1881.

NEW ZEALAND.

CONTROL AND INSPECTION OF MINES

(REPORT ON).

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

To the Hon. WILLIAM ROLLESTON, Minister of Mines.

SIR,— Mines Department, Wellington, 20th June, 1881.

I have the honor to forward for your information the following report upon the official control and inspection of mines under "The Regulation of Mines Act, 1874," showing the transactions under the Act, &c., since my last general report of the 15th of July, 1880, with an appendix containing the reports of inspections of coal mines during the year, and the usual statistical tables.

I have, &c,

OLIVER WAKEFIELD,
Under-Secretary for Mines.

REPORT

INSPECTIONS, REPORTS, ETC.

THERE has been steady progress in the work of this branch of the Mines Department during the past year Frequent inspections have been made of the principal coal mines most requiring attention, the mines of less importance having also received their due share of inspection, and the provisions of the Act have been fully enforced wherever necessary since the proclamation of mining districts and the formal appointment of Inspectors to them, referred to in my report of last year In addition to the appointment of Messrs McLaren and Binns respectively to the districts in the North and South Islands, Mr Cox (Assistant Geologist, formerly holding a general appointment as an Inspector), has, under your direction, been appointed severally to each district proclaimed under the Act, and has been instructed to give one-fourth of his time to this department. The report of his recent inspections, under this appointment, will be found with the other Inspectors' reports in the appendix. The condition of the Shag Point Coal Mine has again this year claimed a large share of attention, and in addition to the Inspectors' reports, recent special correspondence upon this subject is published at the end of the appendix, this matter and Mr Binns's letter being again referred to in Mr Inspector Cox's report upon this mine. During the year Mr Inspector Binns has taken steps to establish the Act and special rules in various of the smaller coal mines in the South Island requiring inspection, and special rules for some of these have been approved by the Governor and gazetted, but in the case of mere prospecting mines, and others of little importance, a draft copy of rules has been left with the owners for their guidance in adopting measures for securing safety in working.

The provisions of section 10 of the Act, requiring that a second outlet to the surface shall be made under certain conditions, have now been complied with in all coal mines to which this section applies.

As stated in last year's report, in accordance with the decision of the Government, the inspection of mines under "The Regulation of Mines Act, 1874," has not been extended to mines other than coal, the gold mines at the Thames and adjoining districts being inspected by Mr Inspector McLaren under "The Gold Mining Districts Act, 1873", and his report upon these mines is included in the annual report upon the gold fields.

The question of providing for certificated managers of coal mines (which is not included in the present Act), referred to in my report of last year, and by Mr. Masters, M.H.R., during last session, is further referred to in Mr Binns's report. If the holding of certificates of competency by managers were made compulsory, I certainly think that managers competent to pass the necessary examinations should be enabled to obtain certificates in the colony, in order that they may be upon an equal footing in this respect with managers holding Home certificates.

Statistics, etc.

There is a further increase in the number of coal mines recorded, the total number accounted for this year being 6 in the North and 101 in the South Island, but, as stated last year, many of those in the South Island are upon a very small scale, being either open-work or prospecting mines, and some of them being temporarily abandoned, and the additional number placed upon the list this year are at present of the same unimportant character

The usual tabular statement of the particulars of the coal mines, giving also the total output from the various mines for the year 1880, and the approximate total output from the coal mines in the colony to the end of 1880, is contained in Return No. 1 to the appendix. From the appended statement of the Secretary of Customs (Return No. 2) of coal imports and exports for the year 1880, it will be observed that 123,298 tons of coal were imported during the year, being 34,778 tons less than the quantity imported in 1879. Then by adding the total output (299,923 tons) for the colony during 1880 to the quantity imported (123,298 tons), and deducting the export (7,021 tons) during the same period—assuming, as I have done in former reports, that the remainder has been consumed here—the total consumption in the colony during 1880 would be 416,200 tons, or an increase over the consumption of 1879 of 34,101 tons, the increase of coal won from mines in the colony during 1880 being 68,705 tons over the quantity raised in 1879, or an increase of 137,705 tons over the produce of the mines in 1878, the total production for each of the past three years, and the relative quantity imported, being as follows:—

	Raised in the Colony.	Imported.
1878	162,218 tons	174,148 tons
1879	231,218 tons	158,076 tons
1880	299,923 tons	123,298 tons,

which shews that there has been a steady increase in the quantity raised and consumed in the colony, and a correspondingly steady decrease in the quantity imported. With this evidence under present circumstances before us, it may safely be assumed that, with increased facilities in the way of transit from the mines, their development and the consumption of our own coal will soon be so far extended that importation will no longer be necessary; and, although the export of coal is at present very small, we may hope that as soon as more is produced than is required in the colony, a market will be found to take the surplus, and increase the export trade.

Accidents.

Return No. 3, following the appendix, contains a table of accidents in coal mines, and shows that twenty persons were more or less injured (the majority very slightly), and that there were two fatal accidents during the year These casualties all occurred in the South Island, and they are reported by Mr. Inspector Binns, who points out that the two fatal accidents represent a rate of one death

in the South Island districts for upwards of 100,000 tons of coal raised, but, as Mr. Inspector McLaren states that no accidents have been reported to him for the six mines in his district, yielding an output of nearly 100,000 tons during the year, it follows that the death rate for the whole colony for the year 1880 is one person killed for about 150,000 tons of coal raised, a condition of affairs which no doubt compares favourably with other countries, although of course the occurrence of any fatal accidents at all is much to be deplored.

In last year's report, the fatal accident from fire-damp, by which John Broadfoot lost his life in the Brunner Mine, upon the 3rd of March, 1880, was briefly referred to, and Mr Binns now includes in his present report for the whole year a full account of the inquiry at the inquest into the cause of this accident, with his remarks upon the case.

He also reports the occurrence of an explosion in the Wellington Company's Waimangaroa mine, at Westport, which led to a prosecution (referred to further on), the Magistrate's judgment being given in Mr. Binns's report.

Proceedings under the Act. Conclusion.

As I have more fully pointed out in former reports, the bringing into force an Act of the character of "The Regulation of Mines Act, 1874," has been a matter requiring careful judgment with regard to the interests concerned, and the process has, therefore, been less an arbitrary than a steadily progressive one, a great deal having been effected without the necessity for adopting extreme measures the first actual prosecution under the Act having been instituted during the past year by Mr Inspector Binns, in consequence of the explosion at the Wellington Company's Waimangaroa mine, Westport, on the 21st of August last, by which three men were seriously injured, two informations being laid against the manager of the mine and the contractor for getting the coal, for breaches of the Act and special rules in not providing adequate ventilation, and for not working the mine with proper precautions for safety; a conviction being obtained upon one of the informations, the defendants being respectively fined £5, with £7 18s. costs, and £2, with 17s. costs.

These are the first legal proceedings in the form of a prosecution which have been taken under the Act, and they have probably had a salutary effect in warning coal-mine owners and managers to some extent of the penalties to which they are liable for neglecting to see that all precautions for safety are taken, as provided by the Act and rules. It is to be hoped that the necessity for prosecutions may seldom occur, and it is satisfactory to observe that the Inspectors testify to the continued willingness of owners and managers to do all they can to establish precautions against accidents and to comply with the provisions of the Act, but, although the will may, no doubt, be taken for the deed in many cases, it is none the less incumbent upon all persons connected with the mines to be ever mindful of the exceedingly dangerous nature of the industry in which they are engaged, and that it is their imperative duty never to neglect the smallest occasion for taking precautions against danger

Oliver Wakefield.

APPENDIX

No. 1.

INTERIM REPORT UPON INSPECTION OF COAL MINES, NORTH ISLAND DISTRICTS.

Mr. Inspector McLaren to the Under Secretary for Mines.

Sir,— Inspector of Mines Office, Thames, 20th October, 1880.

I have the honor to report that, towards the end of July, I received a note from Mr. Phillips, the new manager of Miranda Coal Mine, stating that he had given up his position as manager, and that the ownership of the mine had fallen back into the original proprietor's, Mr. Foote's, hands; but that the plan which he had had prepared, at my request, would be open for my inspection at Mr. Dalton's, Civil Engineer's Office, Auckland.

On the 30th July I went to Auckland, with the intention of proceeding to the Miranda Mine, but first called on Mr. Dalton to see the plan, and found that he had drawn the plans of the two levels separately—that is, not with the view of showing how the workings in the one level stood in relation

to those of the other. It was, however, evident to me at a glance that my fears were true, as expressed in my report of 31st March last—viz., that they had actually undermined the pillars of the upper levels. In order to ascertain the extent, I asked Mr. Dalton to plot the one level in connection with the other, which he agreed to do and forward to me.

Having experienced Mr. Foote's previous disobedience in regard to instructions given for the safety of the mine, and wishing, if possible, to avoid the extreme measure of a Court case, which he had no means of paying for, I got introduced to some friends who had influence with him, pointing out to them the danger he incurred, and the strong measures I must take if immediate attention was not paid to my instructions. I am now glad I did so, as this course seems to have had the desired effect, without my having recourse to stronger proceedings.

Miranda Mine.—Having received a letter from Mr. Phillips, enclosing tracing of the workings, with the report of Mr. Dalton, Civil Engineer, thereon (copies attached), I visited the mine on the 18th August, and found that they had evidently got alarmed, and were busily engaged erecting timbers in the lower levels; but, having no knowledge of where the pillars had been undermined, were doing so without judgment. I immediately laid off the ground in the lower levels according to Mr. Dalton's plan, shewing the manager where the pillars were undermined, giving instructions in writing that these be immediately secured by strong timbers, and also that an accurate plan be made. The manager informed me he had no power to order timber, or get a plan made, or do anything incurring expense without the authority of his father, the proprietor. I returned to Auckland next day, and placed a similar notice in his hands, informing him plainly of the terrible danger that his own sons and relations were incurring, and the dangerous position in which he was placing himself should anything happen; also, that it was better to give up working the mine if he could not make it pay sufficiently to enable him to secure it. He promised he would endeavour to do everything required by me, or that his son, the manager, considered necessary to secure the ground. Since then he has written me a letter (copy attached) informing me he is having the mine surveyed. I intend shortly revisiting the mine to see that my instructions are carried out.

Waikato Mine, Huntly.—On the 21st August I visited this mine, and found matters proceeding very satisfactorily there. The principal thing I was anxious about was the ventilation, but found that they had broken through into some old workings to the southward, the presence of which was unknown. It was found that the entrance of the tunnel to these had been covered up by a slip on the surface; this was cleared away, giving a double opening to the mine, and a means of good ventilation. I examined all these old workings, and though it must be some seventeen years since they were opened, yet everything now remains exactly as it was left. Though the roof was wholly unsupported with timber, no falls had taken place either from the roof or sides, showing good standing coal and sound roof overhead. A plan of the new mine, including old workings to the northward, had been made at the time of my visit; but this did not include the old workings to the southward, the manager not being aware of their existence at the time the ground was surveyed.

Taupiri Mine, Huntly.—In my last report I mentioned that the pillars were being successfully drawn in this mine; however, this was stopped by the proprietors of the land soon after the date of that report. The principal work now being carried on is a continuation of the sinking of the incline into the coal in the new ground. This was down for a distance of 400 feet from the entrance, and well into a strong body of coal; but, before they open out, the incline will be continued till the bottom of the dip is found, where a good ventilation shaft will be sunk, and pumping machinery erected. Care was being taken to provide safety recesses, or "man-holes" in the incline, as required by clause 3, Part II. of Act. The ventilation of the mine was good, the manager having carried out my previous instructions to secure same.

Kawakawa Mine.—Visited this mine on the 25th August, and found a new survey of the workings had been made, and a plan prepared, copy of which was furnished to me by the manager, Mr. Moody The ventilation of one of the lower levels was bad, being exceedingly hot and close; they were, however, pushing on work to make a second opening to cause a current of air, and by the sound they must have been within six feet or so of breaking through when I left. On the evening of the same day, at Russell, I received the following telegram from the manager: "The drive near sinking pit has just holed into lowest left level. Ventilation first-class."

Kamo Mine, Whangarei.—Visited this mine on the 2nd September, and found that for the last three months no work had been done in getting coal, as, on account of the road being impassable for loaded wagons, no coal could be conveyed from the mine to the place where vessels are loaded. I examined the workings, and found a number of small falls had taken place from the roof. The mine will require a general overhaul and timbering before work is recommenced; this the manager intends to do, and has a large quantity of timber on hand ready for this purpose. The ventilation to the head of the bords, towards the end of the main level, will require direction, as the air in the rises of these is exceedingly close and hot. The plan requires being brought up to date. The operations in sinking the new shaft have been suspended for the present, a question having arisen as to its being in the best position to work the mine from; it is probable that further borings will be made, in order to settle this point, before the work of sinking is resumed. The ballasting of the railway to Whangarei Wharf is now being proceeded with, and I think the line should be ready for traffic in about six weeks to two months from the date of my visit.

Whau Whau Mine, Whangarei.—The principal work done in this mine since my previous visit has been opening out a large block of coal, into which they have carried two levels, occasionally cross-cutting between them to carry forward the ventilation. One of these levels had reached within 40 or 50 feet of old workings, which are full of water. Borings will now be kept ahead of the drive in order to free the old workings from water before breaking through. When this is done the mine will have another opening to the surface, and a good means of thoroughly ventilating the portion of the mine now being opened out.

I have, &c.,

JAMES M McLAREN,
Inspector of Mines.

The Under-Secretary for Mines, Wellington.

Enclosures.

Mr. Dalton to Mr. Phillips.

Sir,— 39 and 40, Insurance Buildings, 2nd August, 1880.

In accordance with your instructions, I have made a survey of the underground workings of Mr. James Foote's mine, known as the Bridgewater Mine, near Mercer, and have the honor to report thereon as follows:—

Upper Workings.—The crown of the gallery is 25 feet 6 inches below the surface of the ground, and the workings themselves I have taken as being of an average height of 17 feet, so that the floor may be taken as 42 feet 6 inches below the surface, and extent, in total length as shown on plan, 596 feet. There has been a total lack of system in these workings, and I found it impossible to make a correct plan in the time at my disposal, owing to the very uneven walls or pillars, which vary in width and angles, leaving the galleries in places 14 feet wide and in others 23 feet wide, rendering the whole more like a series of caverns than anything else. I have, however, shown on the plan hereto annexed the direction of the galleries, and taken them to be of an uniform width of 14 feet.

Lower Workings.—The floor of the lower workings, coloured green, is 58 feet 6 inches from the surface, and the gallery is on an average 8 feet 6 inches high, and mean width about 14 feet; and the length as shown, 532 feet. Taking the height as 8 feet 6 inches should leave 7 feet 6 inches between the two workings, but, inasmuch as (partly owing to the nature of the material) the depth in some places only amounts to about 5 feet. From an inspection of the plan you will perceive that the lower workings are undermining the pillars of the upper, and it would be presumptuous in me to make any remarks thereon to a practical man like yourself.

I will only say a very careful survey should be made of the workings as they stand, with the object of timbering where necessary I consider the state of things at present very unsatisfactory, and, if persisted in without timbering, of a highly dangerous character.

I have, &c.,

J Phillips, Esq. Wm. Jas. Dalton, C.E.

Mr. J Phillips to Mr. J McLaren

Sir,— Manganese Office, Freeman's Bay, Auckland, 4th August, 1880.

I beg to hand you my report of the Miranda Consolidated Coal and Iron Mines, as follows:— As you are aware, I took over the management of these mines on the 1st of June last. On my first inspection I was seriously impressed with the lack of system in the development of the workings. There seemed to me to be no thought for the safety of life or limb, and, in the absence of any plans, sectional or otherwise, I could not then point out all the dangers to which the men were exposed. On my return to Auckland, I at once sent on Mr. J Dalton, C.E., to survey and draw plans of the mine. I herewith enclose his plan of the workings of the mine, together with his report thereon. You will notice that Mr. Dalton has drawn the upper and lower chambers on the same plan. One glance at this plan will suffice to show that my fears were well-founded, and that the men who first opened the mine were totally ignorant of their work. Had I continued the management, I should ere this have done much towards securing the dangerous parts. The management, however, only continued in my hands five weeks ending 5th July

I have, &c.,

J McLaren, Esq., Mining Inspector, Grahamstown. Jno. Phillips.

Sir,— Auckland, 16th September.

I have been trying for the last week or two for a surveyor to survey the Miranda Coal Mine. I have procured Mr. Lowe to go to the mine next Monday with me, as he told me he had laid off one of the Waikato mines.

I remain, &c.,

Mr. McLaren, Inspector of Mines. (For J Foote,) C. H.*

No. 2.

ANNUAL REPORT UPON INSPECTION OF COAL MINES, NORTH ISLAND DISTRICTS.

Mr. Inspector McLaren to the Under-Secretary for Mines.

Sir,— Inspector of Mines Office, Thames, 6th May, 1881.

I have the honor to forward report on the coal mines situated within my districts, Kawakawa and Waikato, for the year ending 31st December, 1880. As I have visited the mines since that date, my report is brought up to the 31st March, 1881, the same as last year.

It is pleasing to note that there has been a gradual improvement going on in the system of working and ventilating the mines, more especially the chief collieries. To have enforced large alterations on the introduction of the Act would have been arbitrary and, in some cases, ruinous. It was better, therefore, to get amendments gradually made, as old ground was worked out and new ground opened. Much greater care and watchfulness is employed in guarding the safety of the men, and enforcing the rules for that purpose. As a proof this, there has not been a single accident of any kind reported to me since the date of my last yearly report, 31st March, 1880. This speaks well, more especially as the output from the mines for year ending 31st December, 1880, is nearly one-quarter greater than the previous year, being 75,070 tons in 1879, and 96,345½ tons in 1880.

In regard to the important clause 10, Part III., of the Act, "That within two years there shall be made and completed at least two distinct openings to the surface," all the mines have double openings, and in some cases three and four outlets to the surface.

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* It will be seen from the subsequent reports of Messrs. McLaren and Cox that this mine has since been closed.

There is no increase in the number of mines opened during the present year. Evidences of coal existing in other quarters than those already opened out have been shown to me, but people prefer not to disclose the exact locality until mining rights have been secured.

Kawakawa Mine.—The drainage of this mine is now effected through the new shaft. The whole of the pumping machinery has been erected here. Two 12-inch lifts are at present sufficient to raise all the water, but a 24-inch cylinder "Tangye" pump is also being fixed in the shaft, as a stand-by in case of any sudden increase of water. The mine is now exceedingly well ventilated. The whole of the old, or No. 2, pumping shaft, 150 feet in depth, has been bricked up to the surface, and a fire is kept constantly burning in the furnace at the bottom. A current of air is thus kept in circulation through the workings, and is so strong, that a lighted lamp can with difficulty be carried along some of the main levels, and the air at all the headings and bords is very good. The machinery for pumping, hauling, &c., under the immediate charge of Mr. Coutts, engineer, is now in first class order, and every precaution seems to be taken by the manager, Mr. Moody, both under and above ground, to prevent accidents. In addition to the ordinary working of the mine, there have been different works carried on with a view to its future further development, on which at present it is not necessary to make any special comment. The output from this mine has increased from 42,383 tons in 1879 to 54,865 tons in 1880.

Kamo Mine, Whangarei.—This mine has now been placed under the management of Mr. George Black, late manager of the United Pumping Association works, Thames, and formerly of the Union Beach Mine, Coromandel. A new seam of coal has been discovered in this mine, lying 30 feet overhead the present one. There has always been a rumour that this was the case, but nothing was definitely known by the present owners. To settle the point, Mr. Black bored upwards, and found the seam at this place 4 feet 6 inches thick. A drive has now been put in, which struck the seam more on the dip than where the bore-hole was made. The seam here was 4 feet thick, showing that towards the rise it is increasing in thickness. The coal in this seam is of the same nature (brown) as that of the lower seam. I have not heard that any actual tests have yet been made, but Mr. Black is of opinion it is even superior in quality to the lower seam. In regard to the workings in the lower seam the ventilation was much improved from what it was on my former visit, the air course having been extended to near the end of the main level, directing the air to the furthermost working. The current is, however, not very strong, which is to be accounted for by having to split the air through so many bords in order to keep the whole of the mine cool, the immense amount of slack lying in the unused bords apparently having a tendency to render the mine very hot. A general overhaul seems to have been given to the mine on recommencing work when the Kamo–Whangarei Railway opened, and it is now in very fair working order. Surveys have been recently made, and the workings brought up to date on the plan. Preparations are being made for boring with the Government diamond drill, as the rock is exceedingly hard. A good trial of the qualities of the drill may be expected.

Whau Whau Mine, Whangarei.—In regard to the proposed opening into the old workings, mentioned in my interim report of 20th October, 1880, the boring was kept well ahead of the drive, which, on striking through into the old workings, relieved them from the water. This now seems to drain all the water from that direction, rendering that part of the mine dry and comfortable to work in. As, however, it was found the old workings had caved in in this quarter, and that communication could not be had, it was wisely considered not advisable to break through for ventilation. For this purpose a cross-drive is now being carried out, which will strike the old workings nearer the outlet, where they are open. In the headings where the men are now working, the air, though sluggish, is cool and of fair quality, not seemingly much affected on its course through other portions of the mine.

Taupiri Mine, Huntly.—Work is now being carried on both in the old and new mines. Arrangements having been come to with the proprietors of the land in regard to drawing the pillars in the old mine, this is being gradually and successfully done, and the greatest care seems to be taken by the management to prevent accidents. In regard to the new mine, before regular operations were commenced a shaft was sunk, and communication made with the bottom of the hauling incline. This shaft serves for pumping as well as an upcast for ventilating the mine. A ladder has been fixed in the shaft, but without the usual stages at intervals. As this ladder is never to be used by the men except in case of emergency, these I do not consider necessary A "Tangye" pump has been fixed at the bottom of the shaft, the steam for which is conveyed down the incline, the exhaust being up the shaft. The steam-pipe down the incline (which acts as a downcast), not being all jacketed, causes the incline to be nearly as hot as the upcast shaft. This prevents the ventilation from being as good as it otherwise would be; but for the present it is sufficient, as the workings are not yet very extensive. I pointed out to the manager that the practice of blasting at all times in the mine made the air very bad and hurtful for the men employed, as the smoke is driven through the various workings before escaping by the upcast, and suggested that the firing be allowed only to take place when the men are knocking off, so giving time for the mine to clear before the next shift start work. The manager agreed with the suggestion, and promised that in future it should be carried out, as it would tend to the comfort and health of the miners, as well as enable them to do more work.

Waikato Mine, Huntly.—This mine is in good working order and well ventilated, there being four openings to the surface. The mine is very disadvantageously situated for getting coal to market, lying as it does on the opposite side of the Waikato River from the Auckland railway line; at present the coal is tipped into barges, which are towed up the river to a convenient point, and there loaded into the railway wagons. This arrangement is unsatisfactory as well as costly The coal having too much handling is very much broken up and deteriorated in value by its having to be tipped from a height of 30 feet into the barges. As pointed out in my last year's report, from the extent of coal a bridge across the river would amply repay itself, but other modes might be adopted which would be a great improvement on the present system, either to bring the railway wagons across to the mine on barges, or the mine trucks over to the railway

Bridgewater Mine, Miranda.—I visited this mine in the beginning of November, and found the owner had got a new plan prepared, but it turned out not to be worth the paper it was drawn on.

The engineer who made the survey had evidently got very confused; whether he had mixed up the upper with the lower workings, it was impossible to say, but certain it was that as soon as the neighbourhood of the shaft was left the plan lost all resemblance to the mine, both in the upper and lower levels. The manager, Mr. George Foote, acknowledged he could not understand the plan, but he had waited till I came, to see if I could explain it. Without relying on the plan, my general knowledge of the mine enabled me to direct him to secure those places in the low level where I believed the upper workings were undermined. I brought back the plan with me to Auckland and explained matters to Mr. Foote, the owner. We called on the engineer who made the survey, and he promised to rectify the plan. Soon after this Mr. Foote died, and since then very little coal has been raised from the mine; and for some months work has been entirely suspended, with the exception of occasionally pumping the water in order to prevent the workings from being flooded. The intention of the sons of the late Mr. Foote is, I believe, to dispose of the property On my recent visit I found no one at the mine, the solitary individual left there to work the pumping-engine being probably out pig-hunting. I searched about and found a candle, and went down the shaft and examined the whole mine, both in the upper and lower levels, except the portion in the immediate neighbourhood of the bottom of the shaft, which was under water. My instructions in regard to timbering seem to have been very fairly carried out, as directed by me on my previous visit; but I would have been better satisfied to have had a correct plan to make myself absolutely certain that I had caused the timbers in the lower levels to be placed in the proper position to support the undermined pillars of the upper levels, but I could not ascertain whether the engineer had rectified his survey As regards the mine, everything seemed safe underground, but on the surface the timber of the shaft, machinery, as well as the barges, lock on the Maramarua River, &c., were getting into a very dilapidated condition. It would be well if the mine was sold, as capital is required to develop it, and put everything in working condition, which the present owners are unable to do, not having the means.

I have, &c.,

JAMES M. MCLAREN,
Inspector of Mines.

The Under-Secretary for Mines, Wellington.

No. 3.

ANNUAL REPORT UPON INSPECTION OF COAL MINES, SOUTH ISLAND DISTRICTS.

Mr. Inspector BINNS to the UNDER-SECRETARY for MINES.

SIR,— Dunedin, 31st January, 1881.

Section 40 of "The Regulation of Mines Act, 1874," enacts that "every Inspector shall, on or before the thirty-first day of January in every year, make a report in writing of his proceedings during the year ending on the next preceding thirty-first day of December, and transmit the same to the Governor." I have therefore the honor, as Inspector of Mines for the Districts of Pelorus, Kaikoura, West Wanganui, Westport, Greymouth, Jackson's Bay, Malvern, Timaru, Otago, and Southland, to make the following report of my proceedings during the year ending 31st December, 1880, for the information of His Excellency

I have to chronicle a very large increase in the number of coal mines in this Island; not that all those now for the first time included in the list are new undertakings, but they have at least not been hitherto subject to Government supervision, and there is also a considerable number of new ventures, making a total of a hundred and one. Of this number some are now abandoned or standing; but as they have either been visited during the year, or have been working and thus contributed to the total output, they are included. Seventy-eight have been visited during the year, and the rest are either open work or on a very small scale.

My time during the year has been taken up by departmental work, with the exception of twenty-two days occupied by attendance as a witness at the Compensation Court in Dunedin, in the case Alves *v.* the Corporation of Dunedin.

On 19th July I took charge of this Island, and, as the time at my disposal from that date to the year's end was obviously very short, I thought it better to devote my attention more to the larger mines (some of which required it especially) than to the small ones, which it would have been impossible to bring under the Act at once.

I may here quote a portion of your letter, dated 16th June, 1880, in answer to mine of 14th May, asking for instructions as to enforcing the law with regard to the smaller collieries. This ran as follows: "The Inspector exercising some discretion in this matter, and reporting to this office how this discretionary power is used." Also, with reference to gold-mining, "You will not be required to inspect gold mines or to attend inquests in these cases until further instructed." I have, therefore, since that date attended no inquests on persons killed in gold mines, but have included in this report one accident which occurred on 26th February, 1880, and which is worthy of notice.

Attached is a table of statistics,* and I have to thank the managers of the various mines for sending me particulars of output, &c.; also a table of accidents, with remarks on those requiring special attention.

The law requiring the employment of certificated managers is, unfortunately, not in force in the colony Three or four holders of certificates from the Imperial Government are engaged as managers, but I cannot see that the difficulty is at all overcome by their presence: the advantage of certified management does not lie in the fact that a man is possessed of a certificate, but that under a certain law he is registered as manager of a mine, and is *ipse facto* responsible for the care of it. While on this subject, I may call attention to the hardship under which many able men in the colony are now suffering—they have no certificates, and cannot get any, there being no Board: at the same time they

* The figures in the statistical table are up to the end of 1880, although nearer information is now to hand and some of that given was collected subsequently to sending this report in on 31st January, 1881.

may see others—no more competent than themselves—preferred, as holding Government certificates, which, so far as anyone is able to judge, seems to be obtainable now in some of the districts of Great Britain by any one desiring it.

A description of the conditions of the various collieries (as regards the Act) is given below.

West Wanganui District.

1. *Wallsend Colliery, Collingwoood.*—This is the old Parapara Coal Mine. As it requires an expenditure of time which I have not as yet been able to devote to it, this colliery has not been visited. I was at Nelson in November, *en route* for Collingwood, but finding that more than a fortnight would probably be required, I was compelled to leave it till another time. Very little is being done, half the men having been dismissed at the new year.

Pelorus District.

2 and 3. *Picton Coal Mines.*—Two parties have been prospecting here, and have got coal. Several shafts which they sank are duly fenced or covered.

Westport District.

4. *Mokihinui Coal Mine* has only recently commenced. Two shafts require fencing; the drive is in good order. I have supplied the owner with a draft set of special rules.

5. *Wellington Coal Company's Waimangaroa Coal Mine.*—This mine was carelessly worked, and is now fortunately closed. An explosion took place; full particulars of which, with the resulting prosecution of the manager, will be found in this report. The Wellington Coal Company has now merged into the Koranui, which ought soon to be putting out coal.

6. *Westport Colliery Company's Banbury Mine* appeared last year as the Fisher Mine. This colliery is now in regular work, the surface inclines being completed. The Act is carefully observed. The only drawback is in the ventilation, which, owing to meteorological causes, frequently reverses; in the absence of gas, this is merely an inconvenience, on account of powder-smoke, and Mr. Denniston projects artificial ventilation, which will do away with any cause of complaint. The roof, in places, is rendered bad by the percolation of surface water, but timber is used unsparingly

7 *Energetic Coal Mine, Reefton,* is in good order. The air is good; a weekly report is kept; and the workings are well timbered.

8. *Golden Treasure Coal Mine, Reefton.*—Merely a straight drive, a few yards in, worked for the boilers. Act not yet observed.

9. *Lankey's Gully Coal Mine* is in better order than when last reported on, the roof having been supported by packs. Act not observed.

10. *Gulline's Coal Mine, Reefton,* is not working, and has not been visited since my last report.

11. *Newcastle Coal Mine, Reefton.*—Very little is done here. The pit is in good order, but the Act disregarded.

12. *Dudley Coal Mine, Reefton.*—The remarks on No. 11 apply equally here.

13. *Golden Fleece Extended Coal Mine, Reefton.*—The old mine has been abandoned, and a new one, in a very thick seam of coal, apparently faulted, was just commenced. The Act was not attended to.

14 and 15. *Dugan's and Burke's Coal Mines, Boatman's.*—Not visited since last report.

16. *Oriental Coal Mine, Reefton* ("Union Company's" of last report.)—Nothing is being done just now at this mine, as it is situated in one of the wildest parts of a rough district, and is worked only for a quartz-crushing machine.

17 *Charleston Coal Mine* is worked open-cast, and has not been visited.

18. *Brunner Coal Mine, Greymouth.*—This mine requires very careful management just now Since my last report, work has been carried on to the rise, and artifical ventilation is much required. Preparations are being made for erecting a 16-foot fan at the entrance, a few chains above the brick-shed. The workings are now, to a great extent, in the broken, and with a thick seam of tender coal, this is necessarily a dangerous operation. The Act seems to be observed, the mine being examined before the men enter. The output of large coal was 27,981 tons; of nuts, 2,549 tons; of slack for coke, say, 1,975 tons: making a total of 32,505 tons of coal, in addition to 58,349 fire-bricks, and 25 tons fire-clay An account of the fatal explosion in this mine will be found in its proper place.

19. *Coalpit-Heath Colliery* continues to be carefully managed. The ventilation is excellent. On September 1st it measured 6,536 cubic feet per minute at the far end of the main level, and 17,374 in the main return; or more than 5½ times my last report. On December 16th, only 11,650; but this is ample, as the air is well distributed. The mine is carefully examined every morning, and a report is written. With one exception (weekly report on machinery,) the Act is kept. A small outburst of gas has occurred, and, as these are very dangerous, great care must be exercised. There are two outlets from the workings.

Greymouth District.

20. *Greymouth Wallsend Colliery* has not yet been put in working order. The water is about 650 feet deep in the shaft.

21. *Greymouth Wallsend, No.* 2.—This is the original shaft, and coal is now being raised from it. There were no sliding gates on the winding shaft; but these are now on, Mr. Brown informs me. The mine is free from gas, and there are two outlets. The ventilation is good, and measured 4,095 cubic feet per minute when first tried on December 18th. By judicious stoking, and sheltering the fire from the rain I made it 10,150, showing that there is ample power. Headings are being driven to the dip for the purpose of communicating with the deep shaft.

MALVERN DISTRICT.

22. *Springfield Colliery.*—The old mine, which was in such a bad state at the time of my last report, is now closed. Before this took place its condition was slightly improved. The company have sunk a shaft to the dip.

23. *Springfield, No.* 2.—I have not been down this pit since the levels were broken off on September 1st. The shaft was sunk without accident. The company have till September 1st, 1882, for the formation of their second outlet.

24. *Kowai Pass Colliery* was in very bad order. I had timber set at the shaft-bottom, and the shaft fenced. If there had been no second outlet it would have been necessary to withdraw the men.

25. *Eureka Coal Mine, Springfield.*—Very little has been done here. I have not required these small mines to keep plans.

26. *Fern Dale Colliery, Springfield.*—Mr. Hamilton has been prospecting here, but has not put out any coal. Eight men were employed.

27 *Canterbury Colliery, Sheffield,* has recommenced, having passed into new hands. Air good, and the mine in good order.

28. *Homebush Colliery, Glentunnel.*—The Act is kept carefully here, and the ventilation is good. A sad accident occurred here on January 22nd, 1880. (See remarks on accidents.)

29. *Hart's Coal Mine* has not been visited. Mr. Saunders informs me that the coal has not yet been reached. The total output is copied from the Geological Department reports, and is from the old drive.

30. *Wallsend.*—Still standing.

31 and 32. *Brockley and Mount Somers.*—Not yet revisited. The former has not done much, and the latter is open-work.

TIMARU DISTRICT.

There are two mines in this district, (33) *Albany,* and (34) *Kakahu*: neither has been visited.

OTAGO DISTRICT.

35. *Wharekuri, Duntroon,* has been visited once. It has been a long time at work, but doing very little. The pit is in tolerably good order. Special Rules are established. I have not required a plan.

36. *Kurow Coal Mine* is a very small affair, worked by the owner alone. No plan required.

37, 38, and 39. *Prince Alfred Nos.* 1 *and* 2, *and St. Andrews.*—These continue in good order. They are still under the same management, and the Act appears to be observed. There is an excellent plan.

40. *Ngapara Colliery.*—The ventilation and timber are good. A plan is kept, and there is more than one outlet.

41. *Shag Point Coal Mine.*—As will be seen on reference to the last printed report of the department, this mine has occupied a good deal of attention. I have already reported very fully on its condition at various times, and explained my course of action with reference to the different breaches of the law which existed. Having been fortunate enough to secure the approval of the Hon. the Minister of Mines in the course which I adopted, it is unnecessary to enter here into any details. As mentioned in my report of June last, a man was in the habit of riding on the set in the engine-plane. As the manager declined to put a stop to this, even after another man had been hurt (see list of accidents), the only course open to me, in order to avoid a fatal accident, was to give notice under section 19; this I accordingly did, at the same time sending the statutory notice for the information of His Excellency. After this, the manager discontinued the practice. The ventilation is now much better, and may be called good, except at the ends of the levels, which are taken too far without a return. My efforts to persuade Mr Williams to drive double headings have been abortive. The fire is still burning, but does not interfere with the ventilation of the pit, being walled off: in fact it is to a great extent the motive power, and the new furnace has never been lighted: this is on the surface, as the condition of the mine did not allow of its being placed at the bottom of the shaft. The roof is very bad, hence the large number of accidents from falls. Of the two outlets from this mine, only one is always available; but the company are about to form a second, by means of a shaft to the dip. This colliery has been visited ten times during the year.

42. *Elliott's Coal Mine.*—Prospecting has been carried on, but no other work done.

43. *Hill's Creek Coal Mine.*—Not visited.

44. *Idaburn Coal Mine.*—This is an open-work coal mine, and has not yet been inspected. Mr. Grant kindly sent me particulars.

45. *Last Chance Coal Mine, Hyde.*—This is a small mine on the banks of the Taieri, six miles above Hyde. For the first two months of 1880 it was worked open-cast, and the tunnel was opened in July. Introduced Act. Plan not required.

46. *Dunsmuir's Coal Mine.*—Open work. Not visited.

47 *Kyeburn Coal Mine*—The coal here lies at a very high angle. The Act is not observed, and there is no ventilation at the end of the workings. For this and No. 48 I have not required a plan.

48. *Perseverance Coal Mine, Upper Kyeburn Diggings.*—This coal is equally steep. I introduced the Act, and requested Mr. Stuart's attention to some loose stuff near the mouth, which might, if it fell, shut the mine completely.

49 and 50.—Not visited. Open-work.

51. *Mount Ida Coal Mine.*—Worked by an adit. Not visited. No coal has been put out.

52. *Swineburn Coal Mine.*—Not visited. Mr. McAra has been good enough to write informing me that work has hitherto been carried on by stripping and driving, but as this became impossible, he is making preparations for sinking a shaft.

53. *Coal Creek, Waihemo.*—Two men have been working here with a view to opening a coal mine. A drive which had been started with the hope of reaching coal had been abandoned, and sinking was being carried on when I was there.

54 to 65.—None of these mines in the district about Cromwell, Clyde, and Roxburgh have been visited since my last report.

66. *Fernhill Colliery, Green Island.*—The water-race mentioned in last report as likely to flood the mine has done so, but without danger to life. As the air is not good, this mine will require mechanical ventilation. There are several outlets. Mr. Shaw seems careful in observing the law In addition to the output of coal, 2,487 tons of sand was sent away, at which work three men are employed.

67 *Allandale Coal Mine, Green Island.*—A new pit, on a very small scale, owned by two working men, and worked by the owners, as are most of these small mines. A shaft has been sunk, and a drive put in, with the intention of forming a communication. Pit in tolerably good order. Statutory time for plan and formation of special rules not yet arrived.

68. *Green Island Colliery.*—This pit was in good order, as regards ventilation, but the creep mentioned before has proved fatal, and the workings are now on fire, and closed. On October 11th, 1880, the men were working in the upcast drive in such bad air that I had to withdraw them. A new shaft has been sunk to the extreme rise. Plan kept.

69. *Saddle Hill Colliery, Green Island.*—No second outlet has yet been made for this pit, but only eight men are employed below ground. The cage is not covered; ventilation not sufficiently guided. A new shaft is to be sunk, and that will benefit the mine very much A plan is kept.

70. *Walton Park Colliery, Green Island.*—This mine was not, when visited, so well ventilated as it ought to have been, especially in the rise workings. The plan is made up once a year; the weekly report is not made so often as it should be.

71. *Abbotsroyd Colliery, Green Island.*—By hanging cloths, increasing area of wind roads, and other means, Mr. Freeman has made a great improvement in the ventilation; this will be seen from the following particulars, which I measured on the 11th November, 1880: Ventilation, lowest bord, West side, 1,568 cubic feet per minute; between 3rd and 4th, 1,791; top bord but one, 3,189; main return, 4,567 A wooden chimney has been erected to supplement the upcast shaft, and ladders are fixed so that men can get up at any time in case of accident to the other exit. The roof is bad, but no men have been hurt. Act pretty well observed, and plan kept.

72. *Hurdstone Coal Mine, Tokomairiro,* is now temporarily abandoned; it was visited and reported on early in the year.

73. *Bruce Coal Company's Mine, Tokomairiro,* is in good order, so far as the mine goes, but timber is required in the tunnel. No plan required, as the workings are very limited. Carefully worked.

74. *Real Mackay Coal Mine, Tokomairiro.*—Here the Act is not observed at all. Like the previous one, this mine has changed hands since last June, and it is impossible in these cases to have the law observed, as each new owner has to learn the Act *ab initio.*

Tokomairiro District.

75. *Elliott Vale.*—Special rules established; Act otherwise disregarded. One man only is at work.

76. *Marshall's Coal Mine, Tokomairiro,* is a new mine; one man employed. Introduced Act.

77 *Dunn's Coal Mine, Tokomairiro.*—Boring has been carried on, and a drive commenced.

78 and 79 *Cannon's and Bryce's Lignite Mines, Lovell's Flat.*—Both open-work; have not been revisited.

80. *Benhar Coal Mine, Stirling.*—The Act is pretty well observed here, and a good plan kept. One accident has occurred. There are two outlets, and the ventilation is good.

81. *Kaitangata Railway and Coal Company's Coal Mine, Kaitangata.*—This mine has been visited six times during the year. The ventilation is as follows: The intake for the new workings is by the old drive, and is split so as to send one current round the north side and the other round the south. The motive power consists of a furnace (2 ft. 2 in. x 6 ft.) at the bottom of the shaft, which is (with the chimney) 115 feet deep, and is fitted with ladders in case of accident. The old workings have a separate downcast (4 ft. x 2 ft. 6in. x 69 ft. with chimney), and the air is taken round, being driven by screens into the high places. As the direction has been reversed lately, the screens had to be moved in order to prevent the accumulation of gas: this proves that it is only by ventilation that these wastes are kept clear. The air ascends by the old upcast, in the bottom of which is a furnace (3 ft. 6 in. x 6 ft.), and also the hauling engine for No. 1 pit, the exhaust steam being used to assist the ventilating furnace; but the shaft is rather too small, being only 17 ft. 4 in. in area. Gas is very seldom found either in the new or old workings, and the former are worked with naked lights; they are, however, examined every morning with a safety lamp, and a mark left, before the men enter. A report of this examination is written. The old workings are examined twice a week. The air is conducted to the faces by bratticing, and the ventilation generally is excellent. The places are some of them more than 20 feet in height; and it speaks well for the careful working of the mine, that no one has been hurt during the past year. A good plan is kept and regularly made up, and the Act appears to be kept in every particular.

82. *Kaitangata No. 1 Colliery*—This mine has passed into the same hands as No. 80, and is under the same manager. The rise headings mentioned in the Departmental Report for June last have communicated with the adjacent mine, and the air ascends by them to the furnace mentioned above. The ventilation is only moderate, and on November 18th measured in the main intake only 4,164 cubic feet per minute. I am informed that this is unusually small. Naked lights are used, but the mine is carefully examined before the men enter. One man was hurt by a fall of coal.

83. *Wangaloa Coal Mine, Kaitangata,* has not been visited during the year, as work was commenced on November 25th only; only one man employed.

84, 85, and 86, were visited in the early part of 1880. They are now closed.
87 to 96.—All open-work.

SOUTHLAND DISTRICT.

97 to 99.—All open-work.

100. *Nightcaps Coal Mine, Otautau.*—Visited once, prior to my former report. Not in regular work; but there is a prospect of a considerable output from here.

101. *Preservation Inlet Coal Mine.*—Not visited, as no regular work has been carried on. I am indebted to Mr. W Asher for the output given.

ACCIDENTS.

In the coal mines in the South Island districts during the year there have been nineteen accidents, two of which were unfortunately attended with loss of life. Twenty persons have been more or less seriously injured. Two explosions of fire-damp have occurred, causing, in the first case, one death, and injuries to one man; and, in the second, injuries to three men. One fatal accident was occasioned by a horse and set underground.

Explosions of Gas.

On the 3rd of March an explosion of fire-damp occurred in the Brunner Coal Mine, injuring two men—Robert Elliott, manager, and John Broadfoot, carpenter; the latter died on the day following, leaving a widow and a large family At the time I was at the Nightcaps, about forty-five miles beyond Invercargill, but arrived at Greymouth (having attended an inquest *en route*) in time for the adjourned inquest on the 13th March. The facts of the case may be gathered from the following copy of depositions:—

Martin Kennedy, proprietor of the Brunner Coal Mine, being sworn, stated that he had viewed the body of the late John Broadfoot, and recognized the same. He was employed as a carpenter upon the works of the Brunner Mine; last saw him alive on Thursday, the 4th instant, at noon. He was suffering from burning. He informed me that he, in company with the manager, Mr. Elliott, went into the mine to set the turbine and fan in motion on Wednesday, the 3rd instant; that he had oiled the fan, and set it in motion; that Mr. Elliot and himself went to look at the pipes leading to the turbine, and also to examine the tanks from which the turbine takes its supply of water; in doing so, he turned back, for the purpose of taking the oil-feeder from the fan, and, in passing, the explosion took place, which caused the injuries he was then suffering from. The fan had been in motion about five minutes, and working at the rate of thirteen and a half revolutions per minute. He said he had been frequently there with a naked light, and did not apprehend any danger. He had been employed in the mine for about five years. The deceased erected the fan, and was aware for what purpose it was erected, which was to ventilate the stone-drift in the mine. Have seen Mr. Elliott, the manager, since the accident. He is too unwell to attend the inquest.

In reply to the foreman's question, whether the miners in the Brunner Mine are in the habit of carrying or using safety-lamps, stated that the only place that he was aware of where safety-lamps were used was in the stone-drift; naked lights being used everywhere else.

The foreman asked Mr. Kennedy if, in his opinion, the carrying of a safety-lamp, instead of a naked light, would not be additional security to the bearer of the lamp? Mr. Kennedy's reply was that he had no knowledge of mining, but he supposed it would be.

Richard Gregory asked Mr. Kennedy how long the fan had been stopped, prior to its being put into motion on the day of the accident. Mr. Kennedy was unable to answer the question definitely. In reply to Mr. Gregory, Mr. Kennedy stated that the face of the stone-drift is about 600 to 700 feet from the place. Mr. Elliott was aware that gas existed in the stone-drift.

Charles Morice, sworn: Stated that he is a legally-qualified medical man, and surgeon to the Greymouth Hospital. Received John Broadfoot on March 3rd into the hospital. He was suffering from extensive burns of the head, face, and trunk, and patches here and there about the extremities; the hands and arms extensively burnt. He died from the shock to the system about twenty hours after his admission. The burns are such as would be caused by an explosion of fire-damp.

Inquest adjourned until Saturday, the 13th day of March; to be held at the Court-house, Greymouth.

Saturday, the 13th of March, 1880.—The Jury met at the Court-house, at 11 o'clock a.m., on the application of the Inspector of Police, who stated that Mr. Elliott was unable to attend through sickness. The inquiry was adjourned to Brunnerton at 1 o'clock the same day, to Seaton's Hotel, Brunnerton.

Mr. George Jonathan Binns, Inspector of Mines, appeared on behalf of the Crown.

Martin Kennedy, recalled: Stated that the distance of the face of the fault drive is, from the place, about 1,000 feet, instead of 600 or 700 feet, previously stated. In company with Mr. Elliott, the manager, I went into the fan—this was about ten days prior to the accident. Mr Elliott carried an oil lamp (a naked light), and I had a naked candle; we went in for the purpose of seeing the fan and turbine working; the fan was then going twelve revolutions by my own watch. Mr. Elliott then asked me to time it again to see how fast it could be driven; he moved the handle of the turbine, and, upon timing it again, I found it was going thirty-two revolutions. While it was going at that speed I went to the other side of the fan, and I held the candle in front of the wind of the fan, just to ascertain the force of the wind and to see if the wind would extinguish the candle; this I did for a couple of minutes. The fan was erected for the purpose of allowing the work to be continued in the stone-drift and removing the foul air from the workings in the stone-drift.

By Inspector Feast: After working some distance into the drift foul air was discovered, and the fan was erected to remove it. I believe the fan to be of an exhaustive nature to bring the foul air out. The working in the stone-drift had been discontinued for six months, pending the erection of the fan. When I went there it was for the purpose of testing how it would act; and when Elliott went there, on the occasion of the accident, it was for the purpose of setting it in permanent motion all night, so that the drift might be clear for working in the morning. The general arrangements for the working of the mine are under the sole control of the manager.

By Mr. Binns: I cannot say whether I objected to Special Rule 30 or not, but it is one which I would be likely to object to, as not necessary for the working of my mine. I am not aware that this rule has been adhered to. I recollect having a conversation with you about the mine, in Dr. Skae's office, about the middle of November. I remember your saying that you had written to Elliott, but I cannot say for certain that I saw the letter. I do not recollect your saying that my mine was the only one in New Zealand that gave you any uneasiness; but you said that the Brunner Mine was a cause of anxiety on account of the extent of the wastes. I do not recollect your saying that if I did not take care there would be a repetition of the Kaitangata affair. You said that you were anxious about the wastes, and I said that I would caution Mr. Elliott upon my return, which I did. Elliott replied that he examined the wastes weekly, and oftener, and that there was no trace of bad air in them; and in support of his statement he produced his weekly report book. After the manager's report, there did not appear to be any occasion for extra caution, as he reported everything was all right. [Ground plan of the working portion of the mine produced.] This plan shows all the workings of the mine up to the date of its compilation; but not those of the stone-drift. The plan bears date May 7th, 1879.

By Jurors: Am unable to state whether the regulations under "The Regulation of Mines Act, 1874," have been carried out in the Brunner mine. I believe they have as far as practicable. The manager has the sole employment of the men.

The jury adjourned to the private residence of Mr. Elliott.

Robert Elliott, being sworn, stated that he is manager of the Brunner Mine. Knew the deceased, John Broadfoot; he was a carpenter, employed in the Brunner Mine. I recollect Wednesday, the 3rd of March; he was sent into the mine by me to turn the water on to the turbine, and I told him I would follow him. He started from the outside at ten o'clock. I followed him about half-an-hour afterwards. I found him at the turbine and fan, which were situated in the fourth heading of the lower level; the distance from the fan to the face of the stone-drift is about 1,000 feet. The fan was placed there for the purpose of drawing out the foul air and admitting fresh air, and for the general ventilation of the stone-drift. When I reached the face the deceased was there, and had everything at work. We both carried naked lights. I did not apprehend any danger. I told the deceased to oil the turbine and fan, and that I would soon be there. As soon as I arrived there I asked him if all were right, and if he had got it oiled; and then I said if he had got it oiled we would try the speed it was going at; so we went and tried her, and she made 13½ revolutions per minute. I said, "We cannot do anything more here for a time; we will go to the tank and see about the water, if the supply will keep the tank full—she is going at what we want." We started off to go to the tank; I went first, thinking he was following me. We examined the joints of the piping connecting the turbine with the tank. I got about 2½ lengths of pipes, which measure 30 feet, and then I looked round, and, greatly to my surprise, he was holding his candle as high as he could reach; and I called out to him, "For God's sake fall down!" I think it was too late for him to do so. When holding his candle up the gas ignited, and it was in consequence of this I gave him the warning. I threw myself down and hung on to the pipes. I then heard an explosion. I did not see the deceased after that. I shouted to him after the explosion, and he answered me several times; and the last time he answered me I thought his voice was somewhat weak. I think I remained there from an hour and a half to two hours after the explosion. I received injury from the explosion, but as there was some fresh air where I was I thought it safer to remain than to go out of the mine. The fan had been working less than twenty minutes prior to the explosion. It was about a fortnight before the accident since the fan was worked; we had been short of water. I had been in that portion of the workings in the interval. I was in there nearly every day; might now and then miss a day or two. I generally carried a naked light. No men were working less than two hundred yards from the fan. The effect of working the fan would be to draw the foul air out of the drive into the old workings, which were all bratticed off from where the men were actually at work; they were bratticed off so as to prevent the foul air going into the actual workings, and to make it go out of the mine elsewhere. There are six entrances to the mine. I did not consider it requisite to warn the men who were working in the mine that I was about starting the fan. I have had forty-one years' experience connected with mines, in various positions. It was from my practical knowledge that I did not apprehend any danger to the miners. If deceased had followed to the pipe-end instead of going to the fan, there would have been no danger, either to himself or anyone else. The deceased knew for what purpose the fan was erected; he had been told that after the fan was at work, it would be dangerous to use a light for some time. I have the sole control of the underground workings of the mine, and have the employing and discharging of the hands.

By Mr. Binns: Have read Special Rule 30. That rule has been kept, except about the Davy lamp. There has never been any gas, except in the fault; the mark was not made on the end of the places as required. Special Rule 29 has not been kept. Recollect receiving a letter from you dated 14th November [Plan produced]. On the rise side of the fan there was a slide door in the brattice.; that door was closed at times. It was shut when the fan was working; that was the order.

By a Juror: The gas came in a body. When the fan moved, there might have been fifty or sixty yards of gas along the top. Have sufficient safety-lamps for the working of the mine and they are in good order. If the deceased had had a safety-lamp, and had held it up, an explosion would have taken place if he had pulled it down quickly.

By Mr. Binns: He held the candle where the current of air was coming out of the fan with velocity.

By Mr. Kennedy: The fan has been working twenty or thirty times since its erection and prior to the accident. It worked various periods from two to twenty-four hours at a time. During these times there have been people in the mine and at the fault with naked lights. In my opinion there was no danger from naked lights while the fan was working. I consider it was an accident caused by the negligence of the deceased by not attending to his orders which I gave him. If he had done as I bid, the accident would not have occurred. None of the miners made complaint at any time about the fan being at work whilst they were at work. The driving of the stone-drift is an essential for the working of the mine. I do not know of any better appliance for the better ventilating of the stone-drift. I do not see any danger for the ordinary working of the mine from the working of a fan similar to that worked in the mine.

By a Juror: Mr. Kennedy always supplied me with every requisite for the working of the mine.

Patrick Moore, coal miner, Brunnerton, employed in the Brunner mine: Recollect Wednesday, March 3rd. About 2 p.m. on that date I was employed in the mine. Knew the deceased John Broadfoot for years. I saw a person with a naked light working near the turbine. I was about eighty or ninety yards from the turbine. I heard an explosion, and afterwards saw a flame of fire coming towards my direction. I received no notice at all regarding the working of the turbine and fan. I do not know for certain whether I was in the mine at any other time when the fan was working. I would not have remained in the mine when the fan was working if I knew it, as I consider it to be dangerous to do so. Have been mining twenty years, and the last five or six years coal mining.

By Mr. Binns: Have a copy of the mining rules. I consider clause 30 very necessary. I cannot say whether that rule was observed.

By Inspector Feast: On a previous occasion, about six months ago, there was gas in the drift, and an explosion took place there; Mr. Elliott was aware of the explosion. The first explosion was in the face of the stone-drift.

By Mr. Kennedy: Had I been aware that the fan was at work, I would not have considered it safe to work in the immediate vicinity I formed this opinion subsequently to the accident. Elliott stopped the works since the first explosion. I am not aware that the gas is completely cut off from where I was working. The work is bratticed off, but not air-tight, between where I stood and the fan. Never saw gas in the Brunner Mine, except in the stone-drift. I consider Rule No. 30 important since the last explosion, but did not think so before.

John Morris, fireman, Brunner Mine: Have been employed in the Brunner Mine for 12 years. It is my duty to examine the mine prior, to anyone going in to work, for the purpose of seeing that it is safe to work. Recollect the 3rd day of March. Performed my duties on that day About 2 p.m. I was in the upper part of the workings, about 300 yards from where the explosion took place. Found the mine free from gas and safe for working prior to the explosion. Knew that there was a turbine and fan in the mine; did not know that the fan was put in motion on that day. Never heard that it was to be put in motion on that day. I would not have considered it unsafe to remain in the mine. If I knew the fan was working, I would have considered it safe to carry a naked light in the ordinary workings, but not at the mouth of the fan. Knew the deceased; did not see him that day after the explosion. Cannot explain how the explosion took place. The deceased knew for what purpose the fan was erected, and would have sufficient knowledge of the mine to know whether it was safe or not to approach the fan with a naked light. As a practical miner, ordinary precautions were taken for the safety of the mine. In the event of gas being found in any of the workings, it would be my duty to report it to Mr Elliott. Had not found it necessary before the explosion to report any defects in the ventilation or danger in the working of the mine.

By Mr. Binns: For the safety of the workmen in the mine, I consider that Rule No. 30 should be carried out. Men were often in the mine before examination took place. The men took their own responsibility, and broke Rule No. 29.

By Mr. Kennedy: Where Patrick Moore was would be about 150 to 160 yards from the fan. After the fan was working three or four minutes ["hours" appeared in the newspaper report, and must be correct], it was safe to approach the mouth with a naked light. I was there when Kennedy and Elliott inspected the fan, about ten days before the accident. The air commenced to fly very quickly when the fan was in motion. The wind from the working of the fan comes from the outside. I consider that, from the manner in which the workings were bratticed off, there was no danger to men working in the ordinary workings of the mine. Cannot say whether the miners were workings at other times when the fan was in motion. I was at the fan on the day Kennedy was there with a naked light.

James Williamson, miner, Brunnerton, working in the Brunner Mine: Recollect the 3rd day of March. Not being at work in the mine for a week prior to the accident, I am unable to say anything about it. Have never refused to work in the mine on account of it being considered dangerous.

William Geary, collier, Brunnerton: Have been employed in the Brunner Mine for five years, off and on. About

2 o'clock on the 3rd day of March was working in the mine, about 800 yards from the fan. The deceased knew that the fan drew out the gas.

By Mr. Binns: In my opinion the fan should have been constructed so as to drive the gas to the river, and not to drive it as it did, as there was not enough air to mix with it to kill it.

By Mr. Kennedy: Some days there is a sufficiency of air to dilute the gas.

George Jonathan Binns, Inspector of Mines under "The Mines Regulation Act, 1874:" I have not been appointed to any district under the Act. Have heard the whole of the evidence in this matter. I examined a portion of the Brunner Mine yesterday that portion of the mine where the explosion took place. The fan is in ruins, but the turbine may be there. It is usual to use such machinery for the ventilation of mines. I think the course adopted for the ventilation was good. I consider that if Elliott and Broadfoot had gone with a safety-lamp there would not have been any danger to the remainder of the mine. I see no reason to doubt the evidence of witnesses as to the cause of the explosion; the gas came in a body and exploded at the naked light. I think if Broadfoot had followed Elliott the accident would not probably have occurred. I wish to state that I consider the enforcement of Rule 30 necessary On the 14th of November I wrote to Elliott, calling his special attention to this rule. (Copy of letter produced and read.)

By a Juror: Whenever I have been in the mine the air has been excellent.

That comprised the whole of the evidence, and the jury returned a verdict of "Accidental death." I do not see how any other could very well have been given. That there was a certain amount of negligence and laxity in the working of the mine is plain from the evidence. Special Rule 30, mentioned so often, was a dead letter, although it had been established only after considerable negotiation, and I had more than once drawn special attention to it; still the accident was not due to any direct violation of the Act, and the unfortunate deceased was to a certain extent to blame for causing his own death. The history of the whole case gives a good example of a sudden danger, which no amount of inspection would be likely to prevent. The cause of the explosion was a ventilating apparatus, built at considerable cost for the express purpose of preventing such casualties: it was started, and, at the very moment when the gas came off in a body, Broadfoot ignited it with a naked light. An Inspector might possibly have warned the manager to use safety lamps: but they ought to have been used without any such warning; and Inspectors cannot foresee all dangers which are non-existent at their visits, which are created by the foolhardy recklessness or lamentable ignorance of workmen, and against which it is the express duty of the management to guard.

On the 21st August, 1880, an explosion of gas took place in the Wellington Company's Waimangaroa Mine, Westport, whereby William Young (contractor), Robert Young (coal miner), and John Colligan (coal miner), were injured, the last very severely The occurrence was duly reported. This explosion was the cause of the single prosecution instituted during the year, and the particulars are briefly as follows: The mine was "buttied" to William Young, who was also required by the agreement to examine the pit every morning. He swore that this clause had been added subsequently to his signing the agreement, which was of a very informal character. This was denied by the manager. At all events the mine was not examined; and, on the day mentioned above, Young entered the mine with a naked light, and fired a quantity of gas. On the 4th September a daily report-book was produced at the mine for my inspection. This purported to be the daily report of Young's examination, but was proved in evidence to be a forgery; and the manager was aware of this fact when he showed the book to me. It was filled up for the whole period at one time, and was not signed by the person whose name was attached. I may remark that this was one of the printed form books referred to in my report of the 12th June, 1880, as "not only an incentive to idleness, but conducive to a stereotyped and perfunctory method of performing a most important duty"

On 22nd January, 1880, Stephen Borton (aged 16 years) was killed at the Homebush Coal Mine, Canterbury by being crushed between a set of wagons and the side of the road. The accident was duly reported, and I attended the inquest after having inspected the mine. The scene of the accident was the main level, and it appeared in evidence that a man named Samuel Price had the contract for bringing the coal-tubs from the mine to the railway, to do which it was necessary to go into the main level and attach the horse to the set, which ran a certain distance by the force of gravity, the last wagon being braked by a person riding on it, to prevent the set from going too fast. In this work Price was assisted by Borton, who had been engaged for about five weeks at the mine, and had apparently not been considered a "sharp lad," though by no means wanting in intellect. Still he had not been considered competent to lead the horse until the last week; and on this occasion it is probable that the boy fell over a crossing, or that the wagons came too fast and touched the horse, causing him to jump forward and throw deceased down, when he was so jammed by the set that he died within a few minutes. The road was very narrow and in bad repair. There were also not sufficient refuge holes as required by General Rule 4; but had there been sufficient I do not see that the accident would have been prevented thereby A certain indefiniteness existed as to who was responsible, Mr. Brown, the mine manager, repudiating any authority over Price and his assistants—and I believe that in so doing he was strictly speaking the truth; but by the Special Rules adopted by this colliery it was his duty, acting as oversman, to "give all necessary instructions to the men and boys in the pit or mine respecting their work." My evidence was to the effect that the boy was engaged in no more dangerous work than thousands of boys every day in pits in the Old Country, but, at the same time, I recommended that the practice of allowing a person to lead the horse should be discontinued. This has been done. The verdict was "Accidental death;" but the jury added a rider, "That there was a certain amount of negligence on the part of the manager, in allowing persons to lead a horse in front of the wagons coming out of the mine, as the road is not of sufficient width to allow them to escape in case of accident."

The only other accident in a coal mine calling for remark is the one which happened on 16th September, to J W Shanley, at Shag Point. As mentioned in the general report on the mines, the dangerous practice has been discontinued.

Although my duties do not now lead me into gold mines, or the investigation of gold-mining accidents, the following account of an inquest on one of these cases which I attended last March is deserving of remark. On 26th February 1880, Robert Irwin (aged twenty-two) and Charles McCann (aged about sixteen) were injured by the hauling-engine at the North of Ireland Company's claim, Blue Spur, Tuapeka; the former died almost immediately On the next day but one I inspected the scene of the accident, and, on 7th March, attended the adjourned inquest. The engine (see plan) is

worked by hydraulic power, and is used for hauling cement out of the mine. It will be seen from the plan that the stage is very cramped, and that part is taken up by an open space (*a*) unfenced, and 13 feet 9 inches in depth. I mention this, as avoiding it might distract the attention of the engineman, whose duty it was to watch the set coming up, cut the water off by turning the handle (*b*), thus throw the engine out of gear, and turn the tub on the turntable towards the road to hoppers (*c*) This work must have required great alacrity and watchfulness. At the time of the accident, McCann was on the platform, where he had no right to be. By some means the two got caught between the rope and the drum, which made twenty-three revolutions before it was stopped by the manager. The evidence as to the drum being fenced was as follows:—

Robert Morgan, mine manager: His position (Irwin's) would have been about eight or nine feet from the drum. He need not have been near the rope; anywhere within eight or nine feet would have been his proper place. I do not think Irwin's duties were dangerous. No accident had ever occurred to my knowledge through any person being caught by the rope. After this accident, I was told that a man had once been caught by his coat; but the occurrence was before my time. The drum was not fenced—not "securely fenced," and I consider it was safer without a fence. There was only one way in which the drum could have been fenced—namely, by quartering boards—and by adopting this mode the men would have been cut to pieces in the event of this accident happening . If a fence had been there, the deceased might have put his hand out to save himself, but I would not like to say he would have escaped. He might have escaped. Had the engine been differently placed, it would have been possible to fence the drum securely. There is as much room as I have seen elsewhere. I have done myself the same work that Irwin was doing. . I consider it safe to work there with ordinary care.

Thomas Redman, blacksmith: I do not consider the drum a dangerous part of the machinery. I consider any man could work there, with ordinary care, as safely as he could in a blacksmith's shop. There was danger if he came in contact with the drum; a man putting his head in a coffee mill would likely have it taken off I do not think it was necessary to fence the drum. As the machinery is now fixed, it would not be possible to fence the drum so as to prevent the possibility of accident. The machinery might have been so fixed at first as to give a larger space. Had there been two horizontal bars, the bodies might have been stopped from the drum; but if their clothes had been entangled, it might have been worse for them. It would all depend upon what hold the rope had on the clothes. I do not think Irwin was working in a dangerous position. I do not think the accident was due to any primary imperfection in placing the machinery.

George Jonathan Binns, Inspector of Mines: I examined the machinery of the North of Ireland claim on the 28th ultimo, and produce a sketch-plan of it. In my opinion the drum is an "exposed and dangerous" portion of machinery and should be fenced. There would be some difficulty in fencing it, on account of the machinery being in too confined a position, but I consider it possible to obviate that difficulty; and, had there been a fence, it is probable this accident would not have happened. It is quite possible the accident might have happened with the drum fenced. The chance of escape would have been very much greater.

Mr. Morgan would perhaps consider a pit-shaft safer without a fence, for fear some one might run against it and be hurt. "He might have escaped," was admitted, also that it would have been possible, had the engine been differently placed, to fence the drum securely Mr. Redman did not consider the drum dangerous: machinery which he thought dangerous would be a curiosity The ratiocination introducing a coffee-mill, I failed, and still fail, to understand. "But if their clothes had become entangled, it might have been worse for them.' This I fail to comprehend: it could not have been worse for Irwin, taking the loss of life as the maximum ill. I had no witnesses, as it had not seemed worth while to summon any in order to prove a self-evident fact (the danger of the machinery) The verdict was "That Robert Irwin came to his death at the North of Ireland Company's claim, at the Blue Spur, on the 26th day of February, 1880, by becoming entangled with the hauling-gear, accidentally, casually, and by misfortune, and not owing to any negligence on the part of the owner of the mine, or defect in the machinery, or management thereof:" from the last portion of which I beg to differ *in toto*.

Death Rate in the South Island Districts for 1880.

The number of men employed being 798, and the output 203,248 tons, the two fatal accidents already mentioned make a death rate for the ten districts, of 399 men employed, and 101,624 tons of coal raised, per life lost. This compares favourably with other mining countries, as for instance:—(1.) The average tonnage in Great Britain for a recent period of fifteen years is 107,574 tons per life lost, and the average for five years is 447 men. (2.) A late average in the anthracite mines of Pennsylvania is 103,340 tons, and 346 men. (3.) In Prussia (where the system of Government supervision is extraordinary, there being a perfect army of inspectors), the average for the five years ending 1878 is 382 men. (4.) In 1879 a remarkably high average was attained in Great Britain, viz., 490 men employed, and 149,400 tons, per death.*

Prosecutions.

I had occasion to institute legal proceedings against the manager and contractor of the Wellington Company's Waimangaroa Coal Mine, in connection with the explosion of gas already mentioned. There were two informations against the manager: (1.) For not providing an adequate amount of ventilation (General Rule 1). (2. For not working the mine with reasonable precautions for the safety of the persons employed. The first broke down on account of insufficient proof of liability; on the second, the defendant was fined £5 and costs—total £12 18s. The contractor, for entering the mine with a naked light, was fined £2, and costs 17s. The cases were heard at Westport, on September 10th, 1880, before Mr Revell, R.M., who delivered judgment on September 21st, as follows:—

Binns *v.* Ferguson.—In delivering judgment in the first of these informations, which charges the defendant with having neglected to provide sufficient ventilation in the mine, I have given the defendant the benefit of the doubt I have, respecting the appointment of underviewer in the mine; and as to how far the defendant is culpable for the actual explosion. The men were constantly working with naked lights; and the contractor, Young, was the only person working the mine. The contract specifies that Young should examine the mine daily which he did not do; and, giving the defendant the benefit of the doubt regarding his liability for Young's neglect, I dismiss the information. In the second information the case is different. It is a charge that the defendant did not see that reasonable provisions were employed for the safety of the persons employed in the mine. The weight of evidence goes to show that the mine was not ventilated as well as it might be. The Inspector said the air was good enough, as it showed no fire damp, but he thought there might be freer air, and approved of a chimney that was about to be erected on his last visit prior to the accident, but which chimney never was

* The tonnage per life for 1880, in Great Britain, is 122,775.

SKETCH PLAN OF HAULING ENGINE, NORTH OF IRELAND COMPANY'S CLAIM

A *Open space unfenced and 13 9" in depth*

B *Handle for shutting off water*

C *Drum*

D *Turntable*

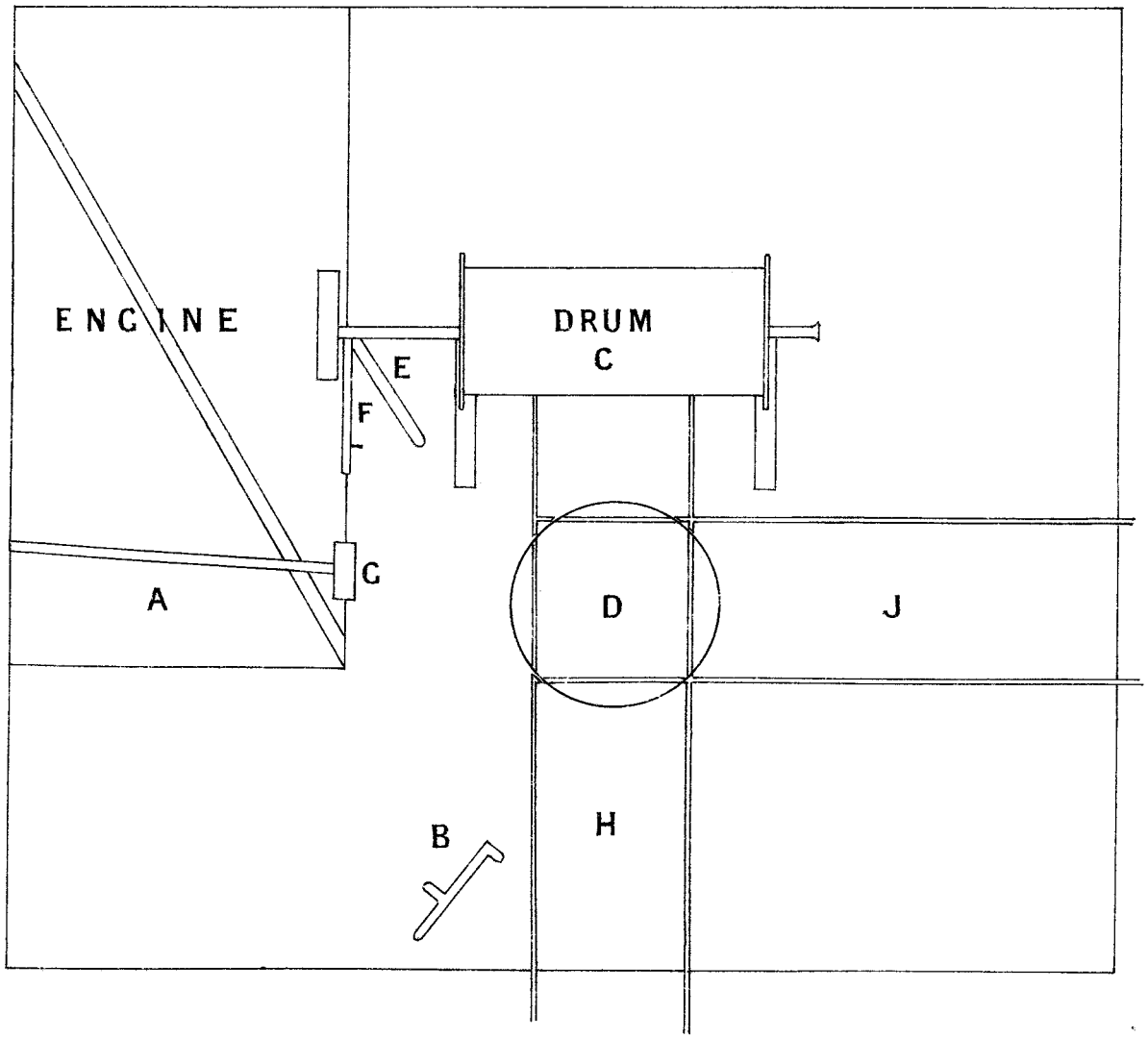
E *Handle for throwing drum out of gear*

F *Brake lever*

G *Seat*

H *Road from Mine*

J *Road to Hoppers*



SCALE 3 FEET TO AN INCH

built. This, in itself, shows some negligence. Now, assuming for argument that Young became underviewer by the agreement put in, the defendant was negligent in not seeing that the duties required by the Special Rules and the Act were carried out properly. With regard to ventilation, Young says the mine was never fit for men to work in. Curtis and Frewin speak of foul air, and the difficulty in keeping lights burning. Curtis fell asleep from effects of air, and says he complained of the air to defendant. Defendant denies this; and Moore says air was always good in the mine, but he has not been in the mine for some months prior to the accident. The evidence of Frewin and Curtis must be taken as that of independent witnesses, and reliable. Attention must be drawn to defendant's action in presenting to the Inspector a book purporting to be filled up, day by day, by William Young as underviewer, when he knew that the book was entered up after the accident from entries in the defendant's diary, thereby endeavouring to mislead the Inspector, and make him believe the book was regularly and properly filled. These facts would, had a fatal accident occurred, have gone far as against the defendant in making him responsible at law for the lives of the persons employed in the mine. As manager, the defendant neglected to see that the Act and rules were carried out, and he is therefore guilty of a breach of the Act, and is fined on this information in the sum of £5, and costs of Court, 17s.; witnesses, £7 1s.

Binns *v.* Young.—In this case against William Young, as contractor, for not examining the mine with a safety lamp, the defendant pleaded guilty; indeed, in the face of the number of witnesses to his act, he could scarcely do otherwise. He must be held responsible as contractor for the carrying out of the Act and rules. The contract with him must be held to have been continuing at the time of the accident. He was in the habit of entering the mine with naked lights, and even after finding the "fall," he proceeded to examine it with a naked light, and without any precaution, and thus occasioned the explosion. Every man employed in a mine is responsible for the safety of his fellow-workmen and himself, and is bound by the rules to neglect no precaution for their protection. I am doubtful how far the defendant can be held liable as underviewer, in view of all the circumstances, but there can be no doubt as to his liability as contractor. The defendant will be fined £2, and costs, 17s.

Methods of Working.

The method of working each mine may be gathered from the attached statistical table; but in order to show the proportions of various methods, I give the following: Worked by adits, 49; horses used, 9; self-acting inclines, 2; engine planes, 3; hand-power, 35; open-worked, 26; prospecting, 8; worked by shafts, 16; steam power, 8; horse-power, 4; water-power, 1; manual labour, 3; no information, 2: total, 101.

I have, &c.,
GEORGE J. BINNS,
Inspector of Mines.

The Under-Secretary for Mines, Wellington.

ADDITIONAL REPORT BY MR. BINNS.

SIR,— Dunedin, 4th June, 1881.

I have the honor, in compliance with your instructions dated the 20th ultimo, to make the following report on the mines which in my annual report are not shown to have been inspected, but which have been visited since. To facilitate reference, the attached numbers correspond with those in the statistical table attached to the annual report and the date shows, in each case, the date of last inspection.

1. *Wallsend (Collingwood) Coal Mine* (12th February, 1881).—In January, the directors of this mine requested me to visit it with a view to determining whether the incline could be safely worked. I therefore made inspections on February 12th and 13th, and, having decided that the incline was totally unfit for working, gave notice under section 19 to discontinue using it. On February 22nd, Mr. Marshall wrote agreeing to this course. With regard to the other portions of the Act, it could not be expected that every detail would be observed, as the mine had not previously been inspected. The workings were in good order; ventilation (natural) very good, measuring 4,560 cubic feet per minute in the main return. The plan is up to date. Boys were employed after hours on Saturdays, and no register was kept, as required by section 13. The horns have been stripped off the incline drum, but men are no longer raised and lowered on the incline: the brake framework is rotten, and the drum insufficiently stayed, the handle in the wrong place, and the rope is utterly worn out.

10. *Gulline's Coal Mine* was off work during my stay in the Inangahua, so has not been visited.

14 and 15. *Dugan's and Burke's Coal Mines* still unite in affording employment for one man. The owner, Mr. H. Dugan, has been supplied with a copy of Special Rules.

26. *Ferndale Colliery.*—Mr. Hamilton, who employed some men prospecting here, writes to me (29th June, 1881) that the works are abandoned, and all shafts duly fenced.

29. *Hart's Coal Mine* (27th April, 1881).—I visited this pit, but was unable to penetrate into the workings on account of water. Introduced Act, and agreed not to require a plan at present. The mine is worked by a dip-drive, which was driven 240 feet before a return air-course was made, air-pipes and a pair of bellows having been used for ventilation. A communication has now been made. This is the only mine in New Zealand where females are employed: one woman and one girl of thirteen have been employed above ground, assisting at the windlass and at the bellows aforesaid. Special Rules have been provided.

30. *Wallsend Colliery* (27th April, 1881).—The old shafts are fenced, and Mr. Wilkie, managing partner in a new proprietary, has been boring. Coal has been found, and a shaft will be sunk shortly

31. *Brockley, No. 1, Coal Mine* (23rd April, 1881).—This is the Rockwood Coal Mine of last year's report. The coal is vertical, and in one place two lifts of about six feet each have been taken, and the whole space supported with timber, which has yielded to the side pressure. There was, however, another outlet from this place, and I requested the manager to set additional timber. Special Rules have been sent.

32. *Mount Somers Coal Mine.*—Open-work. Not visited since December, 1879.

33. *Albury Coal Mine.*—I went to Albury, but finding this mine had been abandoned for several months, did not visit it. Mr. Palmer, of Albury, has been good enough to afford the information given in the table.

34. *Kakahu Coal Mine* (2nd May, 1881).—This mine, which has been worked by means of a slope and shaft, was full of water, and had been abandoned ever since November 17th, 1880. A company is now being floated for the purpose of recommencing work. The timbering of the slope is very insecure, and the shaft required fencing. On my writing to Mr. Meredith, owner of the ground, and pointing out these defects, he wrote that the shaft should be fenced and the mine not worked until after inspection.

43. *Hill's Creek Coal Mine* (6th April, 1881).—Though new on the list, this mine has been worked

for some years. Formerly a drive was put in, but this is now discontinued, and at the above date coal was being worked open-cast.

44. *Idaburn* (6th April, 1881): 46. *Dunsmuir's* (5th April, 1881): 49. *Crossan s* (6th April, 1881): and 50. *Cambrian's* (5th April, 1881) have all been visited. Being open-work they call for no remark.

51. *Mount Ida Coal Mine* (1st April, 1881).—Very little has been done here; only two drives, which were quite safe. The seam is nearly vertical. No plan is required. Special Rules have been supplied.

52. *Swineburn Coal Mine* (31st March, 1881).—No work at all done. I visited the mine at the request of Mr. McAra, who had not enough work open to show me even a sample of coal.

53. *Coal Creek, Waihemo.*—When I was at Coal Creek (8th April, 1881), no work was being carried on.

54. *Alexandra Coal Mine* (25th May, 1881).—The old shaft requires a little timber at the top, and a platform in, as the ladders are vertical, and the shaft more than 30 feet in depth. The present winding shaft also requires a platform, and fencing at the sides of the pit-mouth. The workings are in very good order. Special Rules have been gazetted, but none distributed or exhibited. No weekly report is made. I have not required a plan

55. *Manuherikia Coal Mine* (24th May, 1881).—Nothing done to observe the Act. No Special Rules sent up, although Mr. Jackson was supplied with a draft copy in October, 1880. New ladders have been put in, in a slightly overhanging position. The shaft is not fenced; no weekly report is made; the old shaft is filled in, but not up to the surface level. A new shaft was sunk to a depth of 50 feet, but was abandoned on account of water. I have warned Mr. Jackson that I shall be compelled to take legal action in case of his continued neglect to observe the Act. I have not required a plan.

56. *Cromwell Coal Mine* is now abandoned. (See under "New mines.")

57 *Bannockburn Coal Mine* (21st May, 1881).—Special Rules have been gazetted, but are not hung up or distributed. The old workings have fallen in; air good; two outlets, one of which (a shaft) requires fencing. No weekly report. Plan kept. Present workings are in good order.

58. *Kawarau Coal Mine* (21st May, 1881).—Special Rules were supplied to the owner of this mine on 8th October, 1880, but have not been sent up for approval. A dip drive has been started. The one man at work was very short of air, though it would have been perfectly easy to make another outlet into the old workings overhead. The Act is disregarded, and I have warned Mr. Pryde, but have not required a plan.

59. *Clyde Coal Mine* (23rd May, 1881).—This mine, belonging to Mr. Collins (whose name appeared in last year's report as C. T. Marie), is still worked as badly as ever. The Act is not observed in any way, but the report-book is said to have been burnt in a recent fire. And this cause is also assigned for the neglect to exhibit or distribute Special and General Rules. As men are now occasionally employed below ground I have given the owner notice to work his mine properly I have not as yet enforced section 17, requiring a plan to be kept, but, failing a great improvement in the condition of the mine, shall have to do so as a preliminary step.

60. *Clyde Coal Mine* (23rd May, 1881).—This old shaft required better fencing, which I have pointed out to Mr. Holt, the owner.

65. *Earnsclough Coal Mine* (23rd May, 1881).—This colliery shows a marked improvement on its condition as described in my former report. No boys are employed below ground, and the workings are pretty well ventilated. Men descend by the old dip-drive, and down the lower portion of a new (6ft. x 4ft.) shaft to the two lower workings. All these are in the same seam, which dips very fast. The ladders in the bottom portion of the shaft are vertical; but, at my suggestion, Mr. Buckley has agreed to make a communication between all the workings, putting in cloths or doors to guide the air, thus providing for a second outlet, and for ventilation at the same time. The shaft is unfenced, both at the top and intermediate entrances, and no weekly report is made. Special Rules were sent up to me on 11th March, but I returned them on the 16th, in order that they might be sent to the proper quarter. No plan is required.

The mines in the Cromwell and Clyde Districts, though none of them, except Collins's, badly worked, have had very little attention paid to them, hence the Act is by no means so well observed as in other districts. I have written in each case, pointing out what requires amendment, and the penalties attached, which in one case of a mine where one Chinaman forms the sole staff, amount to a sum not exceeding £160.

72. *Hurdstone Coal Mine* (17th May, 1881).—This mine has been again taken in hand, this time by Mr. Foster, late manager at Marshall's Coal Mine. The workings, which are of very small area, are in good order, there being a good parting and coal roof. A new shaft is being sunk to form a second communication. I have put Mr. Foster in the way of observing the Act, and supplied him with Special Rules.

78 and 79. *Cannon's and Bryce's Lignite Mines* (18th April, 1881).—These are still worked open-cast, the latter very irregularly; and there is nothing new to report.

83. *Wangaloa Coal Mine* (24th January, 1881).—A small mine near Kaitangata. I introduced the Act, and supplied a draft copy of Special Rules. No plan required.

86. *Johnston Coal Mine* (30th May, 1881).—Work has been recommenced here. The drive is too wide; but the mine is held from month to month, so the lessees naturally work it for their own immediate advantage. The entrance requires a set of timber, which I have requested the manager to set. No plan required. Special Rules supplied.

Special Rules.

Special Rules have now been gazetted for thirty-seven coal mines (one of which, Phœnix Coal Mine, is no longer on the list), one has been sent up, but returned (Earnsclough); twenty-six mines are open-work, thirteen temporarily abandoned, six prospecting, and the owners of twenty mines have been sup-

plied with a draft copy, which appeared to me to be sufficient for these very small mines, and to avoid the faults of the set mentioned in the report of 1879 (p. 19) This comprises all on the list.

NEW MINES.

1. *Brockley, No.* 2 (23rd April, 1881).—This is a new mine, near No. 31. Having been worked only since 24th January, 1881, this mine is not, of course, on last year's list. The coal is nearly vertical, as in Brockley No. 1. Four men are employed by the contractors, Messrs. Learmouth and Fibbs. Mr. Storey is manager, and has been supplied with a copy of the Act and draft Special Rules. The mine is well timbered and the air pretty good.

2. *Perseverance Coal Mine, Cromwell* (21st May, 1881).—This is a shaft, sunk by the owners of the old Cromwell Mine. The dimensions are 3 feet 6 inches by 6 feet, by 81 feet, divided by a brattice. Two other shafts were commenced, but abandoned. Vertical ladders were being put in; but, on my pointing out the illegality of this, Mr. McNulty promised to make other arrangements. The seam is six or seven feet thick, and dips 1 in 3. Horse power is used for winding. I put the manager in the way of observing the Act, and supplied draft Special Rules. No plan is required. The shaft is sunk through the coal, and a drive in the direction of the dip is intended to foot the seam, when a rise heading will be driven in order to make a communication with the other division of the shaft.

3. *Clyde Coal Mine, Holt's* (23rd January, 1881).—Mr. Holt has sunk a pair of shafts, and work will be commenced when a road is made to the mine.

I have, &c.,

GEORGE J BINNS,

The Under-Secretary for Mines, Wellington. Inspector of Mines.

No. 4.

REPORT UPON INSPECTION OF COAL MINES, NORTH AND SOUTH ISLAND DISTRICTS.

Mr. Inspector COX to the UNDER-SECRETARY for MINES.

SIR,— Wellington, 25th May, 1881.

I have the honor to inform you that, having been gazetted an Inspector of Mines to each of the mining districts of the colony, as defined in the *New Zealand Gazette* of 22nd April, 1880—namely, the Mining Districts of Kawakawa, Waikato, Pelorus, Kaikoura, West Wanganui, Greymouth, Westport, Jackson's Bay, Malvern, Timaru, Otago, and Southland, and having, in accordance with the instructions of the Minister of Mines, had the reports of the other District Inspectors submitted to me, that I might decide which mines required the most attention, I have visited those in the South Island which, from Mr. Binns's report, I considered necessary, and propose visiting the North Island mines immediately

In forming my opinion as to what mines most required attention, I grouped them, firstly in the order of the number of men employed, which showed that out of the one hundred mines which Mr. Binns mentions in the South Island, only twelve were employing more than ten men below ground; that one mine employed ten men; that no information was to hand concerning seven mines; and that sixty-six mines were either stopped entirely, or employed only one or two men

List of mines, grouped according to the number of men employed:—No information, 7; not working, 12; employing 1 man, 29; 2 men, 25; 3 men, 5; 4 men, 4; 5 men, 2; 6 men, 1; 7 men, 1; 8 men, 1; 10 men, 1; more than 10 men, 12: total, 100.

Since Mr. Binns's report, the Wallsend Mine, Greymouth, employing fifteen men, has been stopped, as has also the Mokihinui Mine, employing five men.

I decided then, that as the time at my disposal was limited before the commencement of the session, by which time I had to furnish a report, that my attention should be chiefly directed to those mines which employed more than ten men; but that, when I had time on my hands, and the opportunity of visiting other and smaller mines, I would do so.

The classifying of the mines in this manner shows that in reality the total number of mines in New Zealand which have any claims to be considered as such (that is, striking out all mines employing less than three men) and in which I apprehend the Act can be enforced, is only thirty-three, viz., twenty-seven in the South Island and six in the North Island, and that these numbers have since been reduced, by two mines in the South Island and one in the North Island having been stopped; besides which, the Kaitangata Railway and Coal Company's Mine, and No. 1 Kaitangata, being now worked together and connected by drives, the total number will be reduced to twenty-nine mines. It appears necessary to mention this, because the number which appears in the list (106) is apt to give an undue importance to our coal-mining industry as at present developed, and to be liable to mislead the public at large. It is, moreover, I fear, the means of bringing to the colony a number of mining managers in search of occupation, when there is no probability of their obtaining work on their arrival.

With regard to these small mines which are worked by one or two men, and in one case two mines being worked by one man at different times, I would submit that no amount of inspection is likely to be of any use unless an Inspector stayed at each of them and managed the mine.

I have not, of course, visited many of these, but one or two have come under my notice. At Springfield there is a mine, known as the Eureka, which is owned and worked by one man, at such times as he is not employed at the Springfield Colliery or elsewhere. When I was there, I could not find him. The Wangaloa Mine, at Kaitangata, is worked by a carter, who takes out enough coal for a return-load when carting in that direction. The Allandale Mine is worked by one man, his brother carting the coal meantime; the lease is but a small one, and beyond dangers from falls of the roof, which cannot be prevented by inspection, unless a responsible manager is in charge, no dangers are to be apprehended; and to attempt to enforce minor provisions of the Act in such cases would not only be arbitrary, but it appears to me utterly uncalled for.

Again, as regards Special Rules in mines of this sort, they cannot apply in any way, since the one man is manager, overman, collier, &c., and the rules being framed for the protection of the miners at the risk of the manager and overman, they appear to me to be useless. Special Rules have only been

gazetted for a few mines of this class, so far; but I think it my duty to call attention to the unnecessary character of the proceeding to avoid its continuance in the future. It is, of course, necessary to have a record of these mines, in event of their at any time opening out to larger concerns; but, so far as inspection is concerned, it would seem to be not only an expensive luxury, but at the same time next door to useless.

To pass on now to my report of the coal mines inspected during my trip through the South Island.

Shag Point Coal Mine.—I visited this mine on the 25th April, and found that the area on fire, which is to the rise of the workings, is not yet walled off from the main workings of the mine, but is closed in by screens, a small driblet of air being allowed to pass through for the purpose of carrying off the foul gases evolved. This air is regulated by a small hole, about one foot square, in the casing of the air-shaft, and this it is proposed to close when the walling-off has been completed. This is being carried on in such a way, that, when finished, the whole of the area on fire will be enclosed, pillars and all, by a double wall, the intermediate space being filled in with sand, and it should prove a most efficient check on the fire. In the meantime, this fire, I consider, constitutes an important element of danger, from the fact that, burning as it is with a limited supply of air, a large quantity of coal gas is being evolved, which may at any time, from atmospheric causes, or in the event of a fall blocking the present air-course which carries it off, force its way into the workings. The ventilation, generally, is only very moderate, owing to the fact that at present the two downcasts, by the mine and the new shaft, are, if left to themselves, liable to fight, and that, practically, the incline current is overpowered and converted into an upcast; an occurrence which might result in a serious catastrophe, if not guarded against. As it is, the air from the shaft is regulated so as not to overcome the other supply, which ventilates some of the dip workings, and so the total quantity of air passing is less than it would otherwise be. The air current, as directed at present, would not be sufficient to cope with the gases evolved from the burning area, in the event of their forcing themselves into the workings from the causes specified above; but it is fortunate that, by simply opening a door, a very good current of air can at once be brought to play round the boundary line of the burning coal, and would, I think, be amply sufficient to carry off whatever gases are likely to find their way into the workings. I have thought it necessary to write and specially caution the manager on this point, and have impressed upon him the importance of constant inspection of the roadway in question, and of coursing the air in that direction whenever any indications of its necessity be observed, even should it necessitate withdrawing the men temporarily from the dip workings. I found an impression existed at the mine that the gases evolved from the burning area were inexplosive, although it was admitted to me that they had at times behaved in the same manner as fire-damp when examined with a Davy and, moreover, that gas had been seen to burn with a blue flame from slack heaps, dying away at a short distance. I expressed myself in writing to Mr Williams that this was unreasonable, and that any gas which would burn would also explode, should the conditions be such as would favour it. You have since shown me Mr Binns's letter* upon this subject, stating that the gas found in this mine is probably carbonic oxide, and quoting experiments to show that it would be inexplosive, and only burn quietly; but here I must in part differ from him. An explosion, as it must be understood in a mine, means the sudden ignition of a gas which may, by its combustion, greatly expand in volume, or may not. It will, in either case, be attended with the formation of carbonic acid or choke-damp, which is admitted to be even more deadly than the explosion itself. Moreover, it is a moot point now whether the secondary explosions, which ocasionally occur in mines, are not principally due to the carbonic oxide which was formed by incomplete combustion at the first explosion. Be that as it may, however, I do not myself consider that carbonic oxide is the only gas evolved from the burning area which is capable of forming an explosive mixture; for any coals, whether lignite or otherwise, when exposed to destructive distillation at any temperature over 300° Fahrenheit, as must be the case at present in the Shag Point Coal Mine, will give off greater or less quantities of coal gas, which would not be less explosive than fire-damp when mixed with the proper proportion of air.† It is to avoid danger from this source that I have cautioned Mr. Williams, and should have taken the same precautions whether any sign of explosive gas had been seen or not, since the conditions under which the fire is burning, viz., with a limited supply of air, are such as very closely assimilate to a coke oven or gas producer. The presence of this gas in the mine can, fortunately, be readily detected, as it would be seen in the form of smoke, and, accordingly, a very substantial guarantee exists against accident if due precautions are taken, and Mr. Binns reports that Mr. Williams is paying every attention to the case.

Walton Park Mine.—The air in this mine was by no means excessive when I visited it on the 26th April, but Mr. Lindsay informs me that it is generally much better. I have little doubt, however, that the ventilation could be improved by confining the current instead of allowing it to spread through the workings. I am afraid that a certain amount of trouble is in store for this mine in its new pit workings, where the coal is not standing at all well. The principal cause appears to be a number of vertical joints along which the coal falls, the result being that it frequently assumes the form of a gothic arch in the bords, and, in one or two instances, has gone as high as the roof. This has again occurred in the lowest level, which is only driven 6 feet wide; and, at one place, where the work has cut the floor, a certain amount of creep has ensued. From this, I am inclined to think that the behaviour of the roof is not entirely due to the nature of the coal, but may also find an assistance in the fact that the march of the colliery has necessitated a somewhat irregular system of working, the bords to the rise being carried farther in than the main level. Wherever the roof shows any sign of breaking in the manner described, the drives are being kept narrow, and this appears to be the best thing that could be done.

Saddle-Hill Colliery.—Since Mr. Binns's annual report an air-shaft has been sunk to the rise of

* See end of Appendix.

† Dr. Hector mentions (New Zealand Exhibition, 1865, Jurors' Reports and Awards, p. 384) that "the Shag Point coal may be considered to hold the same relative position among the brown coal series that cannel does to the true or older coals. It burns freely with a rich oily flame; upon distillation it gives off a rich gas at a low temperature." This appears to point to the fact that the Shag Point coal is peculiarly apt to give off gas under the conditions which I have mentioned.

the workings. The air is split at the bottom of the downcast shaft, and is taken respectively through the two sides of the workings, and was very good when I visited the mine on the 28th April. The current is produced by a small furnace placed in the air-shaft, but not closed in. This is only a small pit, and the coal varies a great deal in quality—some parts being so inferior as not to be worth working, while others are very good coal; but the worst feature of the mine is the occurrence of a good number of soapy backs or clay partings in the coal, which render timber necessary This timber is rather sparingly used, and I have written to the manager that he should keep a good supply on hand, and use it as occasion requires. He has lately put narrow work through, wherever these have been met with, which appears to answer. The cover of the cage is simply a piece of galvanized iron, hung loose; and this I have requested the manager to alter, and provide a "substantial cover to the cage."

Fernhill Mine.—The coal here is working up in the roof, in the same way as at Walton Park, and the air is not very good. It is worked by a natural current, and this sometimes baffles; besides which, when I visited the mine on the 28th April, I found one of the doors open, and the air, which should have been going round the workings, was taking a straight run to the air-shaft. It is only right to state that, in the workings which were affected by this door being opened only one man was employed, and that he had propped back the door himself as he found it inconvenient in trucking. I requested Mr. Shaw to keep a careful watch on the men in this particular, and he promised to do so. The workings to the dip have now been drained by an adit, but the water which was in the mine has seriously affected these workings, and falls have been numerous, at times running up to the roof, which has then fallen. They are now deserted, and, in a few days, Mr. Shaw hoped to be able to do without them at all as roads.

Kaitangata Railway and Coal Mining Company's Mine.—I visited this mine, with which is now incorporated the No. 1 Kaitangata Colliery, on the 29th April, and found everything satisfactory The current registered in the pit on the morning of my visit was 13,428 cubic feet per minute, and, generally speaking, the air was very good. The mine and pit are now connected by an incline drive, which is being gradually completed to the dip, and will be carried as far as it can be got. Off this dip drive levels are opened, and from these, on the dip side, bords which run as far as the roof. A little gas is occasionally seen in these bords, and when I visited the mine safety-lamps were being used in one of them. They are examined every morning before the men go to their work. In the mine the air was very good, and we were unable to find any gas, although the chambers exist here just as in the old workings; but I understand that gas has never been seen on that side of the mine. The old workings are closed off, the door between them being kept locked. No one enters these old workings except Mr. Samson, who examines them twice a week for gas; he had been through the morning I arrived. The system of working the coal has been to open up low, and then draw the tops from the bords, standing on the coal as it falls, and by this means the high chambers which are seen in the mine are formed. The Act generally appears to be carefully observed in every particular, and every care taken to insure safety to the workings, the mine being subject to a fortnightly inspection by Mr. C. E. Twining, Mining Engineer, at the expense of the company

Green Island Colliery.—This mine, which I visited on the 30th April, has been on fire, but is now filled with water in the old workings, and these have been bratticed off. A small air-shaft has been sunk, in which there are no ladders fixed, and the air was not very good. The tunnel wants re-timbering badly; and a second outlet should be provided, which is proposed to be done by driving a heading out to day Man-holes are wanted in the main incline; and I have written to Mr. Richardson, requesting him to re-timber this incline, and at the same time to make the requisite man-holes—a piece of work which he tells me he intends undertaking at once. I decided that it was not necessary to fix ladders in the air-shaft, in order to comply with the Act, as it is not a working shaft, and, as the present workings must be considered as a new mine, the necessity for a second outlet would not come into force for some time yet, long after one will be provided by the heading which I mentioned. I suggested to Mr. Richardson that it would be as well to fix a windlass, which is on the ground, at the head of the air-shaft, in order to provide a means of exit for the men in event of the tunnel falling in before the repairs were completed, and this he promised to attend to.

Freeman's Abbotsroyd Colliery was in good order on the 30th April, and the ventilation was satisfactory The old workings are now all bratticed off, and the air is taken through the new ones to a small up-cast shaft, being split at the entrance of the mine. There was a certain amount of leakage of black-damp from the old workings, through rat-holes below the bratticing, but Mr. Walker stopped these up while I was there. He examines the workings every morning, and keeps the requisite book for reports.

The Allandale Mine, which I also visited on the 30th April, is only a small concern, being worked by two brothers; one sells and carts the coal, and the other mines it. The workings consist of a drive, and a few bords right and left. The area of coal in the lease is only small, and they propose to get as much out as they can in working back. An air-shaft exists, but it is next to useless as it is situated at present, and the air is not guided at all. The works generally are standing well. I have mentioned this mine in the early part of my report.

Canterbury Mine.—This mine, which is now in the hands of Messrs. Austin and Kirk, I visited on the 4th May. I find that the ventilation is very bad—indeed, that there is practically no air passing through the mine. This, Mr Austin explains to me, is due to the fact that the in-take air has a free run through Jebson's old workings to the air-shaft, and he is at present engaged in stopping these off. No plan exists of the new workings, nor has a manager's book been kept; but, as Mr Binns had a few days previously given instructions for these to be used in future, I took no further action in the matter. The roof appears to stand well generally, and pack walls are built all along the levels, which, with a few props and cap-pieces, form an efficient support for the roof In the main level the roof, though standing well at present, gives one the impression that falls might occur, and I have enjoined caution in this respect, and Mr. Austin has promised to attend to it. He is anxious to keep the mine in good order, and does not stint timber where necessary

Springfield Mine was closed down for repairs to the hauling-gear when I visited it on the 4th May, so I did not go below Mr. Moody has recently taken charge of the mine, and in his hands it will

doubtless be thoroughly well worked. Mr. Binns had visited this mine a few days before I was over there.

Kowai Pass Mine.—Only two men and one manager are employed in this mine, and the workings are but small. When I visited it, May 4th, the pumps were not working, and I could not get to the bottom of the shaft for water. The roof is good generally but at one place it is loose sand; and one man is working here. Some falls have occurred, and I cautioned the manager to exercise the greatest care. He promised to do this, and also informed me that in the course of a few days he would have finished at that end. The air was not very good when I visited the mine, but it was a very still day, and Mr. Deans informs me that he sometimes has a difficulty in keeping the lights burning from the quantity of air passing.

Eureka Mine.—As I have before stated, this mine is worked by one man, when he is out of employment elsewhere. He did not appear to be at work when I visited the mine, nor could I find him. There are two shafts here, which are neither fenced nor covered in.

Ferndale Mine has been abandoned.

Malvern Hills Mines.—I have not considered it necessary to write to any of the managers of the Malvern Hills Mines, as Mr. Binns had visited them all just before me, and had expressed his intention of communicating with them. He had, moreover, called attention verbally to all the points which required attention, so that it was unnecessary to formally supplement his instructions.

Brunner Mine.—I inspected this mine, which is now under the management of Mr. Lees, on the 10th May The work still progresses in the broken, the pillars being split at two or three different parts of the mine. It is not proposed to attempt to draw the whole of these pillars, but to rob them as much as possible, and then leave these parts of the mine to settle down as best they may; and, as was to be expected, this proceeding has been followed by a heave of the pavement, and creep has set in thoroughly at places. Timber has been largely used, a perfect forest of sticks being seen at places, but these have proved utterly inadequate to withstand the pressure put upon them, and throughout the whole mine they may be seen broken in the centre and bent to an angle of about 120 degrees. The pressure which has been brought to bear on these props appears everywhere to have been exerted from the pavement, as, in each instance where they have given, the roof is standing firm. There is fortunately a good roof in most parts of the mine. As it is, however, there are at places very wide chambers in which the roof is practically unsupported, and, although it stands well, falls have occurred, a rather bad one having come down shortly before I visited the mine. It will, of course, be quite impossible to keep sufficient timbers in to support the mine properly if the floor continues to rise in the way I have mentioned, but something may be done by constant watchfulness and a prop here and there when necessary At one part of the mine great difficulty has been experienced in keeping the roads open on account of the creep, and for some time, while Mr. Harrison had charge, these had to be taken up every day At present this creep seems to have stopped, or, at any rate, to be going on more slowly than it was before. Works are now entirely suspended in the stone-drift, and beyond the fault where the explosion reported by Mr. Binns occurred, pending the erection of a fan for ventilating that part of the mine; and this area is shut off, and the door communicating with it kept locked, no one but the manager and underviewer having access to the key The mine is examined daily for gas by the underviewer, and his report is entered in a book kept for the purpose; and Mr. Lees has made a report from time to time, but not so regularly as should be. No gas has been seen lately I have written to Mr. Lees, requesting him, if it is absolutely necessary to draw pillars for the supply of coal, to take these from the rise of the workings, and on no account to weaken the mine to the dip towards the river, as there being no lateral support on this side there is every probability of a serious slip occurring, which might be attended with disastrous circumstances on the surface, which is thickly built over, and if of sufficient magnitude, might also dam the Grey River, with extremely serious results. I have also cautioned him against leaving the wide chambers I have mentioned untimbered, as falls may occur at any time. If the greatest available quantity of coal is to be got from this mine, it will be necessary to open up the workings as far to the rise as it is intended to work, and then bring back the coal from the march; and, unless the pillars are completely drawn when the work commences, there is little doubt that the inevitable creep will ruin the mine.

Coal Pit Heath Mine.—I visited this mine on the 11th May, and found that everything was in good working order, and the ventilation very good. The current, measured in the return air-course, was 13,650 cubic feet per minute, and we were unable to find any gas in the mine, although Mr. Alexander informs me that there is invariably a little in the ends in the morning. No blowers have lately been met with, and the mine is carefully inspected every morning before the men are allowed to go to their work. The second outlet which existed to this mine was by the air-shaft, and ladders were formerly placed down this. These have since been drawn, as they were damaged by the furnace, and thus rendered dangerous in themselves. A wire ladder has been made, but not erected, as it was feared that the fumes from the furnace would soon render this worse than useless, and so a windlass has been erected at the mouth of the shaft, and the ladders kept ready in case of any emergency I have countenanced this proceeding; as, while not complying with the strict letter of the Act, it appears to meet the requirements of the case, and, in view of possible changes, it would be unnecessary to further insist upon the provision.

Westport Company's Banbury Mine.—I visited this mine on the 16th May and found it in thoroughly good order. The roof is bad and treacherous, being traversed by numerous joints and faults, none of which, however, have much throw Reversed faults are not uncommon in the mine, and in some of the bords two of these intersect, thus leaving a wedge-shaped mass in the roof, which of course requires careful timbering to avoid falls; and the timber which is used most unsparingly throughout the mine, is amply strong, and well set. A fatal accident occurred here shortly after Christmas, from a fall of coal when it was being holed, and Mr. Binns attended the inquest. As a sufficient number of sprags are constantly supplied to the miners, this accident could not reflect in any way on the management. The workings consist of two parallel headings, with bords opened out right and left, small at first, but widened out a few feet in, thus leaving a pillar to strengthen the main roadway The ventilation is natural, and was fairly good the day I was there, when it was very calm and still; and I understand that when there is any wind it is first-rate. The plan is kept up, as also the manager's and under-

viewer's books, and the Act is generally observed in its details. The deep gulch, which received so much notice in the papers, does not exist, so far as is known at the mine; but two or three small gulches, which extend from the surface to a depth below the workings, occur; and one of these has been of considerable service in draining some of the dip-workings before the cliff was reached. A certain part of the workings have been completely gutted, and the roof allowed to settle down, and thus ease the workings; and this work was very successfully carried out. A drive is about to be entered from the face of the cliff, through some broken ground, to connect with the workings; and here Mr. Denniston proposes to erect a furnace, which will keep the ventilation more under control, and the position is admirably adapted for it. The works are being steadily pushed on towards the "South Branch," and, when this is reached, the main body of coal belonging to this mine will be opened out; but, in the meantime, there is sufficient ground opened to yield a large output.

I have found throughout the mines which I have visited that the provisions of the Act are carefully complied with, and that the managers are, one and all, willing to do anything suggested to them for the safety of their workings; and I must compliment Mr. Binns on having, in a comparatively short space of time, brought about an observance of details which, while readily adopted by some, must have required constant attention in other cases. I have, &c.,

S. Herbert Cox,
Inspector of Mines.

The Under-Secretary for Mines, Wellington.

Mr. Inspector Cox to the Under-Secretary for Mines.

Sir,— Auckland, 17th June, 1881.

I have the honor to inform you that I have visited the various coal mines now at work in the North Island, and herewith submit my report on the same.

Kawakawa Colliery.—No fault can be found with the workings at this mine, which are in good order throughout, and, under the able management of Mr. T P Moody, may claim to be the largest and best ventilated mine in the colony, over 15,000 cubic feet of air per minute being carried through the workings.

Since I last visited the mine, the new incline has been connected with the sinking-pit, and the old pumping-shaft has been bricked from top to bottom and converted into the main up-cast of the mine, a furnace being erected at the bottom. The air is well guided throughout, and is perfectly fresh at every part of the mine, and, being frequently split, the greatest available power of the current is gained. The mine is examined every morning with a safety-lamp by the deputy-overman, before the men go to their work, but no register of his inspection is kept; as, however, no gas has yet been found, this is not required by the provisions of the Act. The system of working generally has been the post and stall, but a little longwall work has been done in part of the upper seam near the shaft. This has now been stopped while the lower seam is being worked, and then Mr. Moody proposes to take down the clay parting, and finish drawing the top seam. Pillars have been drawn in several parts of the mine and the roof allowed to come down, the timber being generally left in the mine as useless after having done its work. The roof is not good; and it says a great deal for the careful management that no accidents have occurred during the past year. Timber is used unsparingly throughout, a good supply being constantly on hand, due supervision being exercised to see that this is well and securely set and used whenever it is necessary The provisions of the Act appear to be complied with in every particular.

Waikato Coal Company's Mine.—This mine, which I visited on the 13th June, is still under the management of Mr. A. McGlynn. The workings are all in good order, and are standing well. A plan of the mine is kept, and the Act well observed, as far as I could judge, since the men were not at work when I visited it. The mine is only wrought now to supply orders, and is, I understand, standing half its time, only eight men being employed. This is to be regretted, as the coal from this lease is a very good sample of its sort, is easily worked, and has a good roof, thus allowing the whole thickness to be drawn in the bords, a proceeding which was impracticable in the Waikato Mine on the railway side of the river, now abandoned. The old workings which have been struck lately are standing well; but the extent of roof which has been left entirely unsupported makes one wonder that the whole of it has not collapsed long ago. The air was very good for a natural current when I was in the mine, and Mr. McGlynn says that at times it is much better than even then. A large area of coal has been proved on this property, and it would well repay the shareholders to either throw a wire tramway-bridge over the river, or at least provide some more efficient means of transporting the coal than that practised now of tipping it into barges, towing these five miles up the river to Taupiri, and then reloading into railway trucks.

Taupiri Colliery.—This mine, which I visited on the 14th June, I found in very good order, and the ventilation good. A considerable number of pillars have now been drawn in the old mine, and the work in connection with these has involved constant care and attention on the part of the manager, but it has been carried on very successfully so far. The roof is quite soft, but has been found to give ample warning before coming down. Mr. Collins, the manager, inspects the mine every morning, but has not kept a book recording his inspection; he proposes to do this in the future, although not necessary for compliance with the Act. The slack is drawn from this mine, but is not utilized in any way; and it is to be regretted that, with the quantity of clay on the property, it is not employed in brick-burning. This is the only mine in the colony in which I have seen an indicator attached to the winding-gear to show the position of the hutches in the incline.

Whau Whau Coal Mine.—Only a small amount of work is being done in this mine at present, three men only being employed underground. The air is remarkably good for a natural current, and the mine generally is in good order.

Kamo Coal Mine.—At this mine, also, the output is at present small, the principal work lately having been expended on the surface, and in prospecting. As noted by Mr. McLaren, the upper seam has been struck and works have been opened on this, the greater number of men being employed in this part of the mine. The ventilation here is very defective, no attempt whatever being made to

guide the air, and at some of the ends it is very bad. The air also in the rise workings of the old mine where the rest of the men are employed, is also very impure; and at this part of the mine the slack, all of which is left in the mine, appears to be heating, and I fear that a fire is imminent. I have cautioned the manager, who was away when I visited the mine, by letter, to keep a careful watch upon these slack-heaps, and requested him to take steps to improve the ventilation by guiding it to the faces; and, in event of it being found necessary, have advised him to draw the slack from these workings, so as to avoid the difficulties attendant upon an underground fire. I was unable to find that the mine was examined in the mornings before the men go to their work, and I have written Mr. Black to the effect that, as it is the manager's duty to see that the workings are safe, and fit to work in, I consider it necessary that this daily inspection should be made, either by himself or a deputy before the men are allowed to go to their work. The diamond drill had sunk 108 feet through a vesicular basalt on the 15th June, the day that I visited the mine.

Bridgewater Colliery, Miranda.—This mine is now closed and offered for sale, so I did not visit it.

I have, &c.,
S. Herbert Cox,
Inspector of Mines.

The Under-Secretary for Mines, Wellington.

No. 5.

SPECIAL REPORTS UPON THE SHAG POINT COAL MINE.

Mr. Inspector Cox to the Under-Secretary for Mines.

Sir,— Dunedin, 26th April, 1881.

I have the honor to inform you that I have found it necessary to call the special attention of the manager of the Shag Point Mine to the danger of an explosion which would exist in the mine, should the gases now being evolved force their way into the workings. I cannot find fault with the arrangement which is pursued for ventilating at present, as various things render it a difficult matter to improve until the whole area on fire has been walled off; but I have enjoined the strictest caution, and the necessity of constant watchfulness, as, in the event of the gas coming into the workings, it could readily be contended with if the dip workings were closed down for the time. I have written Mr. Binns to the effect that I have given Mr. Williams the above instructions, and requested his attention to the matter at his next visit.

I have, &c.,
S. Herbert Cox,
Inspector of Mines.

The Under-Secretary for Mines, Wellington.

The Under-Secretary for Mines to Mr. Inspector Binns.

(Telegram.) Government Buildings, 6th May, 1881.

I am directed to request that you will arrange to visit Shag Point Mine, and see that proper precautions are taken in accordance with Mr. Cox's recent suggestions to the manager, of which Mr. Cox has informed you.

Oliver Wakefield,
Under-Secretary for Mines.

Mr. Inspector Binns, Dunedin.

Mr. Inspector Binns to the Under-Secretary for Mines.

Sir,— Dunedin, 15th May, 1881.

In answer to your telegram of the 6th instant, I have the honor to inform you that I had already visited the Shag Point Coal Mine on the 6th instant, prior to the receipt of your telegram, and that I made another inspection on the 13th. On both occasions I failed to find inflammable gas.

The inflammable gas referred to in Mr. Cox's letter appears to have been known in the Shag Point Coal Mine for some years, and has never been known to cause an explosion. It also appears, from a letter written by Mr. Jas. Bishop, of Shag Point Colliery (a copy of which is enclosed), to be exactly similar in appearance to an inflammable gas well known in the coal mines of Continental Europe. It is described at Shag Point as burning with a lambent blue flame, similar to the well-known flame of carbonic oxide, which is ordinarily stated by English authorities on mining to be of the rarest occurrence in mines; and in Greenwell's work on coal-mining—a somewhat obsolete but standard work—the following passage occurs: "When mixed with common air it (*i.e.*, CO), does not explode like firedamp, but burns brilliantly" (p. 216).

In Roscoe's Elementary Chemistry (p. 93) we find, "When heated in contact with oxygen, carbon monoxide takes fire, burning with a characteristic lambent blue flame, and forming carbon dioxide."

The following experiments were made by Messrs. Richardson, Browell, and Marreco (under the last of whom I studied) to ascertain the effect of different mixtures of atmospheric air and carbonic oxide on the flame of a candle:—

Percentage of CO in Mixture.	Observation.
2·5	No visible effect.
5·0	Ditto.
10 0 ..	Ditto.
12·5	Flame apparently elongated, but very slightly
15·0	A large top on the flame, with the characteristic appearance of carbonic oxide.
20·0	The top much increased, but the candle burnt tolerably well.
23·0	Appearance same as last, and candle still burnt.
25·0	The candle extinguished, the mixture inflamed, and a disc of flame passed slowly to the bottom of the vessel.
28·5	The candle extinguished, and the gas burnt with a flash. This is the theoretical mixture for perfect combustion.
50·0 } 70·0 }	These mixtures inflamed and burnt more or less rapidly

(*See* Trans. N of E. Inst. Vol. 12, p. 202)

It seems peculiar that, notwithstanding the circumstances under which this gas has been seen at Shag Point, it should, if explosive, never have exploded; and it is unfortunate that, so far, the management have been unable to isolate any with a view to having it analysed. Of course I am fully aware that there is no certainty of this gas being CO; but, considering the circumstances of the case, I venture to express an opinion that it probably is.

As regards Mr. Cox's suggestions for dealing with the threatened danger, as explained in his letter to me of the 26th ultimo: This course appears to be the one adopted by Mr. Williams on previous occasions when dealing with noxious gases from the fire. It is unfortunately impossible to do as Mr. Cox suggests—viz., "See that this is attended to when next I visit the mine." The occurrence of the gas being rare, it is most improbable that I should be there at the time of these precautions becoming necessary; but I have written to Mr. Williams urging upon him the advisability of following this course. I may mention that Mr. Williams appears to be taking every precaution for safety, remaining frequently underground for many hours when the underviewer is away for the night. He is also willing to adopt any additional means required, and to use safety-lamps if desired to do so; but it is probable that this would be of very little use in immediate proximity to an open fire, and the danger to the men from working with an insufficient light in a very high place with a rotten roof, would probably more than counterbalance any advantage. Taking into consideration this probability, and giving due weight to Mr. Cox's opinion (as stated in his letter and your telegram of the 11th instant) that the precautions suggested by him are, if properly attended to, sufficient, I have not required the exclusive use of safety-lamps, but have arranged with Mr. Williams that each set of men is to be provided with a safety-lamp with which to examine the working-place after a fall of stone, or after ceasing work for any time.

The fire is being shut off by the erection of a substantial brick wall, backed with sand, but the unusual character of the roof, and the close proximity of other coal seams, will, I fear, render this expedient only temporary

Appended is a copy of Mr. Bishop's letter to Mr. Williams.

I have, &c.,
GEORGE J BINNS,
Inspector of Mines.

The Under-Secretary for Mines, Wellington.

Enclosure.

Mr. BISHOP to Mr. WILLIAMS.

SIR,— Shag Point Coal Mine, 14th May, 1881.

In reference to the gas met with in your mine, I would state for your information that I have had frequent opportunities of seeing gas under exactly similar conditions, as the result of underground fires. My experience was obtained in the working of lignite coal in Bohemia, where I held an engagement; and I may state that none of the mines throughout the district where I was were entirely free from this peculiar gas.

Comparing my experience there with what I have seen at Shag Point, I feel fully justified in saying the gases are the same. From my own observation, the conditions favourable to the production of this gas are an accumulation of small coal mixed with pyrites and other impurities, and partially shut off from the air. The mass in course of time heats, and gives off large quantities of gas. A process of distillation, and perhaps decomposition, continues until fire breaks out; at this particular juncture the gas is almost sure to be seen burning near the roof, and it can be watched for some minutes; the flame is bright blue, and seems to float on the surrounding atmosphere.

The general opinion held by mining engineers in Austria is that the gas in question will not explode; and after having experienced the gas under varying conditions, I am convinced that it is non-explosive, and perfectly safe to approach with naked lights.

I may just add that I am of opinion this gas is peculiar to lignite and other inferior coal seams, where pyrites are met with in quantity So far as I am aware, it has never been seen in mines working coal of the older formation.

I am, &c.,
JAMES BISHOP.

W H. Williams, Esq.,

RETURN No. 1.

Statistics of Workings in Coal Mines, 1880–81.

Number.	Name of Mine and Locality.	Name of Manager.	Number of Years Working.	Quality of Coal.	Number 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 1880.	Approximate Total Output to 31st December, 1880.	Number of Men ordinarily Employed.	Power used for Drawing Mineral.	Stroke of Pumps.	Size of Barrel.	Height of Column.	Ventilating Power.	Date of Inspector's last Visit.
	Kawakawa District.					Feet.	Feet.														
1	Kawakawa, Bay of Islands ...	Moody, T. P ...	16	glance	1	4½ to 15	4½ to 15	varies	bord and pillar	2	7′ x 10′ and 5′ diameter	engine incline	54,865	396,248	140	engine	6	12″ & 12″	247	furnace	13/4/81 & 14/4/81
2	Kamo, Wangarei	Black, George ...	4	brown	2	8 to 12 4 to 4½	all ,,	,,	,,	..	...	tunnel	6,382½	14,153½	15	hand	...	...	...	natural	21/4/81 & 23/4/81
3	Whau Whau, Wangarei ...	Love, Alexander ..	16	,,	1	5 to 9	,,	,,	,,	1	...	,,	2,272	17,472	5	horse	...	...	...	,,	22/4/81
	Waikato District.																				
4	Taupiri, Huntly	Collins, W ...	5	,,	2	6 to 40	6 to 16	,,	,,	1	5′ 3″ diameter	engine incline	14,817	53,303	40	engine	Tangye	...	85	,,	27 4/81
5	Waikato, Huntly ...	McGlynn, A. ...	4	,,	1	14 to 18	all	,,	,,	..	...	tunnel	15,849	33,995	35	horse	...	...	..	,,	28/4/81
6	Miranda	Foote, George ..	4	,,	1	30 to 55	varies	,,	,,	2	10′ x 4½′ and 6′ x 4′	shaft	2,160	6,395	5	engine	Tangye	...	70	,,	30/4/81
	West Wanganui District.																				
1	Wallsend, Collingwood ...	Marshall, John ..	12	bitum.	2	27″ to 32″	all	W 12½°	longwall	1	45′ x 6′ x 6′	drive	962	7,052	6 u. 1 o.	hand	...	...	...	,,	13/2/81
	Pelorus District.																				
2	Picton, Picton	...	...	...	...	...	..		...	...	..	...	...	...	2	..	...	..	..		28/11/80
3	Picton, Picton	...	..		...	...	...	...	..	...	...	...	...		2	...	...	...	...	...	28/11/80
	Westport District.																				
4	Mokihinui, Mokihinui ...	Andrews, N ...	½	pitch	2	6′ 6″ to 7′ 3′ 6″	all	N 20° E. 1 in 5	bord and pillar	2	6′ x 3′ x 15′ 6′ x 3′ x 29′	drive	500	500	5	hand	..	...	...	natural	7/12/80
5	Waimangaroa, Westport ...	Ferguson, A., M.E.	5	bitum. soft.	1	18′ to 24′	8′	varies	,,	...	...	,,	880	4,403	3	horse	...	...	...	,,	4/9/80
6	Banbury, Westport ...	Denniston, R. B. ...	2	bitum.	1	4′ 4″	all	W 7°	,,	...	..	,,	3,892	7,682	29 u. 7 o.	self-acting incline	...	...	...	,,	4/12/80
7	Energetic, Reefton ...	McAllum, James...	5	pitch	1	10′ 2″	,,	S.W 22½°	,,		...	,,	1,020	2,242	2	hand	..	...	...	,,	13/12/80
8	Golden Treasure, Reefton ...	Mackay, A. ...	9	,,	1	6′	,,	S. 30° E.	,,	..	...	,,	612	726	2	,,	...	...	..	,,	13/12/80
9	Lankey's Gully, ,,	Irving, W ...	...	,,	1	11	9′	W 8°	,,	...	...	,,	288	830	2	,,	..		...	,,	13/12/80
10	Gulline's ,, ...	Gulline, R. E. ...	5	,,	1	6′	...	N.E. slight	,,	...	..	,,	50	200	1 u. 1 o.	,,	...	...	...	,,	17/4/80
11	Newcastle ,, ...	Breen, A. ...	6	,,	1	9′	6′	S.W 32°	,,	1	...	,,	360	660	2	windlass	...	...		,,	14/12/80
12	Dudley ,, ...	Joice, M. ...	7	,,	1	2′	all	N. 25° W. 25°	,,	...	...	,,	31	217	2	hand	6″	8″	6′	,,	12/12/80
13	Golden Fleece ,, ...	Trennery, J ...	10	,,	1	16′	...	varies	,,	...	..	,,	510	5,510	2	,,	..	...	...	,,	13/12/80

14	Dugan's „ ...	Dugan, H. ...	..	pitch	2	1′ 11″ 1′ 8″	all	W 1 in 3	bord and pillar	...	...	drive	150	550	1	hand	...	...	...	natural	15/4/80
15	Burke's „ ...	„ ...	..	„	1	10′	6′	N 30°	„	...	...	„	80	280		„	...	...	...	„	15/4/80
16	Oriental „ ...	...	2	„	1	3′ 3″	all	S. 60° E. 3°	„	...	...	„	none	...	none	„	...	...	...	„	14/12/80
17	Charleston, Charleston ...	...	...	brown	...	...	...	...	openwork	...	...	..	...	...	..	...	...	...	...	...	...
18	Brunner, Greymouth ...	Harrison, J., M.E., F.G.S.	16	bitum.	1	12′ to 16′	all	S.W 1 in 3	bord and pillar	1	..	drive	32,505	150,634	61 u. 11 o.	hand, and self-acting inclines	...	...	...	natural	17 12/80
19	Coal Pit Heath, Greymouth ...	Alexander, Thomas	4	„	1	16′	„	S.W 1 in 4	„	2	10′ x 6′ x 280′ 6′ diameter	shaft	14,330	42,043	28 u. 6 o.	engine 30 h.p.	4′	10″	250′	furnace	16/12/80
	GREYMOUTH DISTRICT.																				
20	Wallsend, Greymouth ...	Brown, Thomas ...	4	„	1	16′	„	S.W 1 in 3½	„	1	11′ diameter x 670′	„	none	12,122	none	engine 48 h.p.	5′	10″	670′	fan, 15′	18/12/80
21	Wallsend, No. 2, Greymouth ...	„	...	„	1	17′	14′	S.W 1 in 4	„	2	10′ x 116, 25′ x 6′ x 6′	„	604x	604x	15 u. 8 o.	engine 16 h.p.	10″	4	95′	furnace,	18/12/80
	MALVERN DISTRICT.																				
22	Springfield, Springfield ...	Bree, W R., C.E.	4	brown	1	4′	all	S.E. 1 in 6 to 1 in 12	longwall	1	6′ x 6′ x	engine plane	7,060	17,394	...	engine 10 h.p.	10″	3″	...	„	26/8/80
23	Springfield, No. 2, Springfield...	„	1	„	2	7′ 6,″ 4′ 0	„	...	bord and pillar and longwall	1	12′ x 5′ 2″ x 246′	shaft	none	none	79 u. 18 o.	engine	12″	20″	246′	steam jet	26/8/80
24	Kowai Pass „ ...	Lomas, George ...	1½	„	3	1′ 7,″ 9,″ 1′ 6″	„	E. 1 in 4	bord and pillar	2	5′ x 2′ 6,″ 5′ x 5′ x 10′	„	450	575	6	horse	...	...	...	natural	26/8/80
25	Eureka „ ...	Jackson, T. ...	1	„	1	...	„	S.E. 1 in 6	„	2	...	drive	324	324x	1	hand	...	..	...	„	26/8/80
26	Fern Dale „ ...	Hamilton, J ...	½	...	...	...	...	...	...	...	...	...	none	...	4 u. 4 o.	...	...	...	...	...	...
27	Canterbury, Sheffield ..	Austin, J ...	18	brown	2	2′	all	S.E. 1 in 3	longwall	1	3′ x 4′ x	drive	784	16,764	3	hand	...	...	...	...	27/8/80
28	Homebush, Glentunnel ...	General Manager, McIlraith, J., Mining Manager, Brown, T.	8	„	2	3′ and 7′	„	E. 10° S. 1 in 3	bord and pillar	2	3′ 6″ x 3′ x 60′ 3′ 6″ x 3′ x 20′	„	7,873	19,972	18 u. 2 o.	horse	...	...	...	„	13/8/80
29	Hart's, Malvern ...	Saunders, J ...	...	altered brown	3	18,″ 12,″ and 8″	„	E. 22°	longwall	...	...	„	none	8,000	2	windlass (2)	4″	9″	14″	bellows	...
30	Wallsend „	...	4	„	3	3′ 6″	„	E. 10° S. 1 in 3	...	2	...	shaft	„	3,478	none	engine	12″	5″	91′	...	...
31	Brockley „	Storey, C. ...	1½	altered brown	1	3′ 6″	„	vertical strike N.E and S.W.	narrow	...	..	drive	50	50x	3	hand	..	...	...	...	25/1/80
32	Mount Somers, Mount Somers	Milne, James ...	16	brown	1	25′	20′	...	openwork	...	...	..	236	3,236	1	...	...	...	...	...	27/12/79
	TIMARU DISTRICT.																				
33	Albury, Albury ..	...	1	„	..	5′	..	...	drive	...	...	...	40	40x	2	...	...	...	...	...	...
34	Kakahu, Geraldine ..	Meredith, G., owner	½	„	1	8′	..	...	...	2	7′ x 4′ x 45′ 9′ x 5′ x 32′	shaft	8	20	6	hand	...	...	...	...	...
	OTAGO DISTRICT.																				
35	Wharekuri, Wharekuri ...	Cairns, W B., ...	14	„	1	25′	14′	S. 60° W. very high	narrow work	1	..	drive	270	5,270	1	„	...	...	...	natural	27/9/80
36	Kurow, Kurow ...	Scott, D. ...	1	„	1	..	...	very high	„	...	..	„	50	50x	1	„	..	...	...	none	27/9/80
37	Prince Alfred No. 1, Oamaru...	Henderson, A. ...	...	„	2	9′	all	E. 10° S. 1 in 5	bord and pillar	..	...	„	1,089	2,049x	3	„	...	...	...	natural	29/9/80
38	Prince Alfred No. 2, „ ...	Willetts, J. ...	4	„	2	9′	„	„	„	1	4′ x 4′ x	„	2,030	8,955	5 u. 2 o.	„	...	...	...	„	29/9/80

RETURN No. 1—*continued.*

STATISTICS OF WORKINGS IN COAL MINES—*continued.*

Number.	Name of Mine and Locality.	Name of Manager.	Number of Years Working.	Quantity of Coal.	Number of Seams Worked.	Thickness of Seam.	Thickness Worked.	Dip of Seam.	System of Underground Working.	Number of Shafts.	Dimensions Shafts.	Output Delivered by	Output for 1880.	Approximate Total Output to 31st December, 1880.	Number of Men ordinarily Employed.	Power used for Drawing Minerals.	Stroke of Pumps.	Size of Barrel.	Height of Column.	Ventilating Power.	Date of Inspector's last Visit.
						Feet.	Feet.														
39	St. Andrew's, Oamaru ..	Willetts, J ...	2	brown	1	6½	all	E. 13°	bord and pillar	1	4′ diameter x 26′	drive	350	4,569	2	hand	...	..	...	natural	29/9/80
40	Ngapara, Ngapara ...	Nimmo, James ...	2	„	1	25	7 to 8	N. °5	„	2	4′ 6″ x 2′ 8″ x 36′	„	954	1,958	3	horse	...	..	...	„	28/9/80
41	Shag Point, Shag Point ...	Williams, W. H....	18	pitch	1	12	all	E., varies	„	1	...	engine-plane	36,066	86,504	150 u. 24 o.	engine	...	...	..	natural, and spontaneous underground fire	13/10/80
42	Elliott's „ ...	...	...	..	..	...	...	...	...	...	...	...	none	...	...	..	...	...	...	...	3/2/80
43	Hill's Creek, Hill's Creek ...	Davis, Henry ...	16	lignite	1	30	10	S. 30°	openwork	...	...	...	60	60x	1	...	..	...	...	...	...
44	Idaburn, Rough Ridge ...	Grant, W A. ...	10	„	1	23	all	N 10°	„	...	...	...	706	5,188	2	...	2″	6″	...	...	...
45	Last Chance, Hyde	McAuley, H. ..	1	brown	1	13 x	...	N.E., 1 in 75	narrow-work	1	4′ x 2′ x 23′	drive	50	50x	2	hand	6″	2″	25′	natural	11/11/80
46	Dunsmuir's, Hill's Creek ...	Dunsmuir, A. ...	14	lignite	2	12 and 18	12	N.E., 1 in 3	openwork	..	..	„	130	270	1	...	..	...	...	...	...
47	Kyeburn, Upper Kyeburn ...	McCready, D. ...	7	brown	3	25	12	W 60°	narrow-work	1	20′ x 4′ x 2′ 6″	„	630	8,173	4	horse	...	..	...	natural	13/11/80
48	Perseverance, „	Stuart, John ...	2	lignite	3	6 to 16	12	„	„	1	3′ 6″ x 2′ x 50″	„	250	460	2	hand	..	...	...	„	12/11/80
49	Crossan's, Naseby	Crossan, H. ...	...	„	1	9	7	level	openwork	...	...	...	120	1,000	1	...	...	...	...	...	...
50	Cambrian's, St. Bathan's ...	Jones, J R. ..	...	„	1	25	25	W 10°	„	...	...		975	975x	2	hand	..	..	..	...	...
51	Mount Ida, Upper Kyeburn ...	Veale, S. ...	1	„	3	9	all	S.W 67°	narrow-work		...	drive	none	none	2	„		...	...	natural	...
52	Swineburn, Kyeburn ...	McAra, C. ..	1½	„	...	..	...	...	...	...	...	„	74	118	2	„	...	..	...	...	...
53	Coal Creek, Waihemo ...	Binnie, R. ..	...	brown	..	...		...	...	...	...	„	20	20x	2	„		..	...		12/11/80
54	Alexandra, Manuherikia ...	Thomson, William ...	...	„	1	14 to 15	6 to 7	S., 75° W. slight	bord and pillar	2	5′ x 2′ 6″ x 50′	shaft	645	5,445	1 u. 1 o.	horse	..	...	...	natural	24/2/80
55	Manuherikia, „ ...	Jackson, T. ...	2	„	1	12	6	N W., slight	„	1	5′6″x2′9″x60′ x x 45′	„	500	1,020	1 u. 1 o.	„	..	...	...	windsail	25/2/80
56	Cromwell, Cromwell ...	McNulty, E. ..	1	„	1	3′ 6″ to 6′	all	W 15°	„	1	...	drive	300	600	1	hand	...	...	...	natural	22/2/80
57	Bannockburn, „	Smith, James ...	...	„	1	12	6	W 70° W.	„	1	...	„	1,040	2,040	2	„	...	...	...	„	20/2/80
58	Kawarau, „	Pryde, John ...	3	„	1	5′ 6″	5	E. 60°	„	..	...	„	600	1,400	2	„	...	...	...	„	21/2/80
59	Clyde, Clyde	Collins, T. M. ...	9	„	1	20	10	S.E. 5°	„	...	...	shaft	1,200	2,020	2	„	..	...	..	...	24/2/80
60	Clyde, „	Holt, James ...	...	„	..	...	...	..	...	2	...	„	none	15,500	2	water	...	...	...	...	23/2/80
61	Gibbstown, Gibbstown ...	Dooley, E. A. ...	...	„	...	...	..	...	openwork	...	...	...	750	1,750	4	...	..	...	...	...	...
62	McPherson's, Roxburgh ...	McPherson, A. ...	...	lignite	1	25	20	N W 16°	„	...	..	...	500	560	2	...	...	...	...	..	26/2/80
63	Crossan's, „ ..	Crossan, R. ..	11	„	1	28	20	varies	„	...	...	...	40	540	1	...	...	...	...	...	27/2/80
64	Low and Robertson's, Roxburgh	Low, John ...	17	„	1	28	20	„	„	...	...	...	800	5,800	4	...	...	...	...	..	26/2/80
65	Earnsclough, Clyde ...	Holden, Charles ...	4	brown	1	16	12	„	bord and pillar	1	...	drive	300	600	2 u. 1 o.	horse	...	...	...	natural	24/2/80

66	Fernhill, Green Island... ...	Shaw, J E. ...	3	brown	1	19½	7	N 10° E. 1 in 10	room and rance	1	4 9″ x 3′ 6″ x	drive	3,975	6,268	13 u. 6 o.	hand	...	...	...	natural	11/10/80
67	Allandale, „	Wright, John ..	¼	„	1	13	6	...	bord and pillar	1	2′ 6″ x 3′ 6″ x 36′	„	69	69	2	„	...	...	...	„	8/11/80
68	Green Island, „	Above, Semple J., Below Richardson, D.	8	„	1	14	7	E. 10° N 1 in 10	room and rance	2	4′ x 2′ x 91′ 12 x 4′ 6″x 130′	shaft	5,044	53,421	10 u. 3 o.	engine 15 h.p.	3″	7½″	130′	„	8/11/80
69	Saddle Hill, „	Campbell, J ..	6	„	1	19½	11	E. 1 in 10	„	1	..	„	4,419	26,822	8 u. 2 o.	horse	...	..	..	furnace	8/11/80
70	Walton Park, „	London, James ...	10	„	1	18	7	E. 1 in 9	„	2	12′ x 4′ 6″ x	shaft and drive	19,370	178,025	38 u. 9 o.	engine	4½″	11″	175′	natural	4/11/80
71	Abbotsroyd, „	Freeman, James ...	5	„	1	16	7	E. 10° N 1 in 10	„	1	2′ 6″ x 5′ x	drive	8,216	27,677	14 u. 6 o.	horses	...	...	...	„	6/11/80
72	Hurdstone, Milton	...	1	liguite	1	9	all	level	„	..		„	167	167x	1	horse	...	...	...	„	20/1/80
73	Bruce, „	Hardwick, N ..	6½	pitch	1	12′ 6″	6	varies	„	...	..	„	622	5,705	3	hand	...	...	..	„	18/10/80
74	Real Mackay, „	Reid, John ...	12½	„	1	25	8	N.E. to E. 1 in 8	„	...	..	„	850	9,373	2	„	...	..	...	„	22/10/80
75	Elliott Vale, „	Young, A. ..	...	„	1	20	8	S. 22° W 1 in 5	„		...	„	560	4,000	1	„		...	...	„	3/11/80
76	Marshall's, „	Foster, James ...	½	brown	1	7	5	varies	„	...		„	50	50	2	horse	..	...	...	„	17/11/80
77	Dunn's, „	...		altered brown	1	4	..	E.	...	...	...	...	none	..	2	...	...	...	...	...	17/11/80
78	Cannon's, „	Cannon, T. ...	10	lignite	1	20	all	varies	openwork	..	...	...	300	300	2	..	...	...	...	...	30/1/80
79	Bryce's, „	Bryce, James ..	2	„	1	12	8	„	„	..	..		200	500	2	...	..	...	...	...	31/1/80
80	Benhar, Stirling	Nelson, J ...	16	brown	1	40	8	S. 17°	bord and pillar	...	..	engine plane	4,500	16,590	7 u. 2 o.	engine 8 h.p.	3″	6″	40′	natural	6/8/80
81	Kaitangata, Kaitangata ..	Samson, W ...	5	pitch	1	27	24	W.N W 1 in 7	„	3	6 x 4 x 90 x 25 4 x 2·6 x 64 x 5 3·8 x 5 x 60 x 20	drive	15,830	59,997	25 u. 6 o.	horses	..	...	...	furnace	18/11/80
82	Kaitangata, No. 1, Kaitangata...	„ ...	3	„	1	27	12	W.N W varies, very steep	„	1	11′ 9″ x 4′ 6″ x 392′	shaft	10,799	23,611	21 u. 3 o.	engine	bucket	...	...	„	18/11/80
83	Wangaloa, „ ...	Sewell, R. M. ...	1/10	„	1	10′ 6″	6	E. 1 in 6	„	...	...	drive	26	26	1	hand		..	...	natural	...
84	Lawrence, Lawrence	...	...	lignite	1	3′ 6″	all	...	„	...	..	..	none	2,056	none	windlass	...	...	...	„	29/1/80
85	Frying Pan, Havelock	Henry, S. ...	1	„	1	6′ 6″	...	S.W 1 in 8	...	1	3′ x 3′ 6″ x 32	shaft	15	15	2	„	...	...	...	„	2/2/80
86	Johnston, Johnston	...	6	„	1	6	6	S. 60° W 5°	bord and pillar	..	...	drive	none	..	none	...	..	...	...	„	13/1/80
87	Chittock's, Gore ...	Chittock, F ...	4	„	1	9	all	N	openwork	...	...	...	208	728	1	...	..	..	...	...	4/3/80
88	White's „	White, W W ..	4	„	1	9	„	S.E.	„	...	...	...	60	200	1	...	...	...	...	...	4/3/80
89	Sarginson and Telfer's, Gore ...	Sarginson, J H. ...	2½	„	1	8	„	„	„	..	...	...	35	54	1	..	...	...	..		4/3/80
90	Dawson's, „ ...	Dawson, F. A. ...	3	„	1	6	„	„	„	...	...	..	68	138	1	...	...	...	...	...	4/3/80
91	McKinnon's, „ ...	McKinnon, A. ...	5	„	1	6	„	N	„	...	...	..	73	183	1	..	...	...	...	...	4/3/80
92	Gore, „ ...	Scott, J N ...	2½	„	2	2′ 10″ 3′ 4″	„	S.W 5°	„	...	...	...	272	800	1	...	...	...	...	...	17/2/80
93	Harker's, „ ...	Harker, S. ...	3	„	..	...	...	„	„	...	...	...	200	700	1	...	..	...	...	...	...
94	Chatton, Chatton	Pacey, W R. ...	4	„	...	..	...	„	„	...	...	...	280	713	1	...	...	...	...	...	...
95	Pukerau, Pukerau ...	McKenzie... ..	1¼	„	1	12x	12	„	„	...	...	...	275	275x	2	...	...	...	...	...	...
96	Pukerau, Pukerau	Gordon	2	„	...	..	..	„	„	...		..	534	800	1	..	..	...	...	...	...
	SOUTHLAND DISTRICT.																				
97	Angus's, Mataura	Stewart, Charles ..	5	„	1	12½	8	...	„	...	...	...	723	3,534	2	...	...	...	...	...	18/2/80
98	Mataura, „	McNairn and Stark	5	„	1	12½	all	W 1 in 20	„	...	...	...	990	1,790x	2	...	...	..	...	...	18/2/80
99	Wyndham, Wyndham... ...	Genge, G. ...	3	„	1	6′x	6	..	„		...	...	300	600	1	...	...	...	...	...	18/2/80
100	Nightcaps, Otautau	Twining, C. E. ...	..	...	...	..	...	...	...	...	...	...	150	296	2	...	...	...	...	...	2/3/80
10	Preservation Inlet, Pres. Inlet...		...		..	..	...	...	..	...	...	...	300	300x	none	...	...	...	...	...	...
													299,923	1,416,401							

NOTE.—For later inspections of the principal mines since the end of 1880, see the latest reports in the Appendix.

RETURN No. 2.

RETURN of the QUANTITY of COAL IMPORTED into and EXPORTED from NEW ZEALAND for the Year ended 31st December, 1880.

Countries whence Imported.	Coal Imported.		Countries to which Exported.	Coal Exported.	
	Quantity.	Value.		Quantity.	Value.
	Tons.	£		Tons.	£
United Kingdom	3,934	3,549	New South Wales	4,000	4,000
New South Wales	118,928	165,594	Victoria	3,015	1,972
Victoria	11	21	Norfolk Island	1	2
Tasmania	5	6	South Sea Islands	5	5
Queensland	400	350			
New Caledonia	20	30			
Totals	123,298	169,550	Totals	7,021	5,979

REMARKS.—4,000 tons, value £4,000, exported from Russell; and 2,715 tons, value £1773, exported from Greymouth.

WILLIAM SEED,
Secretary of Customs.

RETURN No. 3.

TABLE of ACCIDENTS in COAL MINES during the Year ending 31st December, 1880.

No.	Date.	Name of Mine.	District.	Cause of Accident.	Fatal.	Non-Fatal.	Name of Sufferer.	Remarks.
1	22 Jan.	Homebush ...	Malvern ...	Run over by set ..	1	...	Borton, Stephen	
2	14 Feb.	Shag Point ...	Otago ...	Fall of stone ...	...	1	M'Caffery, P ...	Very serious
3	3 Mar.	Brunner ...	Westport ...	Explosion of gas ..	1	...	Broadfoot, J	
					..	1	Elliott, R.	
4	2 July	Kaitangata No. 1	Otago ..	Fall of coal ...	..	1	Ross, R.	
5	28 July	Brunner ...	Westport ...	Fall of coal ...	..	1	Masters, R.	
6	31 July	Benhar ...	Otago ...	Fall of coal ...	...	1	Tweedie, J	
7	13 Aug.	Shag Point ...	Otago ...	Fall of timber ...	..	1	Smith, R. ...	Slight
8	21 Aug.	Wellington Company's Waimangaroa	Westport	Explosion of gas ..		1	Young, R.	This accident resulted in a prosecution.
						1	Young, D.	
						1	Colligan, J	
9	24 Aug.	Shag Point ..	Otago ...	Fall of coal ...	...	1	Walker, William	
10	27 Aug.	Brunner ...	Westport ...	Fall of coal ...	...	1	Moore, P	
11	27 Aug.	Brunner ...	Westport ..	Fall of coal ...	...	1	Sands, H.	
12	8 Sept.	Shag Point ...	Otago ...	Fall of stone ...	...	1	Glen, Thomas	
13	16 Sept.	Shag Point ...	Otago ...	Set in engine-plane	...	1	Shanley, J W	Practice stopped.
14	29 Sept.	Brunner ...	Westport ...	Fall of coal ...	...	1	Morris, John	
15	15 Nov.	Shag Point ...	Otago ...	Fall of stone ...	...	1	Wilcox, T.	
16	20 Nov.	Shag Point ...	Otago ...	Jammed by tub ...	...	1	Garven, W	
17	26 Nov.	Springfield ..	Malvern ...	Fall of roof ...	...	1	Giles, John	
18	20 Dec.	Shag Point ...	Otago ...	Fall of roof ...	...	1	Baker, James	
19	21 Dec.	Banbury ...	Westport ...	Fall of coal ...	...	1	Thomson, H.	

By Authority: GEORGE DIDSBURY, Government Printer, Wellington.—1881.