much coal being left overhead, and consequently some difficulty is experienced in maintaining the roof. Ventilation fair, and airways clear. The upcast shaft is provided with a chain ladder. (29/10/1902): Attention paid to safety of working, and timber kept close up to the faces. Air well conducted.

Hit or Miss Mine, Nightcaps (Alley and Tinker; W. Tinker, permit).—(26/4/1902): Mine in good order; timber plentifully used, and ventilation good. The mine is being opened in a regular manner, 6-yard pillars being left. (21/10/1902): Mine in good order, and carefully worked. The level is advancing in good hard coal.

Blythe Pit, Nightcaps (Grier and Spence, lessees).—(27/4/1902): The coal is dipping below water-level, and the stripping is also becoming too heavy. Pit standing full of water. (30/10/1902), (J. Ritchie, owner): Nothing doing here now, the pit having been abandoned by the lessees.

Wairio Mine, Nightcaps (A. McBride).—(26/14/1902): The mine had been sublet to Mr. J. W. Kelly, who had driven on the 11 ft. seam for about 90 ft. At this date the rails had been lifted, and the mine was standing full of water. Only a small quantity of coal now being taken out for private use.

Quested's Pit, Nightcaps (J. Quested).—(26/4/1902): Present face 4 ft. of coal, with 2 ft. of light stripping. A new pit is being opened in the neighbourhood.

Brighton's, Nightcaps (J. Clarke).—(26/4/1902): The seam is worked opencast; 6 ft. of stripping overlying 14 ft. of very good coal. Mr. John Clarke is working the pit during summer months under an arrangement with Mr. Brighton. Stripping kept well ahead of the working-face.

Mount Linton Station Pit, Nightcaps (Colonel Chalmers, owner).—About 60 tons of coal per annum is taken out for own consumption. A water-wheel is being erected for pumping purposes.

Orepuki Shale-mine, Orepuki (New Zealand Coal and Oil Company; M. Straw, manager).—(26/2/1902): Only Nos. 1 and 2 headings now working, it having been found necessary to concentrate the men and work out sections as rapidly as possible, owing to the "waste" heating and the

difficulty of getting in tight stoppings in the broken ground. Timber plentifully used, and roadways and working-places in good order. The "Hayes" fan recently erected, running at 180 revolutions, produced 33,120 cubic feet of air per minute. Water-gauge, $1\frac{1}{10}$ in. (23/4/1902), (A. Love, manager): Return airway in good order. Fire stoppings have been placed at the heads of all the jigs to the south level, and are well attended to. The pillars are somewhat crushed, and a little leakage of damp prevails. Only seven men on the average are now employed in repairing and getting coal for surface requirements. (31/7/1902): Connection has been made between the iron main jig and the coal-faces. One holing-machine is at work in the upper level. A good deal of timbering has been done in the main roadways and air-courses, and the back airway is now a good travelling-road. Ventilation good. Report-book to date. (28/10/1902): Work underground limited to four men producing coal for surface-boiler consumption. The whole of the old district now closed off; fire stoppings in, and well looked after. Air excellent. Roadways and working-places well timbered and safe.

REMARKS.

The output of coal and lignite (Southern District) during the year 1902 amounted to 419,179 tons, a total increase of 24,112 tons over the previous year. Returns of output from the several portions of the district are as follows:—

	Tons.
Canterbury	19,445
Otago	308,310
Southland	91,424
	419,179
Output for previous year	395,067
Increase	24,112

The contributions to the Coal-miners' Relief Fund amounted to £409 19s. 9d., while payments from the fund had been recommended amounting to £338 2s. 3d.

ACCIDENTS.

There have not been any fatal accidents in coal-mines in this district during the year. A total of seventy-nine accidents have been reported to me, only a few of which might be termed serious, a large proportion being of a trivial nature, and resulted in the men being only a few days off work. Of the above total, fifteen were accidents to eyes, two of which were aggravated and rendered serious by the patients' delay in visiting medical men. The rules issued by the Department for treatment of eye accidents have been extensively circulated, and the number of such cases has perceptibly decreased.

17th February, 1902.—Archibald Dobbie, trucker, Orepuki Shale-mine: Finger jammed between box and rail; subsequently amputated at the first joint.

26th July, 1902.—E. Middlemas, youth, rope-attendant at Castle Hill pit-bank: Bruised thigh; tripped and fell over a low embankment at the mine-mouth.

8th September, 1902.—Thomas Gray, banksman, Fernhill Colliery: Fracture of forearm while attempting to prevent a loaded box of coal from tipping up.

30th September, 1902.—James Marsh, miner, Homebush Colliery: Bruised shoulder; while wedging a fall of coal off the pillar side a flake came away unexpectedly.

25th October, 1902.—Alexander Graydon, miner, McDonald's Pit, Wendon: Fracture of leg by flying coal from a shot in the face.

I have, &c.,
E. R. GREEN,
Inspector of Mines.

The Under-Secretary, Mines Department, Wellington.

APPENDIX I.

MINING MANAGERS' EXAMINATION PAPERS.

QUESTIONS USED IN EXAMINATION OF MINING MANAGERS FOR FIRST-CLASS CERTIFICATES.

SUBJECT No. 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 method of sinking a shaft where quicksand is met with in the first 30 fathoms.
2. Give sketches and dimensions of the materials generally used while sinking through quicksand for a shaft intended to be 12 ft. diameter when finished.
3. In opening up a new seam of coal, state fully what considerations would influence you in deciding method of working, say, by longwall or bord-and-pillar.
4. What precautions would you enforce to insure safety of men firing shots in sinking a shaft?
5. In opening up on a seam of coal known to contain firedamp, what precautions would you adopt to prevent its accumulating? and what means would you employ to get coal down after preparation by the miner? Give your reasons.

SUBJECT No. 2.—*The Various Methods adopted in securing Shafts and Workings in a Mine, showing Relation and Efficiency of each Class of Material used.*

1. How would you ventilate the space below the scaffold when men are employed lining the shaft?
2. Show by sketches how you would set timber in inclined seams so as to resist pressure of roof and sides.
3. What size pillars of coal would you leave for support of shaft—assume dip 1 in 3, and seam 7 ft. thick, shaft 1,000 ft. deep?
4. State the reasons which would guide you in deciding to drive the winning-places to the extreme boundary before opening out wide work, either bord-and-pillar or longwall.
5. Show by plan and section the method of timbering a 6-yard bord with bad roof, and also method of timbering and supporting the face and gateways in longwall workings.

SUBJECT No. 3.—*The Various Methods of hewing and cutting Coal of Different Classes, and Means of securing Ground while so engaged.*

1. Describe the different systems of coal-working with which you are acquainted, and say under what conditions each system works best. Give a rough sketch of the system adopted at any mine of which you have a knowledge, stating thickness of seam, quality of roof, floor, &c.
2. Give your experience of taking out coal-pillars. Describe how you protect yourself from falls of roof, illustrating by sketches.
3. Describe what is meant by "drawing" timber from coal-workings, and precautions to be adopted when doing so, and the effect the removal of timber has on the working of pillars.
4. What in your opinion is the best explosive now in use in coal-mines? Give your reasons, stating leading characteristics; and say what are your views as to substitutes for explosives, and under what conditions you would prohibit use of explosives.
5. Describe by sketches the method of getting coal by bord-and-pillar and by longwall, giving the size of seams and system of timbering, and generally means of supporting the roof best suited to each.

SUBJECT No. 4.—*The Various Methods of Ventilation, and Construction of Airways so as to produce a Good Circulation of Fresh Air in any Part of a Mine.*

1. Describe briefly the general principles of ventilation in mining, and describe by sketches the various means which have been adopted to obtain satisfactory results.
2. What are the chief points to be kept in view when constructing an airway with the object of passing a large volume of air with the minimum expenditure of power?
3. Describe the form and uses of the following: The thermometer, barometer, hygrometer, and water-gauge.
4. Having a pair of shafts 16 ft. diameter, 500 yards deep, requiring ventilation to be 120,000 cubic feet per minute, with 2 in. water-gauge, describe what type of fan and engine you would adopt, and show calculations of size of fan and engine required.
5. The total quantity of air passing in a mine is 100,000 cubic feet per minute, and it is distributed through four airways—

No. 1, 1,200 yards long, 6 ft. by 6 ft.;
No. 2, 1,000 yards long, 5 ft. by 5 ft.;
No. 3, 2,000 yards long, 6 ft. by 5 ft.;
No. 4, 1,500 yards long, 5 ft. by 4 ft.

What proportion passes through each?

SUBJECT No. 5.—*Area of Airways, Velocity and Division of Currents, and Effect of Friction.*

1. What is meant by splitting the air? How does it affect the general ventilation of a mine, and what are the limits to its adoption?
2. Having regard to safety, what do you consider the extreme velocity for air travelling the faces in a fiery colliery?

3. The temperature of the air in the downcast and upcast shafts of a colliery is 50° and 80° Fahr. respectively: what volume of air in the upcast amounts to the same weight as 1 cubic foot in the downcast at same depth?

4. Show how you would ventilate the workings on annexed plan, having due regard to the requirements for haulage.

5. If a drift 30 yards long, 6 ft. wide, and 4 ft. high is filled with a mixture of firedamp and air at the most explosive point, what quantity of air would be required to dilute it so as to be non-explosive?

SUBJECT No. 6.—*On the Nature and Composition of Explosives and Dangerous Gases met with in Coal-mines, and on Spontaneous Combustion.*

1. Give the chemical composition of any of the high-explosive compounds of which you have a knowledge.

2. What gases are most common in coal-mines? State composition, under what conditions and where most frequently found.

3. Which is the most likely part of a working-place to find firedamp accumulating in? What is the most explosive mixture of firedamp and air? What effect has firedamp unmixed with air upon the flame in a lamp?

4. What in your opinion is the best means of avoiding dust-explosions in underground workings?

5. Explain what you understand by the term "spontaneous combustion," and what steps should be taken to prevent same in coal-mining.

SUBJECT No. 7.—*On the Drainage of Mines, and Pumping-appliances.*

1. What is the principle which governs the working of pumps generally?

2. What diameter of pump would be required to replace two pumps of 8 in. and 12 in. diameter respectively, assuming stroke same in each pump?

3. Give sketches of working-parts of—

(*a.*) Bucket lift,

(*b.*) Ram pump,

and show how placed in shaft.

4. Assuming feeder of water, 500 gallons per minute, to be pumped from a depth of 1,000 ft., what pumps would you apply, and what horse-power will be required to do the work?

5. State principle controlling the working of a siphon, and how same can be applied to drainage of mines.

SUBJECT No. 8.—*The Haulage of Coal on Underground Planes and Shafts, also Different Systems of such.*

1. What is meant by "self-acting inclines," and what is the least grade at which such inclines will act?

2. Describe with sketches any systems of haulage with which you are conversant, and state system you prefer, and why.

3. Describe with sketches how you would fit a shaft with necessary guides for cages to work in a shaft 1,000 ft. deep, and state kind of guide you prefer. Give reasons.

4. Assume shaft 800 ft. deep, quantity of coal to be raised 600 tons per day of eight hours, and show how you would arrive at size of engines, diameter of drum, and rope required.

5. State requirements of the Act as to inspection of machinery.

SUBJECT No. 9.—*The Theoretical and Effective Power of Steam-engines and Boilers, also Strength of Hauling Rope, Chains, &c.*

1. Find the horse-power of an engine whose mean steam-pressure is 75 lb., diameter of cylinder 18 in., length of stroke 36 in., and steam cut off at two-thirds of the stroke, number of revolutions being 50 per minute.

2. Sketch a Lancashire boiler, showing the position of fittings required, with name of each.

3. A loaded tub weighing 10 cwt. standing on a level takes a pull of 25 lb. to start it: what pull will be required to move it on an incline of 1 in 20?

4. Show by calculations how you would ascertain breaking-strain and safe working-loads of chains and ropes.

5. What size hauling-engine would be required to raise 100 tons per hour up an incline 1,000 yards long, grade 1 in 10, and assuming speed of five miles an hour?

SUBJECT No. 10.—*The Incrustation of Steam-boilers, Causes of same, and Remedies.*

1. Under what conditions does the formation of scale occur in steam-boilers, and what are the dangers likely to arise from such forming?

2. Describe any system with which you are acquainted for the prevention of incrustation in boilers.

3. What system for the heating of feed-water do you consider the best, and what are the advantages of using hot feed?

4. Under what conditions would it, in your opinion, be dangerous to put the feed on to a boiler; and under such conditions, what would you do?

SUBJECT No. 11.—*Tapping Water in Mines, and Mode of constructing Dams underground.*

1. What circumstances would guide you in selecting the position for an underground dam to resist heavy pressure? How would you construct such a dam, and what special precautions would you take during progress of work? Give sketches and dimensions, and state material to be used, and generally what would be required to make secure.

2. Describe necessary precautions to be observed in approaching old workings known to contain dangerous accumulations of water. Give sketches showing how work carried on.

3. Assume dam 10 ft. by 7 ft., head of water 600 ft.: what would the pressure be per square inch, and what would the total load on the dam be?

SUBJECT No. 12.—*Blasting, and the Use of Explosives.*

1. Briefly describe what you consider the safest explosive for use in coal-mines.

2. State your reasons and explain what precautions you would take to prevent shots blowing out.

3. Describe duty of shot-firer and generally the precautions to be adopted regarding the firing of shots, more especially in mines known to give off firedamp and which are dry and dusty.

SUBJECT No. 13.—*The Effect of Faults on Coal-seam. How to ascertain Direction of a Seam of Coal when dislocated by Fault.*

1. Show by sketches the effect produced by faults—
   (*a.*) Downthrow;
   (*b.*) Upthrow;
   (*c.*) Overlap or reverse fault.

2. Describe a typical case, and what steps you would adopt to recover the seam.

3. What is the meaning of the term "intrusive rock," and what effect has such on coal-seams?

4. A seam of coal dips at the rate of 6 in. per yard when a downthrow fault of 50 ft. is met: how far would it be necessary to drive at 9 in. per yard dip before cutting coal-seam again?

SUBJECT No. 14.—*A Knowledge of the Different Classes of Coal, and of the Character of the Rocks and of the Formation of Country where Coal likely to be proved.*

1. State in which formation coal is generally found, and describe character of same.

2. What is anhydrous coal? Is there true coal found in New Zealand? If so, where?

3. Describe the rocks you consider to be indicative of the existence of coal in your district, giving a section.

4. Enumerate the several kinds of coal, and state the elements chiefly objectionable in coal, and why so.

SUBJECT No. 15.—*A Knowledge of Underground Surveying and Making of Plans showing System of Working, Inclination of Seams, Faults, and Course of Ventilation.*

1. Candidate must produce plan showing the system of working in a colliery, with the surface for at least 20 acres in the vicinity of the shaft and the underground workings in different-coloured ink. The connection between the surface and underground must be described in the event of there being only one shaft. The levels and main headings must have assumed traverse calculated in detail, and showing latitude and departure of each bearing.

2. In using the magnetic needle what precautions have you to observe in surveying and plotting?

3. Sketch as accurately as possible the following bearings, and calculate the latitude and departure, and give the course and length of the seventh set to tie with the start of the first set:—
   No. 1—S. 47·00° E., 340 links.
   No. 2—S. 79·30° W., 160 links.
   No. 3—S. 30·45° E., 420 links.
   No. 4—N. 62·30° W., 710 links.
   No. 5—N. 41·00° E., 230 links.
   No. 6—N. 62·30° W., 340 links.

4. Describe system of levelling you are acquainted with, and show how to keep a level-book and reduce levels.

SUBJECT No. 16.—*Knowledge of Arithmetic and of keeping Accounts.*

1. What will be the cost of laying a single tram-line 500 yards, with rails 20 lb. per yard, cost £9 5s. per ton; sleepers 3d. each, laid every yard; fasteners, 5 cwt., at 16s. per hundredweight; and men are paid 4½d. per yard for laying?

2. A colliery produces per week 6,500 tons of screened coal and 1,250 tons of small; the wages-cost on total output is 5s. 6½d.: what is the cost per ton of large coal when it is debited with the entire wages expended and credited with the value of the small at 3s. 10½d. per ton?

3. Contractors deliver coal at the pit-bank at the rate of 4s. 3·85d. per ton: what rates should be paid (*a*) at an advance of 13¼ per cent., (*b*) at a reduction of 5¾ per cent.?

SUBJECT No. 17.—*A Knowledge of the Coal-mines Act.*

1. Describe provisions of the Coal-mines Act—
   (1.) With regard to ventilation;
   (2.) Regarding reports of accidents;
   (3.) Signals in shafts;
   (4.) The inspection of shafts and machinery.

2. What are the requirements of the Act as to fixing stations, duties of fireman, and use of explosives?

3. What are the duties of the manager in terms of the Act?

4. What are the provisions of the Act regarding the fencing of abandoned workings, providing refuge-holes, second outlet from mine, timbering and setting of sprags when holing, and approach to old workings?

QUESTIONS USED IN EXAMINATION OF MINING MANAGERS FOR SECOND-CLASS CERTIFICATES.

SUBJECT No. 1.—*On the Sinking of Shafts and Construction of Main Roadways in opening out a Mine.*

1. Describe briefly what preparations you would make before proceeding to sink a shaft, stating—
   (1.) The system of timbering you would adopt, showing how secured;
   (2.) What precautions you would adopt to protect men from falling *débris;*
   (3.) Precautions to be observed in firing shots in a sinking pit.
2. In starting opening out a mine with shaft, say, 500ft. deep and seam 10 ft. thick, dip 1 in 6, what size shaft-pillars would you deem requisite—roof good, floor soft?
3. State your experience in working in—
   (1.) Longwall;
   (2.) Bord-and-pillar.

SUBJECT No. 2.—*Methods adopted in securing Shafts and the Workings in a Mine.*

1. How would you prepare a bed for wedging curb for carrying cast-iron tubbing, and what condition of strata is essential?
2. Show by sketches how you would set timber in inclined seams so as to resist pressure of roof and sides.
3. When and where do you consider the use of timber chocks as packs advisable in a mine worked under the longwall system? Describe how you would set them, and the method you would adopt to withdraw them.

SUBJECT No. 3.—*The Various Methods of hewing and cutting Coal and securing Ground.*

1. Describe the process of getting coal by—
   (*a.*) Bord-and-pillar; and
   (*b.*) Longwall.
2. In clearing a heavy fall where roof bad, describe by sketches how you would proceed.
3. Under what circumstances are chocks useful in coal-workings?
4. What is meant by the term "gob-fire," and how would you proceed to seal up such a fire?

SUBJECT No. 4.—*Various Methods of Ventilating and Construction of Air-ways.*

1. What are the most dangerous gases met with in coal-mines? Why are they dangerous? Which of the gases have you had most experience with?
2. What size would you drive an airway to pass 10,000 cubic feet per minute?
3. What means of ventilating do you prefer? State reasons.
4. Explain your views as to what effect a heavy fall of the barometer has upon the condition of a mine.

SUBJECT No. 5.—*On Air-ways and Ventilation generally.*

1. What are the advantages of splitting air in mines? State where and when and how you would do it, and how you would provide for the proper quantity going in each direction.
2. Give sketch of an overcast air-crossing with sizes that you consider suitable to put over the main road in an extensive mine.
3. If you suddenly found you had a high-side goaf filled with firedamp, the goaf being 50 yards up and 100 yards wide, with a drawing-road on each side, describe step by step the course you would take to remove the gas, assuming you had sufficient air.

SUBJECT No. 6.—*On the Nature and Composition of Explosives and Dangerous Gases, and on Spontaneous Combustion.*

1. What kind of explosive do you prefer in a fiery mine, and how would you use it?
2. Give the composition of any of the flameless explosives of which you have had experience.
3. What does the Act stipulate in order to secure safety whilst charging shot-holes? and what precautions are to be taken in preparing coal for blasting?
4. What in your opinion is the best way of avoiding a dust-explosion?

SUBJECT No. 7.—*On the Drainage of Mines, and Pumping-appliances.*

1. Describe the kind of pumps of which you have experience.
2. In opening out dip workings with only moderate feeders of water, how would you carry them on? Give reasons.
3. A pumping-engine goes seven strokes a minute; length of stroke 8 ft., diameter of pump 15 in.: what is the quantity pumped per minute, in gallons?

SUBJECT No. 8.—*Haulage of Coal, and Different Systems in Use for Inclines and Shafts.*

1. How would you fit up an inclined plane to run 100 tons an hour? Describe appliances, and give reasons for adopting them.
2. Assume shaft 500 ft. deep, from which it is required to raise 50 tons an hour, what size engine would you put down?
3. Give brief description of any system of haulage with which you are acquainted, and state which system you prefer, giving reasons.

SUBJECT No. 9.—*Tapping Water in Mines, and Mode of constructing Dams.*

1. What precautions are necessary in approaching old workings known to contain dangerous accumulations of water? Describe fully, giving sketches.

2. Sketch and describe a dam capable of withstanding heavy pressure, and give considerations guiding you in selecting site of same.

SUBJECT No. 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.

SUBJECT No. 11.—*Effect of Faults on Coal-seams.*

1. What is meant by the following:—

(*a.*) Downthrow fault;
(*b.*) Upthrow fault;
(*c.*) Overlap fault.

Show effect by sketches.

2. What is meant by the term "dyke" in coal-mining, and what is the effect of such on coal-seams?

3. Having driven against a downthrow fault, what steps would you take to ascertain amount of displacement, and how would you proceed to recover the seam and open out again?

SUBJECT No. 12.—*Knowledge of Arithmetic.*

1. How much money is required to pay the following day-work wages to five men, and what is each man's share?—

First man, 4 days at 4s. 6d. a day;
Second man, 5¾ days at 5s. a day;
Third man, 6 days at 4s. 3d. a day;
Fourth man, 2¼ days at 4s. 2d. a day;
Fifth man, 3½ days at 3s. 11d. a day.

2. A collier receives £2 4s. for getting and filling 24 tons of coal, and he pays 5d. a ton for filling: how much does he receive for getting?

3. The wages of a company of miners at standard rate amounts to £15 10s.: what will the amount be if an advance of 27 per cent. on standard is made?

SUBJECT No. 13.—*A Knowledge of the Provisions of "The Coal-mines Act, 1891."*

1. Describe the provisions of the Act with regard to—

(1.) Ventilation;
(2.) Reporting accidents;
(3.) Shaft signals;
(4.) Explosives;
(5.) Duties of firemen and underground manager.

2. What are the principal points to be observed in managing a fiery mine in order to comply with the provisions of the Act?

3. Give provisions of the Act regarding fencing of abandoned places, providing second outlet and refuge-holes.

APPENDIX II.

LIST of PERSONS who have obtained CERTIFICATES as MINE-MANAGERS under the Coal-mines Acts of 1886 and 1891.

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., White Cliffs.
Freeman, J., Green Island.
Geary, J., Kamo.
Gray, J., Abbotsford.
Harrison, J., Brunnerton.
Irving, J., Kaitangata.
Jemison, W., Waimangaroa.
Kenyon, J., Shag Point.
Kerr, G., Kamo.
Lindsay, W., Otago.
Lloyd, J., Invercargill.
Louden, J., Green Island.
Love, A., Whangarei.
Mason, J., Nightcaps.
May, J., Greymouth.
Moody, T. P., Kawakawa.
Moore, W. J., Springfield.
Nelson, J., Green Island.
Ord, J., Huntly.
Redshaw, W., Whangarei.
Reed, F., Westport.
Richardson, D., Abbotsford.
Shore, J., Kaitangata.
Shore, T., Orepuki.
Shore, W. M., Kaitangata.
Smart, W., Christchurch.
Smith, A. E., Nelson.
Smith, T. F., Nelson.
Sneddon, J., Mosgiel.
Swinbanks, J., Kawakawa.
Taylor, E. B., Huntly.
Thompson, A., White Cliffs.
Walker, J., Collingwood.
Williams, W. H., Shag Point.

First-class Certificates issued after Examination under the Coal-mines Acts, 1886 and 1891.

Armitage, F. W., Auckland.
Armstrong, J., Brunnerton.
Barclay, T., Kaitangata.
Barclay, W., Kaitangata.
Bennie, Boyd, Waihi.
Carruthers, J., Shag Point.
Carson, W., Kaitangata.
Coulthard, J., Taylorville.
Dixon, C. W., Granity.
Dixon, W., jun., Kaitangata.
Dunn, Andrew, Denniston.
Dunn, W., Brunnerton.
Dunn, W. R., Thames.
Elliott, R., jun., Denniston.
Fleming, J., Kaitangata.
Fletcher, James, Granity.
Fry, Sydney, Waimangaroa.
Gibson, John, Westport.
Gillanders, A., Shag Point.
Green, E. R., Abbotsford.
Green, J., Brunnerton.
Herd, J., Brunnerton.
Hill, Robert, Abbotsford.
Hosking, G. F., Auckland.
Hughes, D., Preservation Inlet.
Jebson, D., Canterbury.
Johnson, W. P., Thames.
Leitch, J., Blackball.
Leitch, W., Blackball.
McCormack, W., Denniston.
McEwan, Robert, Coromandel.
Milligan, N., Westport.
Morgan, Wm., Waihi.
Murray, T., Westport.
Newsome, F., Denniston.
Newton, James, Brunnerton.
Shore, Joseph, Kaitangata.
Sowerby, H., Denniston.
Tattley, E. W., Huntly.
Taylor, A. H., Waikato.
Turner, G. F., Shag Point.
Westfield, C. H., Fairfield.
Young, James H., Waimangaroa.

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.
Lindop, A. B., Springfield.
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 Coal-mines Acts of 1886 and 1891.

Coutts, J., Thames.
Gordon, H. A., Wellington.
Gow, J., Dunedin.
McLaren, J. M., Thames.
Wilson, G., Thames.

Mine-managers' Certificates, issued on Production of Certificate from a recognised Authority outside the Colony under "The Coal-mines Act, 1891."

Alison, R., Greymouth.
Dixon, J., Westport.
Fletcher, George, Westport.
Frame, Joseph, Kaitangata.
Goold, A. L., Auckland.
Irvine, James, Dunedin.
Jordan, R. S., Kaitangata.
Lewis, W., Blackball.
Pollock, James, Green Island, Otago.
Proud, Joseph, Wanganui.
Scott, Joseph, Ngahere.
Tennent, R., Brunnerton.
Twining, C. E., Dunedin.
Wight, 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, White Cliffs.
Lennox, W., Springfield.
Lobb, Joseph, Mokau.
Longstaff, H. C., Kaitangata.
Love, Alexander, Orepuki.
McGeachie, J., jun., Mokau.
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.
Barber, John, Shag Point.
Barclay, T., Kaitangata.
Barclay, Wm., Kaitangata.
Brown, Robert, Kaitangata.
Campbell, Peter, Fairfield.
Cherrie, R. C., Mokau.
Christie, James, Saddle Hill.
Clemo, G., Whangarei.
Craig, John, Coal Creek Flat.
Dixon, W., jun., Kaitangata.
Duncan, James, Kaitangata.
Duncan, John, Lovell's Flat.
Harris, A., Saddle Hill.
Hill, R., Abbotsford.
Hodson, John, Kaitangata.
Hunter, A.. Southland.
Lindsay, J. B., Orepuki.
McAllister, Neil, Kaitangata.
McLelland, J., Kaitangata.
McLelland, A. C., Kaitangata.
McNeill, D., Fairfield.
Neilson, Moffat, Abbotsford.
Orr, Hugh, Fairfield.
Parcell, W., jun., Bannockburn.
Snow, T., Mercer.
Taylor, Joseph, Collingwood.
Waldie, A. B., Mokau.
Westfield, C., Fairfield, Otago.

APPENDIX III.

STATISTICS of WORKINGS in COAL-MINES, 1902.

Name of Mine and Locality.	Name of Manager.	Number of Years worked.	Quality of Coal.	No. of Seams worked.	Thickness of Seams.	Thickness worked.	Dip of Seam.	System of Underground Working.	Number of Shafts.	Dimensions of Shafts.		Output delivered by	Output for 1902.			Approximate Total Output to 31st December, 1901.	Approximate Total Output to 31st December, 1902.	Number of Men ordinarily employed.			Power used for drawing Mineral.	Pumps.			Means of Ventilation.	Date of Inspector's Last Visit.
										Size of Shaft or Adit.	Depth of Shaft or Length of Adit.		Coal.	Slack.	Total.			Above.	Below.	Total.		Stroke.	Size of Barrel.	Height of Column.		
NORTH ISLAND.																										
KAWAKAWA DISTRICT.																										
Kawakawa Company (*stopped*)	..	..	semi-bitum.	..	..	..	..	bord and pillar	..	..	..	..	Tons. ..	Tons. ..	Tons. ..	Tons. 794,865	Tons. 794,865	..	..	..	..	..	..	..	..	..
Kawakawa Mine	Culley, John ..	4	ditto	1	4′	4′	1 in 6	ditto	2	6′ x 4′	150′	adit	3,640	..	3,640	59,329	62,969	1	5	6	horse	..	..	..	natural	7/11/02
HIKURANGI DISTRICT.																										
Hikurangi Coal Company ..	Moody, T. P. ..	10	"	1	7′ to 12′	7′ to 10′	1 in 6	"	2	6′ x 5′	264′	"	39,119	..	39,119	236,876	275,995	6	48	54	steam & horse	..	..	..	"	6/11/02
Northern Colliery (late Hikurangi Colliery)	Kerr, George ..	5	"	1	5′ 6″	5′ 3″	irregular	"	1	6′ x 5′	200′	"	7,946	..	7,946	44,982	52,928	7	21	28	manual & horse	..	..	..	"	6/11/02
West Bryan's and Phœnix ..	Goold, A. L. ..	14	"	1	7′	7′	1 in 8	"	2	7′ x 7′	250′	"	9,901	..	9,901	53,152	63,053	3	16	19	steam & horse	6″	3″	54′	"	6/11/02
Walton and Graham ..	.. ..	..	"	..	..	..	..	..	..	..	..	..	..	..	..	1,210	1,210	..	..	..	..	..	..	..	..	..
WHANGAREI DISTRICT.																										
Kamo (*stopped*)	.. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	225,037	225,037	..	..	..	..	..	..	..	..	..
Kamo, New (*stopped*) ..	.. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9,373	9,373	..	..	..	..	..	..	..	..	..
Whauwhau (*stopped*) ..	.. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	70,853	70,853	..	..	..	..	..	..	..	..	..
NGUNGURU DISTRICT.																										
Ngunguru	Taylor, A. H. ..	10	semi-bitum.	1	2′ to 5′	2′ to 5′	1 in 8	bord and pillar	3	4′ x 4′ 7′ x 7′	360′	adit	18,017	..	18,017	132,927	150,944	13	35	48	steam	..	..	..	natural	10/11/02
Kiripaka	Clemo, George ..	3½	ditto	1	3′ to 20′	12′	1 in 8	ditto	1	7′ x 5′	250′	"	14,138	..	14,138	28,853	42,991	2	11	13	manual	..	..	..	"	10/11/02
WAIKATO DISTRICT.																										
Waikato Mine (*stopped*) ..	.. ..	..	brown	..	..	..	..	..	..	..	..	..	..	..	..	209,089	209,089	..	..	..	..	..	..	..	..	..
Taupiri Extended	Wight, E. S. ..	14½	"	1	30′	20′	1 in 10	bord and pillar	2	10′ dia.	166′ 209′	shaft	4,717	248	4,965	635,889	640,854	2	6	8	steam	24″ 12″	10″ 5″	166′ 210′	Waddle fan	25/9/02
Taupiri Reserve	"	15½	"	1	10′ to 24′	6′ to 8′	1 in 8	ditto	1	7′	50′	adit	28,162	3,690	31,852	230,131	261,983	13	47	60	"	12″	7″	220′	exhaust steam	26/9/02
Ralph's Taupiri	"	10½	"	1	30′ to 50′	20′	1 in 10	"	2	9′ 6″ x 5′ 8′ 6″ dia.	190′ 145′	shaft	51,690	756	52,446	124,039	176,485	20	85	105	"	12″ 24″	7″ 6″	190′ 260′	Waddle fan	25/9/02
Ralph's (*stopped*)	.. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	23,019	23,019	..	..	..	..	..	..	..	..	..
Harrison's (*worked out first six months*)	Harrison, J. ..	..	..	..	..	..	..	..	..	..	..	..	2,278	..	2,278	8,344	10,622	..	..	..	..	..	..	..	..	..
MOKAU DISTRICT.																										
Mangapapa Mokau Mine ..	Lobb, J. ..	18	brown	1	7′ 6″	7′ 6″	1 in 36	bord and pillar	1	6′ x 6′	990′	adit	4,250	..	4,250	25,322	29,572	3	12	15	horse	..	..	..	furnace	4/7/02
Fernside (*stopped*)	.. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3,265½	3,265½	..	..	..	..	..	..	..	..	..
Co-operative (*stopped*) ..	.. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	940	940	..	..	..	..	..	..	..	..	..

MIRANDA DISTRICT.																											
Miranda (*stopped*)																	20,668	20,668									
Union Collieries (late Maramarua)		2	brown	1	50′	12′ to 20′	irregular	bord and pillar	2	4′ x 4′ 6′ x 6′	90′ 200′	adit	3,383	110	3,493	430	3,923	7	10	17	steam	12″ 6″	6″ 5″	90′ 90′		6/6/02
BOMBAY DISTRICT.																											
Bombay (*stopped*)																	81½	81½									
Totals North Island													187,241	4,804	192,045	2,938,675	3,130,720	77	296	373							
MIDDLE ISLAND.																											
NELSON.																											
Enner Glynn (*not at work*)																1,337	1,337										
COLLINGWOOD.																											
Pakawau (*not at work*)																4,873	4,873										
Puponga	Walker, James	1	bitum.	1	7′ 6″	all	1 in 4	bord and pillar	1	9′ x 6′ 6″		hand				1,000	1,000	5		5					natural	17/12/02
Wallsend (*not at work*)																47,413	47,413										
TAKAKA.																											
Mines not at work.																											
Motupipi																130	130										
Takaka																70	70										
WESTPORT.																											
Mokihinui	Ratcliff, W.	22	bitum.	2	7′ to 14′	all	1 in 16	bord and pillar		10′ x 6′	132′ 264′	adit	4,158	2,129	6,287	73,423	79,710	1	6	7	horse				natural	10/1/03
Millerton	Dunn, William	11	″	1	4′ to 40′	12′	variable	ditto	2	10′ x 6′	2,178′ 2,970′	inclined plane	253,123	23,627	276,750	657,977	934,727	94	331	425	gravity	12″ 12″ 12″	4″ 4″ 4″	40′ 40′ 100′	fan* fan† ..	6/11/02
Coalbrookdale	Green, John	22	″	2	4′ to 18′	all	″	″	2	8′ x 8′ 9′ x 5′	8,146′ 2,640′	ditto ″	98,536	24,634	123,170	3,104,412	3,347,748	67	191	258	steam and compressed air	12″ 12″ 10″ 18″	6″ 5″ 4″ 6″	100′ 100′ 20′ 25′	fans*	30/10/02
Ironbridge	Sowerby, H.	11	″	2	6′ to 20′	all	″	″	2	8′ x 6′	9,048′	″	96,133	24,033	120,166			79	198	277		9″	2″	25′	..	31/10/02
Seddonville	Murray, Thomas	1	″	..	..	..	..	development only	1	10′ x 7′	726′	..	120	..	120	..	120	30	15	45	..	..	..	..	fan†	5/11/02
Flaxbush	Smith, Edward	..	″	2	1′ 6″ to 4′	all	1 in 1	stoping	..	..	..	adit	500	..	500	390	890	..	2	2	hand	..	..	..	natural	3/12/02
Westport Cardiff (*not at work*)																227,441	227,441										
BULLER ROAD.																											
White Cliffs	Fleming, M.	8	brown	1	..	9′	1 in 3	pillar	2	9′ x 7′	100′	adit	150	..	150	980	1,130	..	1	1	windlass	..	..	.	natural	4/12/02
Rocklands	Fleming, A.	2	″	1	15′	8′	1 in 6	bord and pillar	2	8′ x 8′	990′	″	1,319	..	1,319	656	1,975	..	4	4	horse	..	..	..	″	4/12/02
THREE-CHANNEL FLAT.																											
Cocksparrow (*not at work*)																959	959										
CHARLESTON.																											
Waitakere (*not at work*)																868	868										
LONGFORD.																											
Mines not at work.																											
Longford																1,830	1,830										
Alexander																282	282										

* Schiele. † Hayes.

Statistics of Workings in Coal-mines, 1902—*continued.*

Name of Mine and Locality.	Name of Manager.	Number of Years worked.	Quality of Coal.	No. of Seams worked.	Thickness of Seams.	Thickness worked.	Dip of Seam.	System of Underground Working.	Number of Shafts.	Dimensions of Shafts.		Output delivered by	Output for 1902.			Approximate Total Output to 31st December, 1901.	Approximate Total Output to 31st December, 1902.	Number of Men ordinarily employed.			Power used for drawing Mineral.	Pumps.			Means of Ventilation.	Date of Inspector's Last Visit.
										Size of Shaft or Adit.	Depth of Shaft or Length of Adit.		Coal.	Slack.	Total.			Above.	Below.	Total.		Stroke.	Size of Barrel.	Height of Column.		
MIDDLE ISLAND—*continued.*																										
													Tons.	Tons.	Tons.	Tons.	Tons.									
BOATMAN'S.																										
Archer's Coal-mine ..	Archer, F. W. ..	9	bitum.	1	12′	9′	1 in 2½	bord and pillar	1	6′ 6″ x 4′	800′	tunnel	1,400	..	1,400	2,080	3,480	1	3	4	hand	..	..	..	natural	16/10/02
Coghlan's Coal-mine ..	Coghlan, John ..	1	„	1	8′ to 16′	7′	1 in 4	driving	1	7′ x 6′	210′	„	60	280	340	370	710	..	1	1	„	..	..	..	„	16/10/02
REEFTON.																										
Bourke's Creek	Cairns, Robert ..	5	semi-bitum.	1	8′ to 13′	8′	1 in 3	tunnels & bords	1	7′ x 5′	75′	tunnel	1,216	..	1,216	3,919	5,135	2	3	5	horse	..	..	..	„	13/10/02
Murray Creek	Morris, J. H. ..	23	ditto	1	14′	14′	1 in	open face	..	..	99′	..	..	1,434	1,434	10,515	11,949	2	..	2	„	..	..	..	„	14/10/02
Phœnix	Knight, John ..	11	bitum.	2	14′	9′	1 in 1	bord and pillar	1	6′ 6″ x 4′ 6″	600′	adit	1,481	129	1,610	15,721	17,331	1	5	6	„	..	..	..	„	14/10/02
New Inkerman	Sutherland, B. ..	5	semi-bitum.	1	5′	5′	1 in 3	stoping	1	6′ x 4′	420′	„	581	..	581	1,674	2,255	..	2	2	hand	..	..	..	„	7 /2/02
Progress New Mine ..	Cochrane, Thomas	5	ditto	2	3′ to 20′	3′ to 20′	1 in 3	bord and pillar	2	6′ x 10′	700′	„	2,117	..	2,117	11,689	13,806	2	3	5	„	..	..	..	„	14/10/02
Loughnan's	Loughnan, S. ..	10	„	1	4′ 6″	4′ 6″	1 in 3	ditto	1	8′ x 4′ 6″	150′	„	..	..	..	1,713	1,713	..	1	1	„	..	..	..	„	14/10/02
New Scotia	Masters, J. W. ..	1	brown	2	3′ to 6′	3′ to 6′	1 in 2	„	1	6′ 6″ x 3′ 6″	30′	„	62	..	62	..	62	..	2	2	„	..	..	..	„	6/2/02
Mines not at work.																										
Barr's Mine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	35	35	..	..	..	..	..	..	..	..	..
Devil's Creek	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	40	40	..	..	..	..	..	..	..	..	..
Lankey's Creek	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8,228	8,228	..	..	..	..	..	..	..	..	..
Golden Treasure	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6,625	6,625	..	..	..	..	..	..	..	..	..
Cochrane's	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	370	370	..	..	..	..	..	..	..	..	..
Reefton	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	40	40	..	..	..	..	..	..	..	..	..
Sir Francis Drake	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2,173	2,173	..	..	..	..	..	..	..	..	..
Cumberland	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,070	1,070	..	..	..	..	..	..	..	..	..
Coal Creek	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	67	67	..	..	..	..	..	..	..	..	..
GREYMOUTH.																										
Blackball	Leitch, Walter ..	12	bitum.	2	17′	15′	1 in 5	bord and pillar	..	9′ x 6′	1,232′	adit	78,300	21,297	99,597	425,715	535,312	50	72	122	steam	5¾″	6″	90′	furnace	25/11/02
Brunner Mine	Coulthard, John..	38	„	1	10′ to 12′	all	1 in 4	ditto	..	10′ x 7′	1,000′	„	90,290	26,424	116,714	1,846,446	1,963,160	35	110	145	„	..	..	..	Scheile fan	14/11/02
Tyneside	Armstrong, James	20	„	1	12′	12′	1 in 4	„	1	10′ dia.	90′	shaft	283	..	283	18,398	18,681	4	7	11	„	pulsom pump	eter No.	10	natural	..
Point Elizabeth	Herd, Joseph ..	..	„	..	..	..	..	..	4	3 10′ x 7′ 1 7′ x 7′	..	adit	..	..	..	..	..	9	27	36	„	..	..	..	fan	29/11/02
Mines not at work.																										
Coal-pit Heath	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	577,190	577,190	..	..	..	..	..	..	..	..	..
Wallsend	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	205,539	205,539	..	..	..	..	..	..	..	..	..

CANTERBURY.																									
Springfield, Springfield ..	Horsley, J. ..	26	brown	1	3′ 3″	all	1 in 6	bord and pillar	2	6′ 6″ x 4′	70′	shaft	1,217	..	1,217	86,031	87,248	1	5	6	steam	direct st	acting	exhaust from pump	9/10/02
Victoria, Springfield ..	Cloudesley, W. J.	2	„	1	3′	„	1 in 6	longwall	1	4′ 6″ x 3′	50′	adit	210	..	210	43	253	2	2	4	horse	..	..	natural	15/9/02
Campbell's, Springfield ..	Campbell, P. ..	0½	„	1	2′	„	..	„	..	..	..	„	110	..	110	..	110	2	..	2	..	..	..	„	15/9/02
Homebush, Glentunnel ..	Campbell, J. C. ..	30	„	2	3′ and 7′	„	1 in 3	bord and pillar	..	6′ x 6 ′	40 ch.	tunnel	8,578	627	9,205	132,559	141,764	4	19	23	horse & steam	..	..	„	10/10/02
St. Helen's, White Cliffs ..	Levick, H. ..	21	„	3	4′ 6″ 3′ 2′ 10″	„	1 in 3	pillar, stope, and wall	1	4′ 6″ x 3′ 7″	32′ 5 ch.	adit	1,249	..	1,249	8,814	10,063	1	3	4	hand	..	..	„	10/10/02
Brockley, Glenroy	Lee, H. ..	2	„	1	3′ 6″	„	vertical	..	..	..	..	..	95	..	95	60	155	1	1	2	horse	..	..	„	16/9/02
Mount Somers, Mount Somers	Thompson, A. ..	38	„	1	35′	10′	1 in 9	bord and pillar	..	..	..	adit	4,695	731	5,426	39,238	44,664	3	11	14	„	..	..	„	18/9/02
Albury, Albury	Willetts, J. M. ..	11	„	1	22′	10′	1 in 1	ditto	..	4′ x 3′ 6″	68′	shaft	870	40	910	3,584	4,494	2	2	4	„	..	..	„	19/9/02
Elephant Hill, Waihao Downs	Adamson, A. ..	34	lignite	1	..	..	..	..	..	..	..	..	50	..	50	130	180	..	1	1	..	..	..	„	..
Waihao, Waihao Forks ..	Adamson, A. ..	13	„	1	4′	all	..	bord and pillar	..	..	..	adit	688	..	688	597	1,285	2	2	4	..	..	..	„	..
Private Pits.																									
Dalethorpe, Springfield ..	Nuthall, A. J. ..	8	„	1	..	..	..	..	..	..	..	..	34	..	34	217	251	..	..	..	..	..	..	„	..
Snowdon, Rakaia Gorge ..	Gerard, G. ..	17	„	1	14′	8′	..	narrow	1	4′ x 4′	90′	shaft	100	..	100	1,518	1,618	..	..	..	..	..	..	„	..
Craigieburn, West Coast Road	Manson, D. ..	6	brown	1	..	..	..	..	..	..	..	adit	35	..	35	148	183	..	..	..	..	..	..	„	..
Springburn Lime Company, Staveley	Scott, R. L., Secretary, Ch'stch'ch	..	..	..	..	12′	..	..	..	..	..	„	115	..	115	250	365	..	..	..	..	..	..	„	..
McKenzie's Castle Hill ..	McKenzie, J. ..	1	..	..	..	..	..	..	..	..	..	..	1	..	1	..	1	..	..	..	..	..	..	..	..
Waihao Forks, Waihao Forks	McPherson, D. ..	10	lignite	1	..	..	..	open	..	..	..	open	..	..	..	226	226	..	..	..	..	..	..	..	..
Pits not at work.																									
Wairiri, South Malvern ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,213	1,213	..	..	..	..	..	..	..	..
Acheron, Lake Coleridge ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	503	503	..	..	..	..	..	..	..	..
Kowai Pass, Springfield ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	559	559	..	..	..	..	..	..	..	..
Glenroy, South Malvern ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	115	115	..	..	..	..	..	..	..	..
White Cliffs, South Malvern	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	33,051	33,051	..	..	..	..	..	..	..	..
Duke's (Park Gate) Kakahu	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	916	916	..	..	..	..	..	..	..	..
Spring Vale, Fairlie Creek ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	200	200	..	..	..	..	..	..	..	..
Mount Hutt, Rakaia Gorge..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	155	155	..	..	..	..	..	..	..	..
Sheffield, Sheffield ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	52,284	52,284	..	..	..	..	..	..	..	..
Hartley, White Cliffs ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,991	1,991	..	..	..	..	..	..	..	..
NORTH OTAGO.																									
Rocky Point, Hakataramea..	MacFarlane, D...	3	brown	1	..	..	..	..	..	..	..	..	55	..	55	125	180	1	..	1	..	..	..	natural	..
Awakino, Kurow	Orr, G... ..	23	„	1	15′	7′	vertical	stoping	1	6′ x 2′ 6″	53′	adit	22	..	22	5,585	5,607	1	..	1	..	..	..	„	10/7/02
Wharekuri, Wharekuri ..	Shanks, A. ..	..	„	1	40′	..	„	..	..	..	..	„	152	..	152	1,216	1,368	1	..	1	..	..	..	„	10/7/02
Otiake, Otiake	Simpson and Cunningham	2	„	1	..	..	„	..	..	..	..	..	48	..	48	32	80	..	1	1	..	..	..	„	10/7/02
St. Andrew's, Papakaio ..	Nimmo, T. ..	24	„	1	6′ 6″	6′	1 in 4	bord and pillar	1	4′ x 2′ 6″	60′	adit	1,926	..	1,926	29,465	31,391	1	4	5	horse	..	..	„	9/9/02
Prince Alfred, Papakaio ..	Willetts, J. ..	33	„	1	1′ to 9′	1′ to 9′	1 in 9	ditto	1	5½′ x 6′	51′	„	1,274	..	1,274	45,342	46,616	2	5	7	„	..	..	„	9/9/02
Ngapara, Ngapara ..	Nimmo, W. ..	24	„	1	18′ to 25′	8′	1 in 17	„	1	4′ x 4′	50′	„	836	..	836	18,103	18,939	1	2	3	„	..	..	furnace	11/9/02
Shag Point, Shag Point ..	Shore, T. ..	32	pitch	6	2′ to 6′	all	1 in 4	ditto and longwall	2	16½′ x 6′ 7½′ x 5′	415′ 280′	shaft	260	69	329	401,443	401,772	12	40	52	steam	2′	8″	400′ exhaust steam	16/12/02
Allandale, Shagpoint ..	Westfield, C. H...	15	„	3	4′ to 6′	„	1 in 4	bord and pillar	..	10′ x 6′ 8′ x 4′	1,000′ 280′	dip tunl.	17,209	7,707	24,916	165,439	190,355	12	63	75	„	1′	6″	200′ ditto and natural	19/12/02
Pits not at work.																									
Phillips, Kurow	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,985	1,985	..	..	..	..	..	..	..	..
Wharekuri (Collins), Kurow..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,424	1,424	..	..	..	..	..	..	..	..
Rosebery, Otepopo	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,424	1,424	..	..	..	..	..	..	..	..
Earlybank	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	281	281	..	..	..	..	..	..	..	..
Cairns, Kurow .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11,395	11,395	..	..	..	..	..	..	..	..

Statistics of Workings in Coal-mines, 1902—*continued.*

Name of Mine and Locality.	Name of Manager.	Number of Years worked.	Quality of Coal.	No. of Seams worked.	Thickness of Seams.	Thickness worked.	Dip of Seam.	System of Underground Working.	Number of Shafts.	Dimensions of Shafts. Size of Shaft or Adit.	Dimensions of Shafts. Depth of Shaft or Length of Adit.	Output delivered by	Output for 1902. Coal.	Output for 1902. Slack.	Output for 1902. Total.	Approximate Total Output to 31st December, 1901.	Approximate Total Output to 31st December, 1902.	Number of Men ordinarily employed. Above.	Below.	Total.	Power used for drawing Mineral.	Pumps. Stroke.	Pumps. Size of Barrel.	Pumps. Height of Column.	Means of Ventilation.	Date of Inspector's Last Visit.
MIDDLE ISLAND—*continued.*																										
SOUTH OTAGO.													Tons.	Tons.	Tons.	Tons.	Tons.									
Fernhill, Abbotsford ..	Gray, J. ..	25	brown	1	19′	10′	1 in 10	bord and pillar	1	4¾′ x 4½′	..	adit	332	2,137	2,469	133,318	135,787	3	4	7	horse	..	..	..	natural	3/9/02
Freeman's, Abbotsford ..	Hill, R. ..	22	„	2	7′ to 14′	6′ to 7′	1 in 7	ditto	3	6′ x 5′ 7′ x 7′	1,400′ 264′	tunnels	5,594	3,637	9,231	255,335	264,566	6	17	23	steam & horse	12″	5″	130′	exhaust steam from pump	23/10/02
Walton Park, Walton Park ..	Kenyon, J. ..	32	„	1	10′ to 19′	12′	1 in 10	„	3	6′ x 4′ 12′ x 4′	30′ to 170′	„	10,956	631	11,587	554,231	565,818	4	15	19	horse	..	..	..	furnace	23/10/02
Jubilee, Walton Park ..	Campbell, P. ..	5	„	1	12′ to 18′	8′	1 in 10	„	2	6′ x 5′	4 ch.	„	9,022	1,261	10,283	30,657	40,940	2	16	18	steam & horse	..	..	..	natural	2/9/02
Saddle Hill (No. 1), Saddle Hill	Christie, W. H. L.	30	„	1	20′	8′ to 16′	1 in 10	„	4	5′ 10″ x 4′ 6″	264′	„	3,360	4,104	7,464	117,234	124,698	3	11	14	horse & steam	..	..	..	„	4/7/02
Saddle Hill (No. 2), Saddle Hill	Barber, J. ..	1	„	..	..	..	..	..	..	..	..	„	1,004	3,487	4,491	..	4,491	2	7	9	ditto	..	..	..	„	4/7/02
Burnweil, Fairfield ..	Harris, A. ..	11	„	1	16′	10′	variable	bord and pillar	1	5′ x 3′	30′	„	1,060	1,789	2,849	18,700	21,549	2	4	6	„	..	..	..	„	13/5/02
Glenochiel, Fairfield ..	Bryce, D. ..	21	„	1	16′	7′ to 9′	1 in 9	ditto	3	6′ x 4′	4 ch.	„	..	2,000	2,000	24,756	26,756	3	2	5	„	..	..	..	„	13/5/02
Mosgiel, Mosgiel	Sneddon, J. ..	18	„	1	8′	7′	1 in 10	„	2	4′ x 4′	14 ch.	„	800	2,056	2,856	89,778	92,634	3	4	7	steam	4′	4″	70′	„	13/5/02
Riccarton, East Taieri ..	Vickers, J. ..	2	„	1	..	..	..	„	..	..	300′	„	545	2,047	2,592	414	3,006	4	6	10	steam & horse	..	..	..	„	13/5/02
Lauriston, Brighton ..	Walker, J. R. ..	16	„	1	6′	5′ 6″	variable	„	1	..	48′	„	162	38	200	5,437	5,637	1	1	2	horse	..	..	..	„	2/9/02
McColl's, Brighton.. ..	McColl, D. L. ..	14	„	1	6′	5′ 6″	„	„	..	..	..	..	87	35	122	1,181	1,303	1	1	2	„	..	..	..	„	2/9/02
Bruce, Milton	Young, A. ..	35	„	1	15′	9′	1 in 8	„	..	..	..	adit	418	..	418	23,481	23,899	..	2	2	hand	..	..	..	„	26/9/02
Strip-and-at-it, Milton ..	Hardwick, N. ..	8	„	1	8′	6′	..	„	..	..	..	„	8	..	8	692	700	..	1	1	„	..	..	..	„	26/9/02
Reid's, Akatore, Milton ..	Reid, James ..	8	„	1	14′	all	..	„	..	..	..	„	..	..	..	244	244	..	..	..	..	..	..	..	„	..
Fortification, Milton ..	Straw, M. ..	5	„	1	14′	7′ 6″	1 in 12	„	2	7′ x 6′ 6′ x 6′	4½ ch. 11½ ch.	..	12,808	3,714	16,522	10,867	27,389	15	15	30	steam	6″	4″	30′	„	26/9/02
Glenledi, Milton	McGilp, N. ..	..	„	1	20′	all	1 in 8	open	..	..	..	open	384	..	384	1,741	2,125	1	..	1	hand	..	..	..	„	26/9/02
Adam's Flat, Adam's Flat ..	Reid, J. ..	20	lignite	1	14′	10′	..	„	..	..	..	„	40	..	40	2,171	2,211	1	..	1	„	..	..	..	„	26/9/02
Paskell's, Adam's Flat ..	Paskell, J. ..	38	„	1	8′	all	1 in 6	„	..	..	..	„	4	..	4	464	468	1	..	1	„	..	..	..	„	26/9/02
Wallsend, Lovell's Flat ..	Hewitson, R. ..	32	„	1	20′	„	..	„	..	..	..	„	194	..	194	10,760	10,954	1	..	1	„	..	..	..	..	18/6/02
Lovell's Flat, Lovell's Flat ..	Carruthers, J. ..	8	brown	1	5′ to 10′	5′ to 7′	1 in 4	bord and pillar	2	11′ x 5′	470′	shaft	8,985	6,677	15,662	42,144	57,806	10	34	44	steam	16″	6″	480′	exhaust steam from pump & furnace	25/9/02
Benhar, Stirling	McLeod, J. ..	39	lignite	1	30′	12′	..	ditto	2	4′ x 4′	..	incline	2,261	536	2,797	98,780	101,577	1	5	6	horse	..	..	..	natural	18/6/02
Mount Wallace, Stirling ..	Shaw, D. ..	8	„	1	14′	8′ to 10′	..	„	..	..	..	adit	551	..	551	3,595	4,146	..	1	1	hand	..	..	..	„	18/6/02
Taratu-Kaitangata ..	Longstaff, H. C...	1	brown	..	..	7′ to 9′	..	„	..	..	5 ch.	„	2,739	44	2,783	..	2,783	2	10	12	„	..	..	..	„	12/12/02
Kaitangata (including Castle Hill), Kaitangata	Barclay, T. ..	26	„	2	6′ to 30′	all	variable	„	1	9′ x 7′ 6′ diam.	1,100′	incline	88728	39,332	118,050	1,523,207	1,641,257	50	282	332	steam	..	..	..	furnace	11/12/02
		9	„	2	6′ to 25′	„	„	„	1	11′ x 6′ 6″ 10′ diam.	3,236′	„									„				„	10/12/02
Longridge, Kaitangata ..	Mackie, N. ..	1	„	1	4′	„	..	„	..	..	..	..	45	..	45	..	45	1	2	3	..	..	..	..	natural	21/11/02
Wangaroa, Kaitangata ..	Smith, J. ..	22	„	1	10′ 6″	8′	1 in 6	„	..	..	..	adit	44	16	60	1,396	1,456	..	1	1	hand	..	..	..	„	28/8/02
Maintholm, Waipahi ..	Lischner, F. ..	17	lignite	1	15′	all	..	open	..	..	..	open	3,648	..	3,648	29,116	32,764	3	..	3	„	..	..	..	..	4/5/02

Private Pits.																										
Fairbairn's, Taieri Beach	Fairbairn, R.	..	brown	..	..	..	..	..	..	..	..	..	450	30	480	..	480	1	..	1	hand	..	..	..	natural	..
Taratu, Kaitangata	Frazer, H. H.	30	"	1	..	..	..	..	..	..	..	..	12	2	14	204	218	..	..	..	..	..	..	..	"	..
Lakeside, Kaitangata	Landells, James	2	"	..	..	..	..	..	..	..	..	..	107	..	107	720	827	..	..	..	..	..	..	..	"	..
Tuakitoto, Lovell's Flat	Dunlop, R.	12	"	1	20′	8′	..	bord and pillar	1	..	..	incline	27	..	27	3,072	3,099	..	..	..	..	..	..	..	"	20/6/02
Pits not at work.																										
Record, Kaitangata	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	414	414	..	..	..	..	..	..	..	..	..
Early Rise, Milton	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15	15	..	..	..	..	..	..	..	..	..
Chain Hills, Abbotsford	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	842	842	..	..	..	..	..	..	..	..	..
Salisbury, Mosgiel	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4,433	4,433	..	..	..	..	..	..	..	..	..
Bruce No. 2, Milton	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	23,322	23,322	..	..	..	..	..	..	..	..	..
Rigfoot, Stirling	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5,163	5,163	..	..	..	..	..	..	..	..	..
Morrison's, Stirling	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	646	646	..	..	..	..	..	..	..	..	..
Pomahaka, Pomahaka	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	20	20	..	..	..	..	..	..	..	..	..
Castle Hill No. 1, Kaitangata	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9,314	9,314	..	..	..	..	..	..	..	..	..
Crofthead, Kaitangata	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6,713	6,713	..	..	..	..	..	..	..	..	..
Langridge, Kaitangata	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	693	693	..	..	..	..	..	..	..	..	..
Lesmahagow, Kaitangata	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,511	1,511	..	..	..	..	..	..	..	..	..
Cowpan's, Owaka	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	95	95	..	..	..	..	..	..	..	..	..
Shennan's, Waipahi	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	45	45	..	..	..	..	..	..	..	..	..
Early Bank, Milton	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	320	320	..	..	..	..	..	..	..	..	..
CENTRAL OTAGO.																										
Coal Creek, Roxburgh	Barclay, Wm.	32	lignite	1	80′	20′	variable	bord and pillar	..	..	..	adit	5,886	..	5,886	21,238	27,124	4	8	12	horse	..	..	..	natural	14/11/02
McPherson's, Roxburgh	McPherson, M.	32	"	1	80′	30′ to 40′	"	open	..	..	..	open	3,656	..	3,656	24,774	28,430	1	4	5	"	..	..	..	..	4/10/02
Perseverance, Roxburgh	Craig, J.	15	"	1	99′	70′	1 in 4	narrow	..	6′ x 7′	..	adit	3,247	..	3,247	16,083	19,330	1	4	5	Pelton wheel	..	..	..	natural	4/10/02
Knott and Gordon's Gully Pit, Roxburgh	Knott and Gordon	5	"	..	..	..	..	open	..	..	..	open	7	..	7	482	489	1	..	1	..	..	..	..	..	4/10/02
Drummey's, Alexandra	Drummey, J.	..	brown	..	..	..	..	..	..	..	..	shaft	..	..	..	179	179	..	..	..	horse	..	..	..	natural	11/11/02
Alexandra, Alexandra	O'Connell, M.	22	"	1	14′	7′	..	bord and pillar	2	5′ x 2′ 6″ 6′ x 4′	60′	adit	577	..	577	37,753	38,330	2	..	2	"	..	..	..	"	11/11/02
Perseverance, Alexandra	Hunter, A.	..	"	..	..	..	..	ditto	..	..	..	"	4,928	..	4,928	6,385	11,313	2	7	9	steam	..	..	..	"	11/11/02
McQueenville, Alexandra	Howie, J.	15	"	1	14′	7′	..	"	2	4′ 9″ x 3′	62′	shaft & adit	3,950	..	3,950	35,572	39,522	1	4	5	horse	..	..	..	"	9/10/02
Alexandra Coal Company, Alexandra	Carson, W.	..	"	1	28′	8′	..	"	1	6′ x 4′	60′	shaft	9,912	..	9,912	18,085	27,997	6	16	22	steam	three-ram 12″	throw pump 6″	60′	"	12/11/02
Undaunted, Alexandra	Mathias, D. H.	4	"	1	7′	6′	in	"	1	5′ x 2′ 6″	70′	adit	1,384	..	1,384	559	1,943	1	4	5	horse	..	..	..	"	11/11/02
Cambrian's, Cambrian's	Dungey, C.	18	lignite	1	9′	all	..	open	..	..	..	open	117	..	117	13,985	14,102	1	..	1	"	..	..	..	..	9/12/02
Welshman's Gully, Cambrian's	McGuckin, J. & R.	41	"	1	30′	"	..	"	..	..	..	"	959	..	959	29,516	30,475	3	..	3	"	..	..	..	..	9/12/02
Blackstone Hill, Blackstone Hill	Thurlow, R.	36	"	1	unknown	16′	..	"	..	..	..	"	550	..	550	2,467	3,017	2	..	2	"	..	..	..	..	10/12/02
St. Bathan's, St. Bathan's	Enwright, J.	5	"	1	"	..	..	"	..	..	..	"	437	..	437	1,949	2,386	2	..	2	"	..	..	..	..	10/12/02
Beck's Idaburn, Idaburn	Beck, M.	16	"	1	35′	all	..	"	..	..	..	"	644	..	644	14,725	15,369	3	..	3	"	..	..	..	..	10/12/02
McLean's, Idaburn	McLean, L.	..	"	1	15′	"	..	"	..	..	..	"	..	..	..	1,127	1,127	..	..	..	"	..	..	..	..	10/12/02
Idaburn, Idaburn	White, J.	32	"	1	20′	"	..	"	..	..	..	"	1,009	..	1,009	32,555	33,564	3	..	3	"	..	..	..	natural	10/12/02
Border, Rough Ridge	Turnbull, G.	32	"	1	12′	"	..	"	..	..	..	"	235	..	235	6,778	7,013	2	..	2	"	..	..	..	"	4/12/02
Gimmerburn, Gimmerburn	Docherty, C.	37	"	1	12′	"	..	"	..	..	..	"	48	..	48	2,605	2,653	1	..	1	hand	..	..	..	"	12/1/02
Commercial, Kyeburn	Archer, C.	23	brown	1	10′	8′	vertical	stoping	..	..	..	shaft	451	..	451	14,021	14,472	1	2	3	water wheel	..	..	..	"	12/12/02
Dairy Creek, Clyde	McAllister, N.	30	"	1	40′	14′	1 in 2	levels	..	..	..	dip incline	2,512	..	2,512	8,070	10,582	1	4	5	steam	..	..	..	"	13/10/02
Clyde Coal Company, Clyde	Turner, G.	..	"	..	40′	14′	1 in 2	"	..	..	..	ditto	5,255	..	5,255	10,948	16,203	2	9	11	"	..	..	..	"	13/10/02
Cardrona, Cardrona	McDougall, R.	18	"	1	30′	all	vertical	open	..	..	..	open	1,879	..	1,879	10,944	12,823	7	..	7	horse	..	..	..	..	21/10/02
Gibbston, Gibbston	Hodson, J.	16	"	1	30′	"	1 in 2	bord and pillar	..	..	..	adit	1,883	70	1,953	6,391	8,344	3	7	10	steam	..	..	..	natural	28/10/02
Doolan's Creek, Doolan's Creek	Murray, A. C. (Sec., Cromwell)	1	"	..	..	..	..	..	1	..	..	..	25	..	25	..	25	1	2	3	"	..	..	..	"	28/10/02

Statistics of Workings in Coal-mines, 1902—*continued.*

Name of Mine and Locality.	Name of Manager.	Number of Years worked.	Quality of Coal.	No. of Seams worked.	Thickness of Seams.	Thickness worked.	Dip of Seam.	System of Underground Working.	Number of Shafts.	Dimensions of Shafts.		Output delivered by	Output for 1902.			Approximate Total Output to 31st December, 1901.	Approximate Total Output to 31st December, 1902.	Number of Men ordinarily employed.			Power used for drawing Mineral.	Pumps.			Means of Ventilation.	Date of Inspector's Last Visit
										Size of Shaft or Adit.	Depth of Shaft or Length of Adit.		Coal.	Slack.	Total.			Above.	Below.	Total.		Stroke.	Size of Barrel.	Height of Column.		
MIDDLE ISLAND—*continued.*																										
CENTRAL OTAGO—*continued.*													Tons.	Tons.	Tons.	Tons.	Tons.									
Kawarau, Bannockburn	Cromwell and Bannockburn Collieries Company. A. Gillanders, Mine Manager	25	brown	1	10′	6′	1 in 4	bord and pillar	1	6′ x 6′	34′	incline	2,477	..	2,477	29,282	31,759	5	10	15	steam	..	..	..	natural	5/11/02
Excelsior, Bannockburn		10	"	1	6′	5′	1 in 4	ditto	1	6′ x 5½′	..	"	3,037	..	3,037	12,355	15,392	6	9	15	"	..	..	..	"	5/11/02
Bannockburn, Bannockburn		13	"	1	6′	5′	1 in 4	"	1	6′ x 4′	20′	adit	4,672	..	4,672	6,634	11,306	6	10	16	"	..	..	..	"	5/11/02
Nevis, Nevis	Scott, C. ..	9	"	1	20′	all	vertical	open	..	..	..	open	565	..	565	3,139	3,704	2	..	2	hand	..	..	..	..	4/11/02
Ryder's, Nevis	Scott, C. ..	..	"	..	..	all	..	"	..	..	..	"	334	..	334	1,694	2,028	1	..	1	"	..	..	..	..	4/11/01
Clough and Allen's, Nevis ..	Holmes, A. ..	..	"	..	..	..	..	"	..	..	..	"	24	..	24	288	312	1	..	1	"	..	..	..	..	4/11/02
Ritchie's, Nevis	Ritchie, Jas. ..	..	..	..	..	..	..	"	..	..	..	"	30	..	30	88	118	1	..	1	"	..	..	..	..	4/11/02
Private Pits.																										
Price's, Blackstone Hill ..	Price, G. ..	5	lignite	1	12′	all	..	"	..	..	..	"	22	..	22	64	86	..	..	..	"	..	..	..	..	20/2/02
Kyeburn, Upper Kyeburn ..	McCready and Coombs	..	brown	..	..	..	..	"	..	..	..	"	13	19	32	15,335	15,367	..	..	..	"	..	..	..	..	..
Angel's, Bannockburn ..	Angel, C. F. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	5/11/02
Pits not at work.																										
Black Diamond, Roxburgh ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	232	232	..	..	..	..	..	..	..	..	..
Simpson Theyers, Alexandra	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,636	1,636	..	..	..	..	..	..	..	..	..
Cromwell, Cromwell ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3,019	3,019	..	..	..	..	..	..	..	..	..
Cooper's, Cromwell ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	385	385	..	..	..	..	..	..	..	..	..
Upper Nevis, Nevis ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	65	65	..	..	..	..	..	..	..	..	..
Williamson's, Nevis ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	95	95	..	..	..	..	..	..	..	..	..
Padgett's, Blackstone Hill ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	46	46	..	..	..	..	..	..	..	..	..
Waikerikeri, Clyde ..	Dunstan Coal Co. (Smart, J., sec.)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	20,322	20,322	..	..	..	..	..	..	..	..	..
Enterprise, Alexandra ..	(Rivers) ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	703	703	..	..	..	..	..	..	..	..	..
Fennessy's, Idaburn ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	70	70	..	..	..	..	..	..	..	..	..
Cairnmuir, Bannockburn ..	(Crow & Anderson)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,451	1,451	..	..	..	..	..	..	..	..	..
Cooper & Gibson's, Bannock'rn	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5,395	5,395	..	..	..	..	..	..	..	..	..
Gibbston, Gibbston ..	(Cowan's) ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	19,464	19,464	..	..	..	..	..	..	..	..	..
Harrex and Owen's, Cambrian's	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	60	60	..	..	..	..	..	..	..	..	..
Blackman's Gully, Clyde ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	144	144	..	..	..	..	..	..	..	..	..
Nulli Secundus, Bannockburn	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	632	632	..	..	..	..	..	..	..	..	..
Blackman's, Alexandra ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	89	89	..	..	..	..	..	..	..	..	..
Gibson's, Bannockburn ..	Gibson, J. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	220	220	..	..	..	..	..	..	..	..	..
Watherston's, Nevis ..	Watherston, A. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	5	..	..	..	..	..	..	..	..	..
SOUTHLAND.																										
Pukerau, Pukerau	O'Hagan, C. ..	22	lignite	1	16′	8′ to 10′	in 10	bord and pillar	1	8′ x 8′	11 ch.	adit	916	..	916	28,684	29,600	1	3	4	horse	..	..	..	natural	3/5/02
Nelson's, Pukerau	Nelson, J. H. ..	13	"	1	16′	all	..	ditto	..	..	..	"	279	..	279	2,566	2,845	2	..	2	hand	..	..	..	"	3/5/02
Whiterigg, Gore	Hope, J. ..	20	"	1	20′	15′	1 in 20	"	1	3′ 6″ x 2′ 6″	2 ch.	"	2,058	..	2,058	8,813	10,871	2	4	6	horse	..	..	..	"	13/8/02
Heffernan's, Gore	Hoffman, T. ..	24	"	1	30′	15′	..	open	..	..	..	open	903	..	903	5,944	6,847	1	2	3	hand	..	..	..	..	30/8/02
Gutschlag's, Gore	Gutschlag, W. ..	19	"	1	10′	all	..	"	..	..	..	"	20	..	20	3,274	3,294	1	..	1	"	..	..	..	..	..
Sarginson's, Gore	Reinke, A. ..	16	"	1	7′	"	..	"	..	..	..	"	748	..	748	1,819	2,567	2	..	2	"	..	..	..	..	1/5/02

Green's, Gore	Smyth, J. J.	14	lignite	1	22′	17′	1 in 20	bord and pillar	..	..	5 ch.	adit	4,275	..	4,275	26,366	30,641	..	6	6	horse	..	..	..	natural	1/5/02
Knapdale, Chatton	Irvine, W.	17	"	1	26′	15′	almost vertical	wide headings	..	..	..	"	59	..	59	6,301	6,360	..	1	1	"	..	..	..	"	29/8/02
Perkin's, East Chatton	Perkins, A.	3	"	..	..	..	..	open	..	..	..	open	300	..	300	550	850	2	..	2	hand	..	..	..	..	2/5/02
Harvey's, Chatton	Harvey, J.	25	"	1	16′ to 26′	16′ to 18′	..	"	..	..	..	"	..	..	..	13,586	13,586	..	..	..	..	..	..	..	..	29/8/02
Pacey's, East Chatton	Pacey, R.	26	"	1	unknown	14′	1 in 6	"	..	..	..	"	1,010	..	1,010	11,670	12,680	3	..	3	hand	..	..	..	..	2/5/02
Johnstone's, Waikaka Valley	Johnstone, W.	9	"	1	11′	all	..	"	..	..	..	"	1,939	..	1,939	2,719	4,658	3	..	3	"	..	..	..	..	28/8/02
Thorndale, Waikaka Valley	Orchard, E. C.	3	"	..	..	..	..	"	..	..	..	"	543	..	543	822	1,365	4	..	4	"	..	..	..	..	1/5/02
Reid's, Waikaka Valley	Reid, R.	6	"	1	..	all	..	"	..	..	..	"	2,113	..	2,113	2,456	4,569	5	..	5	"	..	..	..	..	28/8/02
Glenlee, Waikaka	McGill, J.	9	"	1	14′	"	..	"	..	..	..	"	1,361	..	1,361	1,852	3,213	3	..	3	"	..	..	..	..	30/4/02
McDonald's, Wendon Valley	Nicol, D.	..	"	1	..	..	..	adit	..	..	..	adit	1,220	73	1,293	1,296	2,589	4	..	4	"	..	..	..	natural	25/10/02
Wendon, Wendon Valley	Edge, A. A.	24	"	1	16′	all	..	"	..	..	..	"	..	..	..	5,432	5,432	..	..	..	"	..	..	..	"	30/4/02
Muddy Terrace (shale pit), Waikaia	Haseldine, J. M.	1	"	..	..	..	..	open	..	..	..	open	411	..	411	..	411	1	..	1	"	..	..	..	..	12/5/02
Monaghan's, Landslip, Waikaia	Monaghan, R.	3	"	..	..	..	..	"	..	..	..	"	556	..	556	74	630	2	4	6	"	..	..	..	..	12/5/02
McIvor's, Landslip, Waikaia	McIvor, W.	11	"	1	15′	all	..	"	..	..	..	"	475	..	475	2,025	2,500	2	..	2	"	..	..	..	..	12/5/02
Goldie's, Landslip, Waikaia	McIvor, R.	..	"	..	..	..	..	"	..	..	..	"	120	..	120	268	388	2	..	2	"	..	..	..	..	12/5/02
Number One, Landslip, Waikaia	McKinnon, A.	3	"	..	..	..	..	"	..	..	..	"	231	..	231	248	479	1	..	1	"	..	..	..	..	10/5/02
Argyle, Waikaia	Baxter, J. and T.	11	"	1	10′	all	..	"	..	..	..	"	248	..	248	1,880	2,118	1	..	1	"	..	..	..	..	12/5/02
Coal Creek, Wendonside	Stevenson, J.	1	"	..	..	..	..	"	..	..	..	"	40	..	40	..	40	..	..	..	"	..	..	..	..	30/8/02
Waimea, Longridge Village, Waimea	Larsen, P.	12	"	1	3′	..	..	"	..	..	..	"	438	..	438	7,164	7,602	2	..	2	"	..	..	..	..	30/8/02
Pyramid, Mandeville	McAllister, E.	10	brown	1	18′	9½′	1 in 2	bord and pillar	..	..	..	adit	12	..	12	1,622	1,634	..	1	1	"	..	..	..	natural	30/8/02
Waimumu, Mataura	Sleeman, C. P.	26	lignite	1	16′	all	..	open	..	..	..	open	9,452	..	9,452	47,345	56,797	7	2	9	"	..	..	..	..	25/8/02
Bogside, Mataura	Mutch and Hurst	6	"	1	16′	13′	..	"	..	..	..	"	214	..	214	2,666	2,880	2	..	2	"	..	..	..	..	25/8.02
Mataura, Mataura	Coster, W.	26	"	1	16′	all	..	"	..	..	..	"	5,776	..	5,776	28,002	33,778	5	..	5	"	..	..	..	..	25/8/02
Townshend's, Mataura	Coomer, R. T.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	739	739	..	..	..	..	..	..	..	..	..
Duthie's, Waimumu	Williams, W. J.	3	lignite	1	..	..	..	open	..	..	..	open	2,358	..	2,358	927	3,285	6	..	6	..	..	..	..	..	26/8/02
Ota Creek, Wyndham	Shields, W.	22	"	1	6′	all	..	"	..	..	..	"	800	..	800	10,096	10,896	2	..	2	..	..	..	..	..	..
Robin Hood, Pine Bush	Trotter, R. A.	21	"	1	15′	"	..	"	..	..	..	"	85	..	85	1,509	1,594	1	..	1	..	..	..	..	..	..
Graham's, Fairfax	Graham, P. S.	24	"	1	5′ 6″	"	1 in 20	bord and pillar	..	..	6 ch.	adit	485	..	485	13,421	13,906	..	2	2	hand	..	..	..	natural	..
Spey Bank, Fairfax	Salton, R.	9	"	1	5′	"	..	ditto	..	..	..	"	..	..	..	540	540	..	..	..	"	..	..	..	"	..
Isla Bank, Fairfax	Slattery, M.	22	"	1	6′	"	..	open	..	..	..	open	414	..	414	5,477	5,891	2	..	2	"	..	..	..	..	..
Nightcaps, Nightcaps	Lloyd, J.	21	brown	3	36′ in the aggregate	24′ in aggregate	variable	bord and pillar	3	4′ x 4′ 4′ x 4′ 6″ 5′ x 5′	32 ch.	adit	39,934	..	39,934	298,563	338,497	20	44	64	steam and horse	..	..	..	Hayes fan	30/10/02
H.B., Nightcaps	Kelly, T.	4	"	1	6′ 6″	..	..	ditto	..	..	..	"	1,597	..	1,597	1,393	2,990	..	3	3	hand	..	..	..	natural	29/10/02
Hit or Miss, Nightcaps	Alley and Tinker	2	"	1	..	..	..	..	..	..	..	..	221	..	221	354	575	2	..	2	"	..	..	..	"	21/10/02
Blythe, Nightcaps	Greer and Spence	3	"	..	..	..	..	open	..	..	..	open	225	..	225	784	1,009	2	..	2	"	..	..	..	..	30/10/02
Quested's, Nightcaps	Quested, J.	..	"	..	..	..	..	"	..	..	..	"	..	..	..	577	577	..	..	..	"	..	..	..	..	26/4/02
Brighton's, Nightcaps	Brighton, G.	3	"	..	..	..	..	"	..	..	..	"	186	..	186	170	356	2	..	2	"	..	..	..	..	26/4/02
McBride's, Wairio, Nightcaps	McBride, A.	2	"	..	..	..	..	"	..	..	..	"	130	..	130	3,864	3,994	1	..	1	"	..	..	..	..	26/4/02
Gillies's, Clifton	Gillies, T.	½	..	..	..	..	..	"	..	..	..	"	82	..	82	..	82	2	..	2	"	..	..	..	..	..
Orepuki, Orepuki	Love, A.	..	brown & oil-shale	..	..	..	..	..	..	..	..	adit	5,385	968	6,353	17,517	23,870	3	28	31	steam	..	..	..	Hayes fan	28/10/02
													2,338 (oil-shale)	..	2,338 (oil shale)	12,048	14,386	..	..	..	..	..	..	..	..	..
Pits worked for Private Use.																										
Milne's, Pukerau	Milne, Jas.	1	lignite	1	7′	all	..	open	..	..	..	open	15	..	15	..	15	..	..	..	..	..	..	..	..	3/5/02
Waikoikoi, Pukerau	Kirk, W.	15	"	1	6′	"	..	"	..	..	..	"	20	..	20	290	310	..	..	..	..	..	..	..	..	..
Mason's, Pukerau	Mason, A.	1	"	1	7′	"	..	"	..	..	..	"	10	..	10	..	10	..	..	..	..	..	..	..	..	3/5/02
Robert Smith's, Pukerau	Smith, R.	1	"	1	14′	"	..	"	..	..	..	"	20	..	20	..	20	..	..	..	..	..	..	..	..	3/5/02
H. Smith's, Pukerau	Smith, H.	1	"	1	7′	"	..	"	..	..	..	"	20	..	20	..	20	..	..	..	..	..	..	..	..	3/50/2
McDonald's, East Gore	McDonald, G. H.	1	"	1	7′	"	..	"	..	..	..	"	56	..	56	..	56	..	..	..	..	..	..	..	..	1/5/02
Leitze's, East Gore	Leitze, M.	23	"	1	4′ to 7′	"	..	"	..	..	..	"	12	..	12	1,440	1,452	..	..	..	..	..	..	..	..	..

Statistics of Workings in Coal-mines, 1902—*continued.*

Name of Mine and Locality.	Name of Manager.	Number of Years worked.	Quality of Coal.	No. of Seams worked.	Thickness of Seams.	Thickness worked.	Dip of Seam.	System of Underground Working.	Number of Shafts.	Dimensions of Shafts.		Output delivered by	Output for 1902.			Approximate Total Output to 31st December, 1901.	Approximate Total Output to 31st December, 1902.	Number of Men ordinarily employed.			Power used for drawing Mineral.	Pumps.			Means of Ventilation.	Date of Inspector's Last Visit
										Size of Shaft or Adit.	Depth of Shaft or Length of Adit.		Coal.	Slack.	Total.			Above.	Below.	Total.		Stroke.	Size of Barrel.	Height of Column.		
MIDDLE ISLAND—*continued.*																										
SOUTHLAND—*continued.*																										
Private Pits—continued.													Tons.	Tons.	Tons.	Tons.	Tons.									
River View, Gore	Nicol, L. D.	11	lignite	..	..	..	..	open	..	..	..	open	15	..	15	864	879	..	..	..	..	..	..	..	..	..
Healy's, East Gore	Healy, P.	1	"	1	..	all	..	"	..	..	..	"	12	..	12	..	12	..	..	..	..	..	..	..	..	1/5/02
Ford's, Chatton	Ford, P.	22	"	..	..	..	..	..	..	..	..	..	19	..	19	430	449	..	..	..	..	..	..	..	..	..
Otama, Otama	Graham, T.	9	"	1	..	all	..	open	..	..	..	open	20	..	20	275	295	..	..	..	..	..	..	..	..	30/8/02
Cross's, Otama	Cross Bros.	..	"	1	..	"	..	"	..	..	..	"	32	..	32	84	116	..	..	..	..	..	..	..	..	30/8/02
McGilvray's, Mataura	McGilvray, J.	12	"	1	4′	"	..	"	..	..	..	"	20	..	20	313	333	..	..	..	..	..	..	..	..	27/8/02
Bushbridge's, Wendon Valley	Bushbridge, P.	2	"	1	..	"	..	"	..	..	..	"	52	..	52	15	67	..	..	..	..	..	..	..	..	29/4/02
Perkins', Wendon Valley	Perkins, G. A.	1	"	1	..	"	..	"	..	..	..	"	23	..	23	..	23	..	..	..	..	..	..	..	..	..
Wyndham, Wyndham	Walker, James	7	"	1	..	"	..	"	..	..	..	"	20	..	20	267	287	..	..	..	..	..	..	..	..	..
Marshall's, Edendale	Marshall, H.	11	"	1	5′	"	..	"	..	..	..	"	30	..	30	545	575	..	..	..	..	..	..	..	..	..
Mount Linton, Nightcaps	Taylor, R.	12	brown	1	10″	8′	..	"	..	..	..	"	20	..	20	614	634	..	..	..	..	..	..	..	..	..
Marlow, Nightcaps	Kelly, J. W.	1	..	..	..	..	..	..	..	..	..	..	10	..	10	..	10	..	..	..	..	..	..	..	..	..
Pits not at work.																										
Glover's, Pukerau	Glover, A.	7	..	..	..	..	..	..	..	..	..	..	..	..	..	84	84	..	..	..	..	..	..	..	..	..
Waikoikoi, Pukerau	Scott & Ferguson	2	..	..	..	..	..	..	..	..	..	..	..	..	..	110	110	..	..	..	..	..	..	..	..	..
Radford's, Wendon	Radford, E. and P.	12	..	..	..	..	..	..	..	..	..	..	..	..	..	4,221	4,221	..	..	..	..	..	..	..	..	30/8/02
McBride's, No. 11, Nightcaps	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	72	72	..	..	..	..	..	..	..	..	..
Nichol's, Gore	Nichol, W.	2	..	..	..	..	..	..	..	..	..	..	..	..	..	10	10	..	..	..	..	..	..	..	..	..
Smyth's, Gore	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	7,107	7,107	..	..	..	..	..	..	..	..	..
Boyd & McNee (late Black's), Greenvale	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	478	478	..	..	..	..	..	..	..	..	..
Glendhu, Mataura	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	347	347	..	..	..	..	..	..	..	..	..
Southbrook, Waikaka	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	117	117	..	..	..	..	..	..	..	..	..
Smith's, Mataura	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	55	55	..	..	..	..	..	..	..	..	..
Edendale, Wyndham	McDonald, A.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,997	1,997	..	..	..	..	..	..	..	..	..
Neill's, Edendale	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	79	79	..	..	..	..	..	..	..	..	..
Valley Road, Pukerau	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3,052	3,052	..	..	..	..	..	..	..	..	..
Moffet & Longshaw's, Waikaia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	72	72	..	..	..	..	..	..	..	..	..
Town's, Mataura	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8,002	8,002	..	..	..	..	..	..	..	..	..
Carr's, Mataura	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	518	518	..	..	..	..	..	..	..	..	..
Porter's, Pukerau	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	22	22	..	..	..	..	..	..	..	..	..
Dickson and Walker, Croydon	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	37	37	..	..	..	..	..	..	..	..	..
Hokonui, Hokonui	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	52,084	52,084	..	..	..	..	..	..	..	..	..
Slaughter-yards, Mataura	(Freezing-works use)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	83	83	..	..	..	..	..	..	..	..	..
Perseverance, Pukerau	..	..	..	..	..	..	..	open	..	..	..	open	..	..	..	2,052	2,052	..	..	..	..	..	..	..	..	..
Frank's, Pukerau	..	..	..	..	..	..	..	"	..	..	..	"	..	..	..	45	45	..	..	..	..	..	..	..	..	..
Rejefsky's, Gore	..	..	..	..	..	..	..	"	..	..	..	"	..	..	..	57	57	..	..	..	..	..	..	..	..	..
Clukoski's, Gore	..	..	..	..	..	..	..	"	..	..	..	"	..	..	..	28	28	..	..	..	..	..	..	..	..	..
Kirk and Sheddon, Gore	..	..	..	..	..	..	..	"	..	..	..	"	..	..	..	140	140	..	..	..	..	..	..	..	..	..
Fryer's Excelsior, Gore	..	..	..	..	..	..	..	"	..	..	..	"	..	..	..	807	807	..	..	..	..	..	..	..	..	..

Dryden's, Gore										"				"				438	438									
Kingdon's, Gore										"				"				27	27									
Westbrook, Greenvale										"				"				175	175									
Middlemiss, Greenvale										"				"				15	15									
Marshall's, Otama																		48	48									
Maslin's, Wendon																		854	854									
Vial's Perseverance, Waikaia																		631	631									
Cambrian (McIvor), Waikaia																		191	191									
Northcote's, Waikaia																		685	685									
McGowan's, Mataura																		125	125									
Genge's, Wyndham																		2,819	2,819									
Monaghan's, Pine Bush																		11	11									
Morley Village (Brazer's)																		2,096	2,096									
Cluny, Orepuki																		156	156									
Waikaka, Gore																		604	604									
Croydon, Gore																		25	25									
Hunter's, Otama																		1,944	1,944									
North Chatton, Waikaka																		672	672									
Edge's No. 14, Wendon Valley																		1,286	1,286									
Munro's, Wyndham																		11,151	11,151									
Wallace, Nightcaps																		20,147	20,147									
Alley's Reliable, Nightcaps																		704	704									
Black Diamond, Nightcaps																		220	220									
Morley Village, Nightcaps																		301	301									
Jones, Edendale																		280	280									
Totals, Middle Island															975,141	197,854	1172995	12514516	13687511	726	1786	2512						
Totals, North Island															187,241	4,804	192045	2938675	3130720	77	296	373						
Grand Totals					1162382	202,658	1365040	15453191	16818231	803	2082	2885																

Add output of following twelve mines, included in previous statement but now abandoned: Motupipi, 360 tons; Westport-Wallsend, 3,441 tons; Waimangaroa, 17,307 tons; Wellington, 2,299 tons; Inkerman, 2,665 tons; Inglewood, 314 tons; Devil's Creek, 343 tons; Inangahua, 71 tons; Murray's Creek No. 2, 450 tons; Burke's Creek, 300 tons; Reefton, 36 tons: total	27,586
Add output of Waikaka, Adam's Flat, and Waimea Mines, inserted twice in statement for 1891	6,518
Output of mines included in statement for 1890, but whose operations were suspended prior to 1890, less three, which are again included in body of statement—namely, Hill's Creek, 779 tons; Lovell's Flat, 323 tons; and Wyndham, 1,988 tons: total, 3,090 tons	132,732
Output of mines included in former statements, but whose operations were suspended prior to 1889	172,529
	17,157,596

JOHN HAYES, Inspecting Engineer

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