SESSION I.
1912
NEW ZEALAND.

ROYAL COMMISSION ON MINES

(REPORT ON THE).

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

COMMISSION.

ISLINGTON, Governor.

To all to whom these presents shall come, and to Neil Dundonald Cochrane, Esq., of Dunedin, Mining Engineer; John Dowgray, Esq., of Granity, Miner; James Sim Evans, Esq., of Nelson, Warden and Stipendiary Magistrate; George Fletcher, Esq., of Granity, Mine-manager; Herbert Scott Molineaux, Esq., of Barewood, Mine-manager; William Edward Parry, Esq., of Waihi, Miner; and Frank Reed, Esq., of Wellington, Inspecting Engineer of Mines.

WHEREAS it is deemed expedient to appoint a Commission to inquire into and report on the conditions relating to the health and safety of the miners of New Zealand and the administration of the laws relating to mining and coal-mines, and to make recommendations for any amendment of these laws which may be considered necessary for the better protection of the health and safety of persons working in mines:

Now, therefore, I, John Poynder Dickson-Poynder, Baron Islington, the Governor of the Dominion of New Zealand, in exercise of the powers conferred by the Commissions of Inquiry Act, 1908, and of all other powers and authorities enabling me in that behalf, and acting by and with the advice and consent of the Executive Council of the said Dominion, do hereby constitute and appoint you the said

NEIL DUNDONALD COCHRANE,
JOHN DOWGRAY,
JAMES SIM EVANS,
GEORGE FLETCHER,
HERBERT SCOTT MOLINEAUX,
WILLIAM EDWARD PARRY, and
FRANK REED

to be a Commission to make inquiry into the matters hereinbefore referred to, and for that purpose to inquire and report generally as to—

(1.) The prevention of accidents in mines;
(2.) The ventilation of mines;
(3.) The underground sanitation of mines;
(4.) Change and bath houses for miners;

and more particularly as to

(*a.*) What steps could be taken for the better prevention of accidents, particularly those from the use and firing of explosives, falls from roof and side, also accidents in shafts and from machinery; and whether any improvement can be made in the present system of investigation and inquiry into accidents:

(*b.*) Whether any, and if so what, steps should be taken to lay down an improved standard of ventilation in mines:

(*c.*) What steps should be taken to guard against the disease known as miners' phthisis:

(*d.*) Whether any, and if so what, fresh legislation is necessary to give effect to your recommendations.

And, with the like advice and consent, I do further appoint you the said

JAMES SIM EVANS

to be Chairman of the said Commission.

And, for the better enabling you to carry these presents into effect, you are hereby authorized and empowered to make and conduct any inquiry under these presents at such place or places in the said Dominion as you may deem expedient, with power to adjourn from time to time and from place to place as you think fit, and to call before you and examine on oath or otherwise as may be allowed by law any person or persons that you may think capable of affording you any information in the premises; and you are also hereby empowered to call for and examine all such books, documents, papers, maps, plans, or records as you judge likely to afford you the fullest information on the subject of this Commission, and to inquire of and concerning the premises by all other lawful ways and means whatsoever; and also to use the evidence taken in the course of any previous inquiry touching the premises.

And, using all diligence, you are required to report to me under your hands and seals your opinion resulting from the said inquiry in respect of the several matters and things inquired into by you under or by virtue of these presents within three months from the date hereof, stating in such report what steps (if any) it would, in your opinion, be expedient to adopt under the circumstances which you find to exist, and in what manner effect should be given to such recommendations.

And it is hereby declared that this Commission shall continue in full force and virtue although the inquiry be not regularly continued from time to time by adjournment, and that you, or any four of you, shall and may from time to time proceed in execution hereof, and of every power, matter, and thing herein contained.

And, lastly, it is hereby further declared that these presents are issued under and subject to the provisions of the Commissions of Inquiry Act, 1908.

Given under the hand of His Excellency the Right Honourable John Poynder Dickson-Poynder, Baron Islington, Governor and Commander-in-Chief in and over His Majesty's Dominion of New Zealand and its Dependencies; and issued under the Seal of the said Dominion, at the Government House, at Wellington, this twenty-eighth day of July, in the year of our Lord one thousand nine hundred and eleven.

R. MCKENZIE,
Minister of Mines.

Issued in Executive Council.
J. F. ANDREWS,
Clerk of the Executive Council.

EXTENDING TIME OF COMMISSION.

ISLINGTON, Governor.

To all to whom these presents shall come, and to Neil Dundonald Cochrane, Esq., of Dunedin, Mining Engineer; John Dowgray, Esq., of Granity, Miner; James Sim Evans, Esq., of Nelson, Warden and Stipendiary Magistrate; George Fletcher, Esq., of Granity, Mine-manager; Herbert Scott Molineaux, Esq., of Barewood, Mine-manager; William Edward Parry, Esq., of Waihi, Miner; and Frank Reed, Esq., of Wellington, Inspecting Engineer of Mines.

WHEREAS by a Warrant dated the twenty-eighth day of July, one thousand nine hundred and eleven, and issued under my hand and the public seal of the Dominion, you were appointed a Commission to inquire into and report on the conditions relating to the health and safety of the miners of New Zealand and the administration of the laws relating to mining and coal-mines, and you were directed and required to report to me on or before the twenty-eighth day of October then next ensuing your proceedings and your opinion touching the matters mentioned therein:

And whereas it is expedient that the said period should be extended as hereinafter provided:

Now, therefore, I, John Poynder Dickson-Poynder, Baron Islington, the Governor of the Dominion of New Zealand, in exercise of the powers conferred by the Commissions of Inquiry Act, 1908, and of all other powers and authorities enabling me in that behalf, and acting by and with the advice and consent of the Executive Council of the said Dominion, do hereby declare and appoint that the time at or before which you shall present to me your report aforesaid is hereby extended to the first day of December, one thousand nine hundred and eleven:

And with the like advice and consent, and in further pursuance of the said power and authority, I do hereby confirm the said Commission.

Given under the hand of His Excellency the Right Honourable John Poynder Dickson-Poynder, Baron Islington, Governor and Commander-in-Chief in and over His Majesty's Dominion of New Zealand and its Dependencies; and issued under the Seal of the said Dominion, at the Government House, at Wellington, this first day of November, in the year of our Lord one thousand nine hundred and eleven.

R. MCKENZIE,
Minister of Mines.

Issued in Executive Council,
J. F. ANDREWS,
Clerk of the Executive Council.

EXTENDING TIME OF COMMISSION.

ISLINGTON, Governor.

To all to whom these presents shall come, and to Neil Dundonald Cochrane, Esq., of Dunedin, Mining Engineer; John Dowgray, Esq., of Granity, Miner; James Sim Evans, Esq., of Nelson, Warden and Stipendiary Magistrate; George Fletcher, Esq., of Granity, Mine-manager; Herbert Scott Molineaux, Esq., of Barewood, Mine-manager; William Edward Parry, Esq., of Waihi, Miner; and Frank Reed, Esq., of Wellington, Inspecting Engineer of Mines.

WHEREAS by a Warrant dated the twenty-eighth day of July, one thousand nine hundred and eleven, and issued under my hand and the public seal of the Dominion, you were appointed a Commission to inquire into and report on the

conditions relating to the health and safety of the miners of New Zealand and the administration of the laws relating to mining and coal-mines, and you were directed and required to report to me on or before the twenty-eighth day of October then next ensuing your proceedings and your opinion touching the matters mentioned therein:

And whereas by a Warrant dated the first day of November, one thousand nine hundred and eleven, the said period was extended and you were required to report to me not later than the first day of December, one thousand nine hundred and eleven:

And whereas it is expedient that the said period should be extended as hereinafter provided:

Now, therefore, I, John Poynder Dickson-Poynder, Baron Islington, the Governor of the Dominion of New Zealand, in exercise of the powers conferred by the Commissions of Inquiry Act, 1908, and of all other powers and authorities enabling me in that behalf, and acting by and with the advice and consent of the Executive Council of the said Dominion, do hereby declare and appoint that the time at or before which you shall present to me your report aforesaid is hereby extended to the sixteenth day of December, one thousand nine hundred and eleven:

And with the like advice and consent, and in further pursuance of the said power and authority, I do hereby confirm the said Commission.

Given under the hand of His Excellency the Right Honourable John Poynder Dickson-Poynder, Baron Islington, Governor and Commander-in-Chief in and over His Majesty's Dominion of New Zealand and its Dependencies; and issued under the Seal of the said Dominion, at the Government House, at Wellington, this eleventh day of December, one thousand nine hundred and eleven.

R. McKENZIE,
Minister of Mines.

Issued in Executive Council,
J. F. ANDREWS,
Clerk of the Executive Council.

EXTENSION OF SCOPE OF COMMISSION.

ISLINGTON, Governor.

To all to whom these presents shall come, and to Neil Dundonald Cochrane, Esq., of Dunedin, Mining Engineer; John Dowgray, Esq., of Granity, Miner; James Sim Evans, Esq., of Nelson, Warden and Stipendiary Magistrate; George Fletcher, Esq., of Granity, Mine-manager; Herbert Scott Molineaux, Esq., of Barewood, Mine-manager; William Edward Parry, Esq., of Waihi, Miner; and Frank Reed, Esq., of Wellington, Inspecting Engineer of Mines.

WHEREAS by a Warrant dated the twenty-eighth day of July, one thousand nine hundred and eleven, and issued under my hand and the Public Seal of the Dominion, you were appointed a Commission to inquire into and report on the conditions relating to the health and safety of the miners of New Zealand and the administration of the laws relating to mining and coal-mines, and to make recommendations as to any amendment of these laws which may be considered necessary for the better protection of the health and safety of persons working in mines:

And whereas it is expedient to extend the scope of the said inquiry in the manner hereinafter appearing:

Now, therefore, I, John Poynder Dickson-Poynder, Baron Islington, the Governor of the Dominion of New Zealand, in exercise of the powers conferred by the Commissions of Inquiry Act, 1908, and of all other powers and authorities enabling me in that behalf, and acting by and with the advice and consent of the

Executive Council of the said Dominion, do hereby direct that your powers and functions under the said Warrant are hereby extended to and shall be deemed to include the power to inquire and report generally as to—

The profitable utilization of the soft bituminous and lignite coals of the Westport District of New Zealand.

And with the like advice and consent, and in further pursuance of the said power and authority, I do hereby confirm the said Commission.

Given under the hand of His Excellency the Right Honourable John Poynder Dickson-Poynder, Baron Islington, Governor and Commander-in-Chief in and over His Majesty's Dominion of New Zealand and its Dependencies; and issued under the Seal of the said Dominion, at the Government House, at Wellington, this thirtieth day of September, in the year of our Lord one thousand nine hundred and eleven.

R. McKENZIE,
Minister of Mines.

Approved in Council.
J. F. ANDREWS,
Clerk of the Executive Council.

REPORT.

To His Excellency the Right Honourable John Poynder Dickson-Poynder, Baron Islington, Governor and Commander-in-Chief in and over His Majesty's Dominion of New Zealand and its Dependencies.

MAY IT PLEASE YOUR EXCELLENCY,—

The Commission, and the enlargement thereof, intrusted to us by Your Excellency directed us to inquire into and report on the following matters:—

(1.) The prevention of accidents in mines;
(2.) The ventilation of mines;
(3.) The underground sanitation of mines;
(4.) Change and bath houses for miners;

and more particularly as to

(*a.*) What steps could be taken for the better prevention of accidents, particularly those from the use and firing of explosives, falls from roof and side, also accidents in shafts and from machinery; and whether any improvement can be made in the present system of investigation and inquiry into accidents:
(*b.*) Whether any, and if so what, steps should be taken to lay down an improved standard of ventilation in mines:
(*c.*) What steps should be taken to guard against the disease known as miners' phthisis:
(*d.*) Whether any, and if so what, fresh legislation is necessary to give effect to your recommendations.

We entered upon our duties at Wellington on the 3rd August, 1911, and laid down our plan of operations, which was as follows: That we should visit all the important mining centres, both coal and gold, and make a personal inspection of the principal mines in order to ascertain the actual working-conditions prevailing in each; that we should hear evidence on oath touching all the matters within the scope of the Commission, the witnesses to be examined by the Commissioners, with provision for any person interested submitting any question through the Chairman or other member of the Commission; all sittings of the Commission where evidence was being taken to be open to the public and the Press, but committee meetings to be held in private.

On the 4th August we proceeded to Whangarei. On the 8th August we commenced our investigations by visiting the Hikurangi and Northern Coal-mines, and on the following day the Commission sat at Whangarei, where evidence was tendered on behalf of the miners, the management, and by the Government Inspector of Mines for the district. This course was followed throughout our itinerary. During our investigations we visited the following places, making inspections and hearing evidence: Whangarei, Thames, Waihi, Karangahake, Auckland, Huntly, Nightcaps, Invercargill, Queenstown, Cromwell, Alexandra, Kaitangata, Dunedin (including Green Island), Westport, Granity, Seddonville, Denniston, Reefton, Big River, Brunnerton, Greymouth, Kumara, Hokitika, Blackball, and Nelson (for Puponga evidence). These places, in the opinion of the Commission, covered the whole of the main centres for coal, quartz-mining, and dredging. A sitting of the Commission was also held in Wellington to consider various matters, chiefly the question of the manufacture of briquettes. During the whole course of our inspections we visited and examined sixteen gold-mines, employing 3,316 men out of a total of 4,124 quartz-miners, and seventeen coal-mines, employing 3,474 men out of a total of 4,599 coal-miners. We heard the evidence of ninety-four witnesses on the subject-matters of the Commission so far as they relate to gold-mining, and seventy-nine witnesses in respect of coal-mining. In the course of our inspec-

tions of the mines we took samples of mine-air, temperatures with the hygrometer, and air-measurements with the anemometer in such places as we deemed it advisable, in addition to which we obtained from the Inspectors of Mines of the different districts similar data regarding samples and tests taken and made by them over an extended period, copies of which are appended (Appendix, Nos. 2, 3, 4). This data gives approximately the general conditions prevailing in the various mines to which it relates.

In regard to the condition in which we found mines generally, and the way in which the Acts have been administered, we have to say that full advantage has not always been taken of the safety precautions already existing. We would urge upon Inspectors of Mines, management, and men alike the necessity for using extreme caution. We believe that if our recommendations are incorporated in the statutes and strictly enforced the mining conditions will be greatly improved and accidents minimized.

We do not propose to discuss the conditions of individual mines, but to report to Your Excellency on the deductions we have made and the conclusions arrived at regarding the various matters within the scope of the Commission, and to make such recommendations as will be for the well-being of the men employed in the different industries and branches thereof. With this object in view we propose to report to your Excellency under the various heads as set out in the Commission, viz. :—

I. The prevention of accidents in mines.
II. The ventilation of mines.
III. The underground sanitation of mines.
IV. Change and bath houses for miners.
V. What steps should be taken to guard against miners' phthisis.
VI. The profitable utilization of the soft bituminous and lignite coals of the Westport District of New Zealand.

I. THE PREVENTION OF ACCIDENTS IN MINES.

This subject has been considered in three sections, as follows :—

1. Inspectors of Mines, deputies, miners, workmen's inspectors, and the management of small mines by permit-holders.
2. Mining—
   - (i.) Coal-mining.
   - (ii.) Haulage.
   - (iii.) Explosions of gas and dust, with its cognate but not always allied subject, shot-firing.
   - (iv.) Metalliferous mining.
   - (v.) Machinery.
3. Miscellaneous.

To these questions your Commissioners have devoted much time and thought. Numerous precautionary measures have been asked for and carefully considered. In many instances we have approved of the suggestions made. In some, however, a majority are not prepared to make any recommendation, for the reason, amongst others, that they are more of the nature of economical questions than directly contributory to accidents.

We are of opinion that where definite provisions which are generally applicable can be made, they should be matter for embodiment in the statutes or regulations. In some cases, however, such provisions might be oppressive or prohibitive under varying circumstances. Such an adaptation of the law according to what may be attainable, and not a general provision which might be contrary to good mining practice in certain cases, is particularly applicable to our recommendations under "Mining," more especially as to coal-seams, which in this Dominion vary greatly in hardness, strength, thickness, and safety of roofs even in the same district. To meet the requirements of local conditions we recommend that a committee should be set up at each mine, with power to make, alter, and from time to time to amend additional special rules for coal-

mines and additional regulations for metal-mines suitable for each particular mine. Accordingly we recommend that section 42 of the Coal-mines Act, 1908, be amended so as to provide—

(1.) For the appointment of a committee at the different mines, consisting of the mine-manager, the Inspector of Mines, and a representative appointed in a similar manner to the workmen's inspector by a majority of the workers in the mine, to frame additional special rules. In like manner we recommend that provision be made under the Mining Act, 1908, for the appointment of similar committees to frame additional regulations, and that the workmen's representatives on these committees be appointed in the same manner as the workmen's inspector under that Act.

(2.) The matters which should fall within the scope of these rules and regulations should be such only as affect the working of the particular mine, not inconsistent with the rules and regulations under the respective Acts. These rules or regulations, when drawn up, should be open for inspection for, say, fourteen days after the making thereof. Any person subject thereto (including any member of the committee) should have the right of appeal against all or any of the rules, either to the Minister of Mines or to an Appellate Board consisting of the Minister of Mines, the Inspecting Engineer, and the Warden (or, if no Warden, the Magistrate for the district in which the mine is situate). If no such appeal is made within fourteen days, then the rules or regulations should become the working rules or regulations of the mine, and have the force and effect of law to the same extent as if they formed part of the general rules or regulations applicable to the mine. In case of appeal the Minister or the Board, as the case may be, should have power to cancel, vary, or amend the rules appealed against, and their decision should be final. A breach of these rules, or such of them as may be specified, should be deemed an offence under the Act.

We believe that such committees should be able to frame effective and satisfactory rules from their knowledge of the local requirements. A somewhat similar though not so extensive a power is provided by section 87 of the British Coal-mines Act.

1. Inspectors of Mines, Deputies, Etc.

We recommend as follows:—

(1.) That Government Inspectors of Mines be required to pass a special examination, higher than that of a mine-manager, before appointment.

(2.) That, in order to enable Inspectors of Mines more effectually to carry out their duties and to enforce their orders, they have summary power of prosecuting in all cases affecting the safety of workers in mines; but that in cases of death, or serious bodily injury, or dangerous practices, the Inspector should consult the Inspecting Engineer of Mines before taking proceedings.

We believe that if they had such powers it would have a better effect in compelling both the management and the men to observe the precautions necessary for safety.

(3.) That the Inspector of Mines be given power to withdraw men from dangerous places in mines, and that an Inspector's duties be restricted to inspections of mines and duties appertaining to mines only under both the Coal-mines and Mining Acts respectively.

(4.) That it be made compulsory for all deputies during their rounds to examine the roof and sides, irrespective of the examination by miners and workmen's inspectors.

(5.) That it be made compulsory for the deputy or fireman who examines the mine, before the first shift starts, to remain at a convenient station near the entrance of the mine, in order that each man entering the mine may have an opportunity of obtaining a verbal report as to the condition of his place, and that each man shall obtain such information from the deputy before proceeding to his work.

(6.) (*a.*) That a coal-miner shall have experience in coal-hewing and timbering before he has charge of a place, and that the period of such experience be two years and a half underground, of which six months shall be at the face with an experienced miner. (*b.*) That the minimum age at which a miner shall be put in charge of a place be twenty-one years.

A great deal of evidence has been tendered on the above subject of an experienced miner getting charge of a place where, quite apart from the danger to the whole mine if it be a fiery one, on his knowledge of mining and timbering not only his own life but that of others must largely depend.

(7.) That the workmen's inspectors have authority to inspect the mine once in every fortnight, and, in addition thereto, that they have authority to do so at all reasonable times, on receiving notice from any two miners that the mine, or any part thereof, is by them considered dangerous, the workmen's inspector to notify the mine-manager, in writing, of the proposed inspection; that, if the workmen's inspector is of opinion that any such mine or part thereof is dangerous, he shall forthwith record the same in a book kept at the mine office for the purpose, and he shall request the mine-manager to stop work at the place and withdraw all men therefrom, and discontinue or rectify any dangerous practice. If the manager refuses to withdraw the men, or fails for an unreasonable time to do so, or remedy the defect, if any, the workmen's inspector may apply to the Inspector of Mines to withdraw the men, or to have the dangerous practice discontinued; that if it is proved to the satisfaction of the Court that the place was dangerous at the time of the workmen's inspection, or that a dangerous practice existed, and that the manager failed without reasonable excuse to comply with the request of the workmen's inspector, he shall be deemed guilty of an offence under the Act; that the manager shall forward without delay a copy of such workmen's inspector's report to the Inspector of Mines.

The above provision may meet urgent cases during the absence of the Inspector of Mines from the district.

2. Mining.

(i.) *Coal-mining.*

The question of the height of pillar-workings involves the earning-power of the men and the cost of winning the coal, but the chief consideration is the safety of the men. High pillar-working has been such a fruitful source of accident in many mines owing to the miner being unable to conveniently sound the roof that we recommend—

(1.) That the lifts in pillar-workings be restricted to 10 ft. in height, and the Inspector of Mines to have power to determine the height at which the remaining coal shall be taken out, subject to the right of appeal to the Warden (or the Stipendiary Magistrate in districts where there is no Warden) and the Inspecting Engineer of Mines; if they fail to agree, the matter to be referred to the Minister of Mines, whose decision shall be final.

(2.) Systematic timbering in its modern sense—that distances should be fixed for the regular setting of props, sets, and chocks, and that such distances should not be exceeded—received our due consideration. We are of opinion that provisions similar to those of the British Coal-mines Act, 1911, on "Systematic Support of Roof and Sides," should be incorporated in the Coal-mines Act of this Dominion, viz. :—

50. (1.) Where props, or props and bars, or chocks are used to support the roof at the working-face, the roof under which any work of getting coal or filling tubs is carried on shall be systematically and adequately supported, and the props or chocks shall be set at such regular intervals and in such manner as may be specified in the notice hereinafter mentioned.

(2.) Holing props or sprags shall be set as soon as practicable, and shall be set at such regular intervals and in such manner as may be specified in the notice hereinafter mentioned, and shall not be removed before the roof-supports (if any) have been advanced in the manner specified in the notice.

(3.) In all parts of a roadway in which sets or trains of tubs are coupled or uncoupled the roof and sides shall be systematically and adequately supported, and in such parts and in all other parts of the roadway the roof or sides of which require to be supported, if props or bars are used as supports, such supports shall be set at such regular intervals and in such manner as may be specified in the notice hereinafter mentioned.

(4.) The manager shall by notice specify the manner in which the supports are to be set and advanced, and the maximum intervals to be observed on roadways between the supports and at the face—

(*a.*) Between each row of props :

(*b.*) Between adjacent props in the same row :

(*c.*) Between the front row of props and the face :

(*d.*) Between the holing props or sprags :

(*e.*) Between chocks or each set of cogs :

Provided that the interval between holing props or sprags shall in no case exceed 6 ft.

(5.) If the Inspector of the district considers that the system of supporting the roof and sides adopted in any part of a mine is unsatisfactory, either by reason of the distances fixed or any of them being excessive or otherwise, he may require the manager to fix some less distance or otherwise modify the system, and the manager shall comply with the requisition unless he disputes the reasonableness thereof, in which case the dispute shall be settled in manner provided under the Coal-mines Act for settling disputes.

(6.) Nothing in this section shall prevent a workman from setting supports in his working-face at more frequent intervals than those specified in the notice aforesaid where necessary for safety.

(3.) That the maximum widths of bords and cut-throughs, where the bord and pillar system is followed, should be 12 ft. and 9 ft. respectively for a distance of 2 yards when opening out or breaking away; thereafter that the maximum widths be 18 ft. and 12 ft. respectively.

(4.) That the use of all three-cornered bars or caps in set timbering be prohibited.

(5.) Drawing timber used to support the roof in pillar-working and otherwise is not carried out for commercial reasons only, but is frequently done with the object of letting the roof fall and so relieving the pressure, thus permitting the safer extraction of the immediately adjoining coal. The danger of knocking out a prop by hammer is so obvious that it only requires to be mentioned. After hearing the evidence and observing the methods practised we recommend that no timber be withdrawn except by lever and chain or by blasting.

(ii.) *Haulage.*

In the report of the British Royal Commission on Mines, 1909, underground haulage is referred to as constituting one of the most fruitful sources of loss of life in mines, being only exceeded in this respect by those coming under the head of falls of roof and sides. In Britain 63·5 per cent. of the haulage accidents for the ten years ended 1907 were due to persons being run over or crushed by

tubs. Of four Inspectors of Mines giving evidence before the British Royal Commission all recommended that sufficient clearance should exist between the trucks and the sides. A recommendation as to this appears further on.

The use of chains on jigs, or self-acting inclines, where usually only one loaded tub during its descent by gravity pulls up the empty tub, was frequently unfavourably referred to in the evidence. The haulage chain passes through a staple on a single prop, and runs on a metal plate, causing so much noise when running that it is a source of danger. The extra jar through the roughness of the running was considered not only a source of accident on the incline itself, but to some extent likely to cause accidents through the jig-props springing, and also by increasing the liability to falls of the roof. On the face-jigs—those lowering from the working-face, being the first stage of the self-acting incline—chains, on account of their suitability for lengthening as the face advances, are required. We therefore recommend—

(1.) That the use of chains should be prohibited on all but face-jigs, and that wire ropes be substituted therefor.

(2.) That provision be made for anchor chains to be supplied and their use made compulsory on all face-jigs. This simple method of preventing runaway tubs, where such occurrences are not infrequent, is likely to reduce the percentage of accidents under this head.

(3.) That all haulage inclines, self-acting inclines, and all jigs except face-jigs, be fitted with bells or adequate signalling-appliances.

(4.) That Special Rule 89 under the Coal-mines Act, 1908, be amplified to include the compulsory provision and use of adequate stop-blocks on all working-jigs.

(5.) That a backstay or trailer should be attached to each ascending tub or set of tubs on every inclined haulage road where mechanical haulage other than endless rope or chain is used.

(6.) That in all mines where cages are used by the men travelling in or out of the mine the engine-driver should always be within hearing of the signals when men are underground, and that this should be provided for in both the Coal-mines Act and the Mining Act.

(iii.) *Explosions of Gas and Coaldust, and Shot-firing.*

(1.) In almost all the large coal-mines in this Dominion ventilating fans have been installed, but the further measure of prohibiting the use of furnaces and steam boilers in fiery mines has been considered. Not only has the possibility of firedamp been taken into consideration, but the further contingency of ignition of the coal-seam. We are of opinion that both ventilating and boiler furnaces should be prohibited in fiery mines.

(2.) The question of the position of the ventilating-appliances has been fully discussed under the head of "Ventilation." It is therefore unnecessary to deal with the matter here further than to emphasize the fact that, as a precautionary measure in case of accident, it is essential that they should be outside the mine, with a proviso for auxiliary fans underground where required.

(3.) Coaldust explosions have formed the subject of much inquiry and research by the British Royal Commission on Mines, 1909, and the following extract from their report (pages 85, 86, 97) shows succinctly some of the reasons, in addition to the evidence tendered to us, for the recommendations which follow:—

> For the starting of coaldust explosions two conditions are necessary: (1) A disturbance sufficient to suspend a cloud of fine dust in the air, and (2) the projection of a flame into this cloud of dust. . . . The means for preventing coaldust explosions may be roughly classified into those which prevent the initiation of an explosion and those which prevent its extension.

Again, they say,—

> It is quite clear that the entire removal of coaldust from a mine so as to render it completely immune against an explosion is out of the question.

Further on they say,—

Watering as a means of preventing coaldust explosions has been practised in some mines in this country for a large number of years, and has generally been considered, where practicable, the most effective method of dealing with the danger.

We recommend—

(1.) That the use of water should be compulsory in all ways in a dry and dusty mine where the dust cannot otherwise be conveniently removed, with the proviso for an exemption for return airways.

(2.) That the provisions of section 6 of the British Statutory Rules and Orders of the Explosives in Coal-mines Order of the 17th December, 1906, be incorporated in the New Zealand statute, namely :—

6. In this order the term "permitted explosives" means such explosives as are named and defined in the First Schedule hereto, and the term "permitted igniter fuse" means such igniter fuses as are named and defined in the Second Schedule hereto: Provided that, where the composition, quality, or character of any explosive or any igniter fuse is defined in such schedules, any article alleged to be such explosive or such igniter fuse which differs therefrom in composition, quality, or character, whether by reason of deterioration or otherwise, shall not be deemed to be the explosive or igniter fuse so defined: Provided further that an owner, agent, or manager shall not be responsible for the composition, quality, or character of an explosive or igniter fuse if he shows that he has in good faith obtained a written certificate from the maker of the explosive or igniter fuse that it complies with the terms of the schedule, and that he has taken all reasonable means to prevent deterioration of the explosive or igniter fuse while stored.

(3.) That only "permitted explosives" of the British schedule for the time being be allowed in (i) pillar-workings where safety-lamps are compulsory, and (ii) in coal-mines where firedamp has been found within the preceding three months.

(4.) That such permitted explosives shall only be fired by safety igniters, or, provided that inflammable gas in the air-currents in the place of firing or part of the ventilating district of the mine does not amount to one-half of one per cent., then electric exploders may be used.

(5.) That sections 32, 33, and 34 of the British Coal-mines Act be adopted, *mutatis mutandis*, viz. :—

32. (1.) No lamp or light other than a locked safety-lamp shall be allowed or used—

(*a*.) In any seam where the air-current in the return airway from any ventilating district in the seam is found normally to contain more than one-half per cent. of inflammable gas:

(*b*.) In any seam (except in the main intake airways within two hundred yards from the shaft) in which an explosion of inflammable gas causing any personal injury whatever has occurred within the previous twelve months, unless an exemption be given by the Minister on the ground that on account of the special character of the mine the use of safety-lamps is not required:

(*c*.) In any place in a mine in which there is likely to be any such quantity of inflammable gas as to render the use of naked lights dangerous:

(*d*.) In any working approaching near a place in which there is likely to be an accumulation of inflammable gas:

(*e*.) In any place where the use of safety-lamps is required by the regulations of the mine.

(2.) Where, in pursuance of the Coal-mines Act, or the Special Rules, or the Additional Special Rules, the use of safety-lamps has been introduced in any part of a ventilating district, it shall not be lawful to use naked lights in any other part of the same ventilating district situated between the place where such lamps are used and the return airway, except when the use of safety-lamps in that part of the district was introduced as a temporary precaution, and the conditions are not such as to render necessary the introduction of the use of safety-lamps throughout the district.

(3.) Where, in pursuance of the Coal-mines Act, or the Special Rules, or the Additional Special Rules, the use of safety-lamps has been introduced otherwise than as a temporary precaution against apprehended danger in any part of a mine, no lamp or light other than a safety-lamp shall subsequently

be allowed or used in that part without the sanction of the Inspector of the district, which sanction shall not be withheld unreasonably, and any question as to whether such sanction has been unreasonably withheld shall be determined in manner provided for by the Coal-mines Act.

(4.) The average percentage of inflammable gas found in six samples of air taken by an Inspector in the air-current in the return airway in the ventilating district at intervals of not less than a fortnight shall, for the purposes of this section, be deemed to be the percentage normally contained in the air.

33. Wherever safety-lamps are required by the Coal-mines Act, or Special Rules, or Additional Special Rules to be used, no safety-lamp shall be used by any person employed in the mine unless it is provided by the owner of the mine, and is of a type for the time being approved as respects the class of mines to which the mine belongs by the Minister of Mines.

34. In any mine or part of a mine in which safety-lamps are required by the Coal-mines Act, or Special Rules, or Additional Special Rules to be used—

(i.) A safety-lamp shall not be used unless it has since last in use been thoroughly examined at the surface by a competent person appointed by the manager for the purpose, and found by him in safe working-order and securely locked; and a record shall be kept of the men to whom the several lamps are given out.

(ii.) Such competent person as aforesaid shall also examine every lamp on its being returned, and if on such examination any lamp is found to be damaged he shall record the nature of the damage in a book to be kept at the mine for the purpose, and the person to whom the lamp was given out shall be deemed to have wilfully damaged the lamp unless he proves that the damage was due to no fault of his own, and that he immediately gave notice of the damage to the fireman, examiner, or deputy.

(iii.) A safety-lamp shall not be unlocked except at an appointed lamp-station (which shall not be in a return airway) by a competent person appointed by the manager for the purpose, nor, except in the case of electric hand-lamps, shall it be relighted except by such a person at an appointed lamp-station after examination by him, and no person other than such person as aforesaid shall have in his possession any contrivance for relighting or opening the lock of any safety-lamp.

(iv.) No part of a safety-lamp shall be removed by any person whilst the lamp is in ordinary use.

(6.) The question of the use of electricity underground and the withdrawal of the men from gaseous places will be dealt with under the head of "The Ventilation of Mines." The matter is also important under "Accidents," hence we recommend—

(*a.*) That the Inspector shall have power to prohibit the use of electricity in any mine or part of a mine where, on account of the risk of explosion of gas or coaldust, such use would be dangerous.

(*b.*) That the use of electricity in any mine or part of a mine be discontinued where the amount of inflammable gas in the air exceeds one-half of one per cent.

(*c.*) That workmen shall be withdrawn from any place where the proportion of inflammable gas exceeds two and one-half per cent.

(7.) We also recommend that the length of time which should elapse before a man returns to a misfire should be the same as is provided in the British Act and the Royal Commission's Report of 1909—viz., one hour for fuse firing, and half an hour for electric firing—both under the Mining and Coal-mines Acts. (Messrs. Dowgray and Parry dissenting from clause 7.)

We recommend that the following matters be left to the proposed committees to frame additional special rules for each coal-mine:—

(1.) Whether some person should accompany the deputy on his rounds of inspection;

(2.) The number of men a deputy can supervise in each particular mine.

Regarding the height of first workings, bords, and cut-throughs, your Com-

mission affirms the principle that the same should be limited, but that the exact height should be left to the proposed committee to determine according to the local conditions.

The safety afforded by splitting all pillars, in distinction to the various methods of working "lifts" or strips off them, has been advocated by some of the witnesses, and has received our consideration. The size of the pillars in some cases must preclude all splitting. We are of opinion that this question should be left to, and can be best dealt with by, the proposed additional special rules.

The question of giving power to Inspectors of Mines to require that the panel system of working should be followed in any mine or any portion of a mine met with our consideration. It need not be further outlined than to state that by this system the mine is divided into districts by barrier pillars or solid strips of coal, so that if underground fires, which are not uncommon in New Zealand, should break out, or if an explosion occurs, their effects should be limited. Your Commission considers this is a question for decision according to the local conditions.

(iv.) *Metalliferous Mining.*

We recommend—

(1.) That Regulation No. 1 (5B) of 7th September, 1911, be so amended that the maximum height of stopes shall be 8 ft. 6 in., measured from the ordinary level of the working-floor of that stope.

(2.) That all ladderways in constant use for travelling, where it is difficult to carry an open light, shall be lighted by fixed lights, if in the opinion of the Inspector of Mines such is required.

(3.) That sufficient space be made in all levels at convenient intervals for men passing trucks.

(4.) That it be compulsory for chambermen and bracemen to be always at their posts; but this is not to be construed as requiring a chamberman at each level.

(5.) That speaking-tubes, or some approved method of communication, be required between levels and shafts and levels and stopes if over 50 ft. in height.

(6.) That all ladders in mines extend for at least 3 ft. above the top of the shaft, platform, or landing-place.

(7.) That the provisions for two outlets from a mine to the surface, as recommended by the Transvaal Mining Commission, 1910, be adopted to the following extent:—

> In connection with every mine there shall be at least two shafts or outlets to the surface, with which every reef or mineral bed for the time being worked in the mine shall have a communication of not less than three feet wide and three feet high, so that such shafts or outlets shall afford separate means of ingress or egress available to all persons employed in such mine: Provided that it shall not be necessary for such shafts or outlets to be situated on the same mine. Such shafts or outlets must not lead to the surface in one and the same shaft-shed, and must not at any point be nearer to one another than thirty feet.
>
> (1.) The provisions hereinbefore contained with regard to shafts or outlets shall not apply—
>
> (*a.*) To any mine in which one of the shafts or outlets has temporarily become unavailable for the persons employed in the mine so long as every effort is being made by the manager to repair the damage:
>
> (*b.*) To any mine in which not more than ten persons are at any one time employed below ground in or in connection with any workings connected with any shaft or outlet which is unconnected with any other shaft or outlet.

(8.) That shift bosses should be required to examine "backs" and sides of working-places and travelling-ways, irrespective of the examination by miners' and workmen's inspectors.

(9.) That the use of all tamping other than plastic clay or water be prohibited.

(10.) On account of the great similarity in size, general appearance, and colour rendering it probable that instantaneous fuse may be mistaken for ordinary fuse, that the use of instantaneous fuse should be prohibited at all mines.

(11.) In addition to its bearing on ventilation we are of opinion that it is desirable that the following recommendation of the Transvaal Mining Commission should be adopted, viz. :—

> Every working-place where rock-drills are in use shall be furnished with a James water-blast or suitable appliance for laying and removing the dust, smoke, and gases after a blast; and no man shall return to an end, rise, winze, or other close place until the air is free from dust, smoke, and fumes caused by blasting.

(12.) That the practice of charging a number of holes, when it is intended to fire only a few at a time, should be prohibited.

(13.) That in straight drives where firing is in vogue the Inspector be empowered to order barriers or other sufficient cover to protect the men when blasting.

(14.) That in all shafts in course of sinking there shall be provided adequate coverings or pent-houses extending over the whole area of such shafts, sufficient space only being left therein for the passage of any sinking cage, skip, bucket, or other means of conveyance. In the case of vertical shafts such covering shall be situated not more than 50 ft. from the shaft-bottom. In the case of steeply inclined shafts such covering shall be situated not more than 100 ft. from the shaft-bottom.

(15.) That it be made an offence for men—

(*a.*) To carry tools or timber in ladderways :

(*b.*) To throw tools or timber down ladderways :

(*c.*) To take explosives with them in cages.

(16.) We recommend that the following matters be left to the proposed committee to frame additional regulations for each mine :—

(*a.*) Dealing with wet places, and the hours to be worked therein :

(*b.*) Making provision for lifting heavy timber from cages to trucks in all levels :

(*c.*) Regulating or prohibiting the practice of "bulling" or chambering holes :

(*d.*) Dealing with the use of electricity in firing holes in shafts, rises, and winzes.

The question of abolishing the night shift as a means of minimizing accidents was raised. We are of opinion that the night shift in mining, in common with night-shift work in all other employments, may be more detrimental to men than the day shift, but not so as to warrant us in making any recommendation thereon. (Messrs. Parry and Dowgray dissenting.)

(v.) *Machinery (Coal and Metal Mines).*

Your Commissioners found that the mines and dredges visited by them are well equipped with suitable and efficient machinery; we also found that exposed and dangerous parts of machinery were securely fenced off, and statutory precautions have been taken for the safety of the men employed about the machinery. We, however, consider that in some directions it is advisable that further provisions should be made, more especially in connection with the qualifications and efficiency of the engine-drivers in charge of winding-engines, and those appliances used in connection with the raising and lowering of persons in shafts.

We make the following recommendations :—

(1.) That before becoming the holder of a winding-engine driver's certificate of competency under the Inspection of Machinery Act, 1908, the candidate, after having passed the examination as provided in the aforesaid Act, and before the certificate is issued to

him, shall practise winding men for one month under a duly certificated and competent engine-driver working at a mine; and at the expiration of the said month he shall demonstrate to the satisfaction of the Inspector of Mines and a duly qualified and certificated winding-engine driver appointed by the Inspector his capacity in raising and lowering men. No such candidate shall raise or lower, or attempt to raise or lower, men until he has passed the examination as aforesaid.

(2.) That all winding-engine drivers shall be medically examined annually for heart-weakness, liability to fits, defective hearing, and vision, and shall hold a satisfactory certificate to that effect from a duly qualified medical practitioner, which must be produced at the request of the mine-manager or the Inspector of Mines or Machinery.

(3.) That the words "or approved barrier" be added after the word "gate" in Regulation 1 (51) of the Amended and Additional Regulations under the Mining Act, 1908, dated the 6th September, 1911. (Messrs. Parry and Dowgray dissenting.)

(4.) That no spike safety-catches, except of a type approved by the Inspector of Mines, shall be used on cages in which persons are raised or lowered.

(5.) That all safety-catches, detaching-hooks, and other safety appliances used on or in connection with cages be examined and tested quarterly by a mechanical expert, and the result entered in a report-book kept for the purpose at the mine.

(6.) That section 254 (28) of the Mining Act, 1908, be amended so as to provide that spring catches, or automatic or self-acting doors, or tumblers of a suitable kind shall be affixed to the pit-head frame below the pulleys of every shaft in which a cage is used, to prevent the fall of such cage down the shaft when detached from the rope by overwinding or otherwise.

(7.) That every winding-rope shall be recapped at intervals of not more than six months, and the section of the rope last cut shall be held available for inspection or for testing purposes by the Inspector of Mines or Machinery.

(8.) That the end of the winding-rope shall be securely attached to the drum or drum-shaft, and that there shall be not less than three turns of the rope on the drum at any time.

(9.) That Regulation 1 (5A), dated the 6th September, 1911, under the Mining Act, 1908, be amended so that the speed of winding in a shaft when a person or persons are being raised or lowered shall not exceed one-half the ordinary speed of the engine, and shall not exceed 200 ft. per minute when the cage or conveyance is within 100 ft. of the surface, bottom, or stopping-place. (Messrs. Dowgray and Parry dissenting.)

(10.) That all knocker- or signal-lines shall be fitted with a suitable lever at each level.

(11.) That where dredging or other machinery can be oiled, repaired, or adjusted when stationary, no such machinery shall be oiled, repaired, or adjusted when in motion; and in cases where machinery cannot be oiled, repaired, or adjusted as aforesaid other than in motion, such oiling, repairing, or adjusting shall be done by a competent and experienced person; and no person whatever engaged on or in close proximity to dredge or mining machinery shall wear loose or flowing outer clothing.

(12.) That all winding-engines which are controlled by electrical power shall be supplied or fitted with a small electric lamp or other appliance for the purpose of immediately attracting the driver's attention in the event of the power being unexpectedly cut off.

(13.) That all boilers over ten years of age shall be subjected to an hydraulic test.

(14.) That pawls and ratchet wheels shall be fitted to all mine windlasses (see Appendix No. 5).

(15.) That windlasses or other suitable mechanical appliances shall be erected in stopes for the purpose of raising and lowering tools and timber.

(16.) After careful inquiry into the suitability of the code of shaft signals specified in the amended and additional regulations, dated the 6th September, 1911, Regulation 1 (5B), we are of opinion that such code can with advantage be improved upon, and would hereby submit a code which is practically the same as that in use in the Commonwealth of Australia and the Transvaal. For signals between levels a system, hereinafter referred to as the "ward" system, is introduced; one ward shall be understood to consist of five consecutive levels in the one shaft:—

CODE OF SIGNALS FOR COAL AND METAL MINES.

1 bell	Stop or hold cage.
1 ,, ...	Raise cage.
2 bells	Lower cage.
3 ,, ...	Men about to ascend.
4 ,, ...	Change to hoist from a different level.
12 ,, ...	Accident.

In no case shall any person enter a cage or other conveyance until back signal, 3 bells, has been received. To meet local requirements additional signals may be used, but same must be approved by the Inspector of Mines.

In addition to the ordinary winding signals the ward system must be used when ringing the cage from one level to another level.

No. 1 Ward.

Present No. of Level.		No. of Level in No. 1 Ward.		Bell.		Bell.
1	...	1	...	1	pause	1
2	...	2	...	1	,,	2
3	...	3	...	3	,,	3
4	...	4	...	1	,,	4
5	...	5	...	1	,,	5

No. 2 Ward.

Present No. of Level.		No. of Level in No. 2 Ward.		Bell.		Bell.
6	...	1	...	2	,,	1
7	...	2	...	2	,,	2

And so on.

When ringing the cage from a level to another level the number of the ward must be rung first, and then the number of the level in that ward. *It must always be understood that there are men on the cage in the inter-level signals.*

3. MISCELLANEOUS.

(1.) The Commission recommends that regulations be framed under the Mining Act and the Coal-mines Act providing for the supply and maintenance of ambulance appliances at mines, and is in favour of men being given facilities for practice with same; also that first-aid lectures be instituted in all mining centres.

(2.) We also recommend that the constitution of the Court of inquiry (into accidents) be amended as follows:—

The Warden, with one mine-manager and one representative of the miners as assessors,

under both the Coal-mines and the Mining Act.

(3.) We are of opinion that the Board of Examiners for mine-managers and other officials should be reconstituted, and consist as follows :—

One representative of owners of mines, being a mining engineer.
One representative of the workmen employed in mines,
The Inspecting Engineer of Mines,
The Director of Geological Surveys of New Zealand, and
The Surveyor-General of New Zealand

both under the Mining and Coal-mines Acts.

II. THE VENTILATION OF MINES.

We have given much consideration to the important subject of ventilation, for, apart from the legislative enforcement of hygienic measures in the interest of miners and as a matter of public policy, the ventilation of mines has an important economic aspect, since it affects to a large extent the industrial efficiency of the workmen, and consequently the cost of mineral production. With the attainment of considerable depth in metal-mining operations and consequent increasing underground temperatures, together with the more extensive use of rock-drills and explosives in mines, the necessity for a stricter standard of ventilation than that at present established by statute has been represented to us. To enable us, therefore, to obtain a thorough knowledge of the existing conditions we have inspected the underground operations at the majority of the large coal and gold mines in the Dominion, and have made numerous measurements of the quantity and temperature of the mine-air, also taking samples of air for analysis (see Appendix, Nos. 2 and 4), in addition to which the Inspectors of Mines throughout the Dominion have furnished to us copious tabulated information giving the air measurements and analyses over an extended period. As the conditions and systems of ventilation at metal-mines and collieries are often dissimilar we have in this report dealt with each separately.

METAL-MINES.

The recent introduction of centrifugal fans and blowers in some of the most important metal-mines, to replace ventilation by natural means formerly adopted, has proved extremely beneficial, for, in addition to the greater volume of air circulated, the supply is constant and therefore reliable, which natural and consequently intermittent ventilation was not. We are therefore of opinion that to secure satisfactory conditions it is absolutely necessary that the deep metal-mines of this Dominion should be ventilated by mechanical ventilators.

Quantity Standard.

The following is the statutory general rule for the ventilation of metal-mines in New Zealand, as prescribed by section 254 of the Mining Act, 1908, and the additional general rule No. 94 (1) thereunder :—

> Ventilation to such extent as is prescribed shall be constantly produced in every mine, to the intent that the shafts, winzes, sumps, levels, and working-places of such mine, and the travelling-roads to and from such working-places, may at all times be in a fit state for working and passing therein.
>
> Ventilation shall be at the rate of not less than 100 cubic feet of air per minute for every person, and 600 cubic feet of air per minute for every horse or other animal whilst employed below ground: Provided that in any case where the Inspector is satisfied that the aforesaid rate is insufficient for the purpose of providing adequate ventilation, either throughout the underground workings generally or in any specified portions thereof, he may from time to time require such rate to be increased to such extent as in the circumstances he thinks reasonable.

In the above general rule provision is made for a quantity standard only; the quality and temperature of the air is not defined, but is left to the discretion of the Inspector of Mines, and the place of measurement of the specified quantity is not stated. We found that a considerable diversity of opinion existed as to whether the quantity of air per person was to be measured at the intakes, re-

turns, or working-places. We therefore propose to recommend a more workable and adequate standard for quality, quantity, and temperature of mine-air, and one which will fulfil the altered mining conditions of recent years without unduly harassing the mine-owners, but, on the contrary, may in some cases tend to reduce the cost of mining by providing a cooler and more invigorating air-current for those employed underground. A quantity standard alone (*i.e.*, the anemometer measurement of the air), as now in operation, is subject to many practical difficulties, for the amount of air required for adequate ventilation varies according to the nature of the individual mine, and cannot be fixed at a given quantity per person at all mines alike, for the following reasons :—

(*a.*) The variable temperature of different mines. One of the principal objects of ventilation in deep mines is the reduction of the temperature of the exposed rocks. If this were not effected the work would be unbearable.

(*b*). The quantity of organic carbon-dioxide from men and animals is variable.

(*c.*) The velocity of the air-current necessary to sweep away noxious gases and dust and to reduce the temperature of the rocks is dependent on the sectional area of the airways and stopes, and a specified quantity per person adequate for the confined stopes of the Thames Goldfield might be insufficient to create any observable current in the wide stopes at Waihi.

(*d.*) An efficient distribution of the air-current and proper air-stoppings, also brattice and doors, are necessary, otherwise a large quantity entering the mine may inadequately ventilate the workings.

(*e.*) The variable exudation of noxious gases from minerals and rocks, which varies in the same mine as the area of the exposed rock-surfaces.

In the mines of the Hauraki Goldfield, more especially at Thames, a gaseous mixture of nitrogen and carbon-dioxide in new workings frequently emanates from fissures in the country rock and in the quartz veins, especially when northerly and easterly winds (the rain-bearing winds) prevail. The presence of these gases has been assigned to two different causes—viz., the action of acid on carbonates such as calcite, or to the dying exhalation of an extinct volcano. The following analysis of gas collected from a winze at Thames may be taken as fairly representative :—

Oxygen	8·2
Nitrogen	54·6
Carbon-dioxide	37·2
	100·0

The specific gravity relative to air was 1·19. The mine-gas is therefore equivalent to a mixture of 39·2 volumes of air, 37·2 volumes of nitrogen, and 23·6 volumes of carbon-dioxide. The presence of this gaseous mixture in certain of the mines is not only a source of considerable annoyance to miners, but has at times caused suspension of mining operations, and has been attended with loss of life. On this goldfield, generally speaking, the deeper the mine-workings the more abundant is the amount of gas present.

On the occasion of our inspection of the low-level crosscut (1,000 ft.) to connect the Thames mines, now being driven in altered andesite country rock, we obtained further evidence of the impracticability of a uniform fixed quantity standard for all mines. At the face of the crosscut then being driven, near which was a fissure giving off water and gas, we obtained samples of mine-air. The place was ventilated by a 22 in. circular air-pipe connected with a Roots blower at the surface, which delivered 1,695 cubic feet of air per minute as near to the face as such pipe could be safely carried without destruction by blasting. Upon analysis the sample was found to contain 3·31 per cent. of CO_2. Four men were working at or about this face, and the quantity of air per man per minute was 424 cubic feet. To dilute this CO_2 with pure air, so as to bring the

CO_2 down to 1 per cent., it would be necessary for about 1,400 cubic feet of fresh air per man per minute to be delivered at that face. From the foregoing it is evident that a quantity standard should be supplemented by a quality standard as a basis for legislation; and it would be also advisable, for the purpose of fixing the quantity standard, that mines should be classified according to the amount of noxious gases produced by them, and according to the temperature of the surrounding rocks. The minimum amount of air passing into a mine should be such amount and of a specified quality proportionate to the number of men employed underground.

Quality Standard.

The object of a quality standard is to fix the permissible amount of air-vitiation by the quantity of carbon-dioxide and of oxygen present. It has been recognized that carbon-dioxide is the best objective criterion of the sufficiency of ventilation. In Victoria and Western Australia a quality test has been fixed for metal-mines, and in Transvaal a similar test has been recommended by a Royal Commission (1910). These standards are apparently based upon that which regulates the ventilation of factories in the United Kingdom, upon the recommendation of a Home Office Factory Ventilation Committee (1900) consisting of Dr. J. S. Haldane, F.R.S., and Mr. E. H. Osborn. This Committee recommended that the maximum permissible quantity of carbon-dioxide, when gas or oil is used for lighting, shall not exceed 20 parts by volume in 10,000 parts of air in factories. The above-mentioned oversea countries have fixed or recommended the following standards for metal-mines :—

Victoria : 25 parts CO_2 by volume in 10,000 parts of air, with not less than 20 per cent. of oxygen.

Western Australia : 25 parts CO_2 by volume in 10,000 parts of air, except for thirty minutes after blasting, when a greater (but specified) percentage is permitted.

Transvaal : 20 parts CO_2 by volume in 10,000 parts of air.

It will be observed that the recommendations of the British Factories Ventilation Committee have practically been adopted by these countries.

It is important to note, however, that the factories standard is not adopted in the mines of the United Kingdom, and that the British Royal Commission on Mines (1909), which included amongst its members Dr. J. S. Haldane (who formed one of the Factory Ventilation Committee of 1900, previously referred to), considered that there was no good reason for such a standard in mines, and they recommended one less strict and which they considered would be thought reasonable by those familiar with mining conditions, as follows :—

> The standard of ventilation ought to be such that a lamp or candle will not burn dimly or produce any appreciable effect on the breathing of the men employed. We also think that any air found by analysis to contain less than 19 per cent. of oxygen, or more than $1\frac{1}{4}$ per cent. of carbon-dioxide, should be regarded as below this standard.
>
> Such a standard would rightly be regarded as unduly lax if the impurities in the air were derived largely from respiration, or lights, or blasting, and were thus liable to be accompanied by other vitiation of a serious kind. The available evidence shows, however, that in collieries and other mines in Great Britain the impurities are derived almost solely from mineral sources. There thus seems to be no good reason for a stricter standard, and we believe that the standard which we recommend is one which would generally be regarded as reasonable by those familiar with mining conditions.

As a result of the above recommendation a section has been incorporated in the British Coal-mines Act, 1911, providing for a quality standard of not less than 19 per cent. of oxygen or more than $1\frac{1}{4}$ per cent. of carbon-dioxide.

We have given a considerable amount of attention to the question of a maximum percentage of carbon-dioxide, and a great number of samples were recently taken for analysis under the various conditions of mining from nearly every metal-mine in the Dominion. With the exception of the sample from the Thames 1,000 ft. crosscut previously alluded to, where 3·31 per cent. of ground carbon-dioxide was present, the maximum percentage of CO_2 obtained in any

sample taken was 0·97, and the maximum percentage of CO was 0·008. The two samples which yielded the highest percentage before mentioned were taken at the commencement of shovelling after blasting by gelignite, being the most unfavourable ventilation conditions under which men are likely to work in our mines. The increased proportion of the CO_2 and CO in the above cases would probably be produced by blasting, and the relatively small proportion of these gases obtained under the conditions would indicate that the "oxygen balance" of the explosives is in the right direction, and that, with the modern explosives of high quality such as those used, the harmful nature of the resultant gases is reduced to a minimum. The highest percentage of carbon-monoxide gas detected in the smoke when shovelling commenced at Waihi mines was 0·0025, and from Reefton mines 0·008; and, as Dr. Haldane has stated that "noticeable symptoms of carbon-monoxide poisoning were never produced with less than 0·02 per cent. of CO, since absorption ceased when the blood became saturated to a comparatively slight extent," it may reasonably be concluded that this gas is not produced in our metal-mines under normal conditions in hurtful quantities, and is never produced unless accompanied by carbon-dioxide.

As a result of the above investigations, giving the percentages of noxious gases found in our mines under unfavourable conditions, we are of opinion that for New Zealand mines a carbon-dioxide standard slightly stricter than the British standard should be fixed—viz., a maximum of 1 per cent., the British standard being $1\frac{1}{4}$ per cent.

Underground Temperatures.

In deep metal-mining operations it is sometimes necessary to circulate a larger volume of air than is required to produce, from a quality standpoint alone, adequate ventilation. For the purpose of reducing the temperature of the rock-surfaces a greater volume of air is necessary, for if this were not effected hard work would be either intermittent or unbearable in the heated atmosphere of many deep and hot mines, in which class those of the Hauraki Goldfield in this Dominion must be included. Observations made with the object of determining the rate of increment of temperature with depth in several countries where deep mining is conducted have shown considerable divergence in different places, as will be seen from the following comparisons of the results of temperature observations :—

Locality.	Depth required for an Increase of 1° Fahr. Ft.
Comstock, U.S.A.	33
Witwatersrand, Transvaal	208
British Collieries (mean)	64
Bendigo, Victoria	77
Ballarat, Victoria	80
Thames, New Zealand	43·5
Waihi, New Zealand (approximate)	32·8

The relative rock-temperatures at the 1,000 ft. level at Thames and at Comstock are 83° Fahr., and at Waihi approximately 85° Fahr.; but it was found that, owing to various causes, the temperature throughout the Waihi Goldfield at any particular horizon was by no means constant.

During our investigations we found that the air in the working-places at Waihi and Thames was highly saturated, generally to the extent of 90 per cent. or more, and that the wet-bulb temperature of the air in working-places ranged between the following limits at the deepest levels :—

	Underground (Wet Bulb).	Outside in Shade (Dry Bulb).
Thames Goldfield (1,000 ft. level)	70° to 83·5°	55°
Waihi Mine (1,000 ft. level)	61° to 82·5°	56·5°
Waihi Grand Junction Mine (944 ft. level)	64·5° to 83°	55°
Waihi Extended Mine (960 ft. level)	79·5° to 89°	50°

On the Reefton Goldfield the rock-temperatures are not nearly so great, the highest temperature recorded—viz., 78° Fahr., wet bulb—being obtained at the 1,266 ft. level in the Progress Mine.

To reduce excessive temperatures and to cause an appreciable current to circulate through the heated stopes of the mines an increased volume of air is necessary, but the extent to which underground temperature may be reduced by this means is somewhat limited, as our investigations have proved. The rate of increase in temperature of the outside air when conveyed into deep mines is demonstrated by the following measurements taken by us. During our inspection of the Thames mines we ascertained by actual measurement that atmospheric air which entered a Roots blower at the surface, and was forced at a velocity of 10 ft. per second through a thin galvanized-iron 22 in. air-pipe down a vertical shaft 1,000 ft. in depth, and along a crosscut 670 ft. in length, increased in temperature in the space of 2 minutes 47 seconds from 55° to 76° Fahr., being at the rate of 7·64° Fahr. increase per minute. The temperature of the air surrounding the pipe did not exceed 81° Fahr. At the Waihi-Grand Junction Mine we found that the temperature of the air, while passing from the top to the bottom of a vertical downcast shaft 955 ft. in depth, increased at the time of measurement from 51° to 56° Fahr., the velocity of the air being at the rate of 16 ft. per second. In this case the temperature of the air in the shaft increased at the rate of 5° Fahr. per minute. The return air in the fan passage at the surface of this mine was 69° Fahr. (completely saturated). From the foregoing examples it will be noted that in the North Island of New Zealand, where the outside temperature is equable (the mean surface temperature at Waihi being 55·7° Fahr.), the temperature of the air descending into the mine will have attained that of the rock-surfaces within seven minutes of entering the shaft.

In discussing the effect of high temperatures on miners the British Royal Commission on Mines (1909) reported as follows :—

> The influence of high temperatures on men is intimately dependent on the moisture in the air, and also on its motion, for the greater the dryness of the air and the greater its motion the more rapidly does warm air carry off the heat of the body and thus neutralize the ill effect of the heat. The existing evidence indicates that in still and saturated air continuous hard work is practically impossible at temperatures exceeding about 80° Fahr., even when men are stripped to the waist, and that when the air-temperature is higher than this the result is the same if the wet-bulb temperature rises above 80° Fahr. A temperature of 100° or 110° Fahr., with the air so dry that the wet-bulb temperature is only 80°, is thus no worse than air completely saturated with moisture at 80° Fahr. In other words, it is the wet-bulb temperature, and not the actual temperature of the air, that matters to a man when the air-temperature is high. In moving air, however, a somewhat higher wet-bulb temperature can be borne than in still air. At wet-bulb temperatures exceeding about 80° Fahr. the amount of continuous work which a man is capable of doing without serious rise of bodily temperature rapidly falls off and becomes practically nothing at 90° wet bulb.

As a result of our investigations and deductions from the foregoing evidence we are of opinion that, to secure a continuous distribution of the air in metal-mines adequate to reduce the temperature in hot working-places within reasonable limits, a standard or fixed temperature of 80° Fahr., wet bulb, should not be exceeded, unless it is not reasonably practicable to maintain the air at such standard, in which case a reduction of the hours of employment should be provided for.

In three of the Australian States fixed standards of temperature are now provided for by law, as follows :—

West Australia : Temperature not to exceed 80° Fahr. wet bulb, or 87° Fahr. dry bulb, without permission of Inspector in case of impracticability.

Victoria : Temperature not to exceed 83° Fahr., wet bulb, without permission of Inspector in case of impracticability.

Queensland : A reasonable limit of humidity shall be maintained—viz., at a temperature of 85° Fahr. by the dry bulb the wet bulb should be at least 5° less, and in case of a higher temperature from 7° to 8° less.

We have the honour to make the following recommendations in connection with the ventilation of metal-mines :—

Proposed Standard of Ventilation.

An adequate amount of ventilation shall be constantly produced in every mine to dilute and render harmless noxious gases to such an extent that all shafts, crosscuts, levels, stopes, stables, and all working-places shall be in a fit state for working and passing therein.

The quantity of air in the main current and in every split, and at such points as may be determined by the Inspector, shall at least once in every month be measured and entered in a book to be kept for the purpose at the mine, and the ordinary number of persons and horses in each split at one time shall also be entered in such book.

For the purposes of this section a place shall not be deemed to be in a fit state for working or passing therein if the air contains more than 1 per cent. of carbon-dioxide or less than 19 per cent. of oxygen: Provided that the Minister of Mines may exempt any mine or mines from the foregoing provision on the ground that they are liable to unavoidable vitiation by carbon-dioxide from the rocks during the early stages of development.

The maximum temperature of the air in any working-place, measured by a wet-bulb thermometer, shall not exceed 80° Fahr., unless firing of explosives has occurred in such place not more than twenty minutes previous to the observation of the thermometer; but the Inspector may, in writing, allow a higher limit of temperature if satisfied that it is impracticable to maintain the temperature below the above-mentioned standard, in which case the Inspector shall notify the manager in writing to reduce the temperature of the air below the standard, and if such is not complied with within seven days he shall determine the number of hours, not exceeding six, for which any person shall be employed in any such working-place within eight consecutive hours, and the number of hours so determined shall not be exceeded for a period of three calendar months whatever the temperature may be during that period.

Regulations under the Mining Act shall provide for the classification of mines according to the amount of noxious gases in the working-places and to the temperature of the surrounding rocks, and the amount of air passing into a mine shall be such amount proportionate to the number of men and animals employed underground in the mine as may be prescribed by the regulations

All air-measurements for the purpose of this classification shall be taken respecting mines of the class to which the mine belongs
at the entrance to each ventilating-section, and shall there be not less in volume than the minimum statutory allowance per man and horse per minute. The total number of men ordinarily employed in any ventilating-section shall not exceed fifty.

The obligation imposed by this section shall be in addition to, and not in substitution for, the obligation to provide an adequate amount of ventilation imposed by the foregoing paragraphs.

Proposed Regulations under the Mining Act.

These regulations to classify mines as follows:—

Class A: All mining operations on Thames and Waihi goldfields below the 800 ft. level, 200 cubic feet per man per minute minimum, 500 cubic feet per minute for each horse.

Class B: Other metal-mining operations, 150 cubic feet per man per minute minimum, 500 cubic feet per minute for each horse.

We also recommend—

(1.) That the manager of every mine shall keep in the office of the mine a separate plan showing the system of ventilation in the mine, and in particular the general direction of the current, the points where the quantity of air is measured, and the principal devices for the regulation and distribution of the air, and on every plan the intake airways shall be coloured blue and the return airways red. Every such plan must be on a scale

of not less than 1 in. to 2 chains, and must be prepared by or under the supervision of a surveyor possessing the prescribed qualifications; and the manager shall, whenever requested by any Inspector, accurately mark on such plan the progress of the workings of the mine, with the ventilation thereof clearly shown up to the time of such request, and shall allow such Inspector to examine and take a copy or tracing thereof.

(2.) That power be given the Inspectors to require that all mechanical ventilation appliances be run constantly, or for such time as he thinks necessary, in all cases where he considers the condition of the mines require it, either for ventilation or reduction of temperature; and in all cases that such ventilation appliances be started and continuously run to their usual capacity for two hours before men start to work in the mine.

(3.) The Inspector shall have power to order, if he considers it advisable, that, for the improvement of ventilation—

(*a.*) All rises be put up on the three-compartment or box system:

(*b.*) Two distinct air-passes, of dimensions specified by him, shall be carried up in all stopes, and maintained solely for ventilation:

(*c.*) That the height of rises be limited to a height specified by him.

COAL-MINES.

Special attention has been devoted by us to the ventilation of coal-mines, and it is gratifying to state that we found that the majority of the collieries of the Dominion were well ventilated. To a certain extent this opinion is substantiated by the fact that during the past fifteen years only one life has been lost as the result of an explosion of firedamp.

The principal defect noticed by us was inadequate distribution of the air by splitting, the insufficient use of air-stoppings and brattice, and the installation of fans of insufficient power in case of extension of the workings or during emergency. At all collieries but those of insignificant proportions ventilation is produced by fans of modern type, thirty fans being at present installed, the type most favoured being the "Sirocco," "Waddle," "Sturtevant," and "Hayes."

Existing Standard of Ventilation.

The following is the statutory general rule for ventilation of coal-mines in New Zealand, as prescribed by subsection (1) of section 40 of the Coal-mines Act, 1908:—

> Ventilation shall be constantly maintained in every mine at the rate of not less than one hundred and fifty cubic feet of air per minute for every person, and six hundred cubic feet of air per minute for every horse or other animal while employed underground: Provided that where the Inspector is satisfied that such rate is insufficient to provide adequate ventilation he may from time to time require the rate to be increased to such extent as he thinks reasonable, either throughout the underground workings or in any specified part thereof.

As in the provision regarding the ventilation of metal-mines, it will be seen that a quantity standard for coal-mines only is provided for, and too much is left to the discretion of the Inspector to determine the adequacy or otherwise of the ventilation. Many of our remarks as to the quantity and quality standards of ventilation in metal-mines are equally applicable to collieries, so we shall not reiterate them. We believe it premature to recommend a temperature standard at the present stage of coal-mining in this Dominion. Owing to the shallow depth of the coal-seams high temperatures or extreme humidity do not occur.

We have the honour to recommend that the following standard of ventilation for coal-mines be substituted for the provision at present in the Coal-mines Act, 1908:—

Proposed Standard of Ventilation.

An adequate amount of ventilation shall be constantly produced in every mine to dilute and render harmless inflammable and noxious gases to such an extent that all shafts, roads, levels, stables, and workings of the mine shall be in a fit state for working and passing therein, and in particular that the intake airways, up to within 100 yards of the first working-place which the air enters, shall be kept normally free from inflammable gas: Provided always that an abandoned road or level not used in connection with the working of the mine shall, if properly fenced off, not be deemed to be a road or level within the meaning of this section.

In the case of mines required to be under the control of a manager the quantity of air in the main current and in every split, and at such other points as may be determined by the regulations of the mine, shall at least once in every month be measured and entered in a book to be kept for the purpose at the mine, and the ordinary number of persons and horses in each split at one time shall be entered in such book.

For the purpose of this section a place shall not be deemed to be in a fit state for working or passing therein if the air contains either less than 19 per cent. of oxygen or more than 1 per cent. of carbon-dioxide: Provided that the Minister of Mines may, by order, exempt any mine or mines from the foregoing provision on the ground that they are liable to spontaneous combustion of the coal, but subject to any conditions specified in the order.

Special rules under the Act shall provide for the classification of mines according to the amount of inflammable and noxious gases in the main return airway, and the amount of air passing into the mine shall be such amount, proportionate to the number of men and animals employed underground in the mine, as may be prescribed by the special rules with regard to mines of the class to which the mine belongs, but in no case shall less than 150 cubic feet of air per minute be provided for every person, and 600 cubic feet of air per minute for every horse while employed underground.

All air-measurements shall be taken at the entrance to each ventilation-section, and shall there be not less in volume than the minimum statutory allowance per man and horse per minute. The total number of men employed ordinarily in any ventilation-section shall not exceed fifty at one time.

The obligation imposed by this section shall be in addition to, and not in substitution for, the obligation to provide an adequate amount of ventilation imposed by the foregoing section.

We also recommend as follows:—

(1.) That the manager of every mine shall keep in the office of the mine a separate plan showing the system of ventilation in the mine, as recommended by us for metal-mines.

(2.) That where a fire is used for ventilation in any mine the return air shall be carried off clear of the fire by means of a dumb drift or airway, unless the mine is one in which inflammable gas is unknown.

(3.) That where a mechanical contrivance for ventilation is used at any mine it shall not be placed beneath the surface, and means shall be provided for reversing the air-current and maintained in readiness to be put into immediate operation (see accompanying drawing, Appendix No. 6): Provided that this provision shall not be construed as preventing mechanical contrivances for ventilation being placed underground when such contrivances are auxiliary only, and the contrivance whereby the main ventilation is produced is placed on the surface and is capable of producing such amount of ventilation as in an emergency would

be sufficient for the safety of the persons employed underground: Provided also that this provision shall not be construed as preventing mechanical contrivances for ventilation being placed underground when such contrivances afford a complete additional system of ventilation, and when a complete ventilating appliance is provided on the surface capable of producing adequate ventilation for the mine and immediately available for use in the event of accident, and is kept in an effective condition and is used once at least in each week.

(4.) That power be given the Inspector to require that all mechanical ventilation appliances be run constantly, or for such time as he thinks necessary, in all cases where he considers the condition of the mines requires it; and in all cases that such ventilation appliances be started and continuously run to their usual running-capacity for two hours before men start work in the mine.

(5.) That no fire or furnace shall be placed underground in any new mine or seam hereafter.

(6.) That the Coal-mines Act, 1908, section 40 (45), be amended to read as follows:—

> If at any time it is found by the person for the time being in charge of the mine or any part thereof that, by reason of the prevalence of inflammable or noxious gases, or of any cause whatever, the mine or any place in the mine is dangerous, every workman shall be withdrawn from the mine or place found dangerous, and a fireman or deputy, or other competent person authorized by the manager or under-manager for the purpose, shall inspect the mine or place found dangerous, and, if the danger arises from inflammable gas, shall inspect the mine or place with a locked safety-lamp, and in every case shall make a full and accurate report of the condition of the mine or place; and a workman shall not, except in so far as is necessary for inquiring into the cause of danger, or for the removal thereof, or for exploration, be readmitted into the mine or place found dangerous until the same is reported by the fireman or deputy not to be dangerous.
>
> For the purposes of this section a place shall be deemed to be dangerous if the percentage of inflammable gas in the general body of the air in that place is found to be two and a half or upwards, or, if situate in a part of a mine worked with naked lights, one and one-quarter or upwards.
>
> Every such report shall be recorded in a separate book, which shall be kept at the mine for the purpose, and shall be signed by the person who made the inspection.
>
> If a workman discovers the presence of inflammable gas in his working-place he shall immediately withdraw therefrom and inform the fireman or deputy.

III. THE UNDERGROUND SANITATION OF MINES.

In the course of our investigations we found the mines, with one or two exceptions, in a very unsatisfactory condition in regard to sanitary matters. Only one coal-mine had made any attempt to provide sanitary arrangements underground. The medical evidence is strongly in favour of such being provided to ensure the health of the miners.

In regard to metal-mines we have the honour to make the following recommendations:—

(1.) That suitable and sufficient latrines be provided underground in all mines not already sufficiently supplied with the same.

(2.) That a reasonable number of latrines should be provided on the surface at or near the entrance of the mine, but not in the line of the intake airway.

(3.) That underground latrines should be placed in such a position as to prevent, as far as possible, the effluvia from mingling with the intake air, preferably in a return airway or with a current leading directly to a return airway.

(4.) That the floors should be cemented to prevent soakage, and so sloped as to run into a pit or receptacle containing sawdust, which should be emptied daily.

(5.) That iron pans, having close-fitting lids which can be clamped to prevent spillage, should be used.

(6.) That a constant and sufficient supply of sawdust, sand, ash, or other deodorant approved by the Inspector of Mines should be kept at each latrine.

(7.) That the roof and walls surrounding the latrine should be lime-washed at regular intervals, and the seat and floor cleaned and disinfected at least every twenty-four hours.

(8.) That screens should be provided to ensure as much privacy as possible in the use of the latrines.

In regard to coal-mines we recommend—

(9.) That suitable and sufficient latrines should be provided, as in metal-mines, with the exception that trucks be used instead of pans.

(10.) That the position of the truck with regard to airways, the deodorants, privacy, and cleansing above mentioned, apply, as nearly as circumstances permit, to latrines in coal-mines.

(11.) That after latrines are provided it should be made an offence for any person to relieve his bowels below ground in any place in any mine other than in a latrine.

(12.) That it be made an offence for any person to destroy or wilfully render any latrine in any mine unfit for use by defiling the seat or otherwise howsoever.

(13.) That all latrine receptacles be emptied once in every twenty-four hours.

(14.) That the number of latrines or trucks to be provided in each mine be left to the committee elsewhere in this report recommended.

With regard to deodorants to be used, the evidence shows that coaldust is a sufficient deodorant in coal-mines, but chlorine disinfectants are not considered suitable for underground latrines.

We are further of opinion that a supply of good wholesome drinking-water, not collected in the mine, should be provided by means of a pipe, or be kept in covered vessels at points reasonably accessible to working-places.

We believe that these reforms, if carried out, would greatly improve the health and comfort of the men, and they do not involve any great outlay to provide.

IV. CHANGE AND BATH HOUSES FOR MINERS.

With regard to the question of providing change and bath houses at all mines, we find the request for the same to be quite unanimous. The medical evidence also emphasizes the necessity for such provisions in the interest of general health, and as a particular preventive against phthisis.

The constant exposure of men to warm temperatures in more or less vitiated air underground renders a sudden change, in wet clothing, to colder conditions above ground highly injurious to health. It is therefore of primary importance that men should be able to change their wet clothing immediately on coming out of the mines under conditions of reasonable comfort. In mining communities it is, for the most part, impossible for miners' dwellings to be supplied with bathing-accommodation. To meet this want we have to recommend that both change and bath houses be provided at all mines.

On this point we are pleased to be able to report that the suggestions have met with a favourable reception from the mine owners and managers. It is recognized by them that the benefits accruing to the men from such facilities are all in the interests of the industry.

We have considered the question of whether the use of baths should be made compulsory. On this point we agree that such a provision would be unworkable, the consensus of opinion amongst the witnesses who represented the workers being that the men would largely avail themselves of the bathing facilities.

In order that small mines may not be unduly burdened we have suggested a limit in the number of men employed for whom bathing-accommodation should be provided, but we are of opinion that there should be no limit so far as change-houses are concerned.

We believe that all change and bath houses should be, as far as possible, erected and fitted on a uniform plan. To this end we have prepared a plan of a change and bath house which would suit all mines.

Under the Mining Act, 1908, section 254, subsection (31), and the Coal-mines Act, 1908, section 40, subsection (28), provision is made for dressing-rooms as follows:—

> If more than four persons (coal-miners) or six persons (metal-miners) are employed in the mine below ground in one shift, sufficient accommodation shall, if ordered by the Inspector, be provided above ground near the principal entrance of the mine, and not in the engine-house or boiler-house, for enabling the persons employed in the mine to conveniently dry and change their dresses, and in no case shall men be allowed to change their dresses upon a boiler.

In the above no provision is made for baths, and what is specified for change-houses appears to be insufficient. We have the honour, therefore, to recommend as follows:—

(1.) That bath-houses be erected at all coal and metal mines, excepting those employing ten men or under, and all open alluvial mines.
(2.) That change-houses be provided at all mines.
(3.) That change and bath houses to be erected be in accordance, as near as possible, with the plan hereto annexed (Appendix No. 7).
(4.) That the hook-and-pulley system (as shown in sketch-plan) is the best design from a hygienic point of view and as a means of keeping each man's clothes separate.
(5.) That the floor-space in every change-room be not less than 12 square feet for each man.
(6.) That where change-houses already exist they be fitted with hooks and pulleys within eighteen months.
(7.) That bath-houses be fitted with hot and cold showers, hand-basins, with an adequate supply of water, and suitable tubs for the men to wash their clothing.
(8.) That there be one shower-bath and one basin for every five men employed underground on the largest shift at one time.
(9.) That two-fifths of such shower-baths be partitioned off to secure complete privacy.
(10.) That the floors of every bath-house shall be of concrete and properly drained.
(11.) That the cost of erection, care, and management of change and bath houses be borne by the mine-owners.
(12.) That the change and bath houses be under the control of a caretaker, whose duty it shall be to keep the same clean and attend to the drying arrangements.
(13.) That no mine-owner shall be compelled to erect bath-houses until a vote be taken of the miners working underground in the mine, nor unless 75 per cent. of the men where the number is twenty or under, 50 per cent. where the number is fifty or under, and 30 per cent. where the number is over fifty request the erection of the same.
(14.) That if satisfactory use is not made of the baths the manager may give notice to the workmen's inspector that he proposes to take a tally of the men using the baths for a period of one month, and if it is found that the total number using the baths is less that 20 per cent. of the men employed underground where the number does not exceed fifty, and 30 per cent. of the number who voted for the erection of the baths when the number exceeds fifty, it shall be optional with the manager whether he keeps the baths open or not.
(15.) That if the baths are closed under the powers of the preceding clause no vote shall be taken to reopen the same for at least three months.
(16.) That if a tally be taken under clause 14 by the manager full facilities shall be given to the workmen's inspector to take a similar tally over the same period.

(17.) That it be made an offence for any person—
(*a.*) Expectorating on the floor or walls of the change or bath house:
(*b.*) Failing to keep his clothes in the place provided for them:
(*c.*) Beating clothes or shaking the dust off the same in the change-house:
(*d.*) Washing his clothes in a hand-basin:
(*e.*) Smoking in change or bath house.

V. MINERS' PHTHISIS.

The term "miners' phthisis" is that most generally applied to the pulmonary disease which, since the introduction of rock-drills at metal-mines, has assumed such serious proportions as to necessitate the appointment in several countries of Royal Commissions to inquire into and report upon its prevalence, nature, cause, and prevention. The reports of the four most important of these Commissions are as follows:—

"Report on the Health of Cornish Miners," by Dr. J. S. Haldane, F.R.S., and others. 1904.
"Report on Miners' Phthisis at Bendigo," by Dr. W. Summons. 1906.
"Report on Pulmonary Diseases amongst Miners," West Australia, by Dr. H. L. Cumston. 1910.
"Report on the Mining Regulations Commission, Transvaal," by Drs. F. E. T. Krause and C. Porter, and A. Heymann, Esq. 1910.

As these reports are practically unanimous upon the subject dealt with, and are the work of well-known specialists, it is not our intention to enter at length into the pathology or the etiology of miners' phthisis, more especially as, owing to the absence of adequate statistical and direct information regarding the prevalence of pulmonary diseases amongst miners in New Zealand, we have not been able to formulate such definite scientific opinion as is necessary for the purpose of comparison with the somewhat copious information, statistical and otherwise, regarding the occurrence and cause of diseases and deaths amongst miners, determined periodically and estimated in proportion to the living of all ages which are included in the aforementioned reports.

We have, however, adequate evidence to prove that in New Zealand miners' phthisis has not assumed serious proportions, as in Transvaal, Cornwall, or Bendigo, and we believe that if the remedial measures recommended by us are adopted the disease may be much reduced, if not entirely eradicated from the Dominion.

Miners' phthisis, from a clinical standpoint, may be classified into three types—viz., fibrosis, tuberculosis of the lungs, and tuberculosis of the lungs superimposed upon fibrosis.

Fibrosis is non-infectious, being a pure fibrosis of the lungs, non-tuberculous in origin, and, when contracted at metal-mines, is silicosis, a disease brought about solely by the mechanical action of silica and other rock-dust particles without absorption of them, and with no poisoning of the system generally. It is of purely local origin, and continues as such till tuberculosis, with its specific bacillus, is superadded.

Tuberculosis of the lungs, or consumption, the infecting agent being a bacillus conveyed only through the sputum of infected persons. The actual infection is more likely to be contracted above ground than at work.

Superimposed tuberculosis of the lungs, a combined type, being a tuberculous infection on a fibroid lung, the tubercle bacilli having been inhaled by a person suffering from fibrosis, in which condition susceptibility exists owing to the low resisting-power consequent upon the lung-tissue being impaired by the action of dust. To this type is almost invariably due the deaths ascribed to miners' phthisis.

Miners' phthisis has been confined throughout the world almost entirely to those employed at metal-mines. Coal-miners display marked relative freedom from superimposed tuberculosis, due no doubt to the fact that the particles of

coaldust inhaled are much larger, also less hard and angular, than silica or rock dust, and on that account are, when inhaled, more likely to be deposited on the mucous secretion of the larger bronchial tubes; also, when absorbed into the lung-tissue, they do not possess the irritating character of the silica particles.

Owing to the absence of uniformity in the classification of the deaths from lung-diseases, and the irregularity of the periods for which the returns are available, we are unable to furnish for the purpose of comparison a perfectly parallel statement showing the proportionate death-rate by miners' phthisis in New Zealand and the other countries, but the following official returns are the best evidence available :—

CORNWALL, ENGLAND, 1900–2.

Mortality-rate per 10,000 Cornish tin-miners :—

Phthisis	50·07
Pneumonia	3·03
Total	53·10

BENDIGO (VICTORIA), 1906–9.

Mortality-rate per 10,000 quartz-miners :—

Tuberculosis	88·04

As against 15·82 for all males in Victoria aged twenty-one years and upwards (excluding miners).

QUEENSLAND AND WEST AUSTRALIA, 1909.

Mortality-rate per 10,000 miners :—

	Queensland.	West Australia.
Phthisis	22·6	31·06
Pneumonia	12·7	14·99
Miners' phthisis	2·8	3·21
	38·1	49·26

TRANSVAAL.

Mortality-rate per 10,000 white miners, including surface workers at mines in the Witwatersrand District. (NOTE.—The surface workers constitute between 54 and 58 per cent. of the total number of miners employed) :—

	1905.	1906.	1907.
Phthisis (of all types)	88	68	84·8

NEW ZEALAND.

Mortality-rate per whole population of males (*vide* Registrar-General's return). No record of the occupation of the deceased was given :—

	1910.	1909.	1908.
Pneumoconiosis	9	6	1
Miners' phthisis	1	10	2
Totals	10	16	3
Proportion per 10,000 males	0·19	0·29	0·059
Assuming all deceased were quartz-miners (surface or underground workers) the proportion per 10,000 would be	23·1	42·9	7·2

In the absence of adequate statistical information we desire to draw attention to the following extracts from the evidence by medical practitioners upon the principal quartz-mining fields in this Dominion :—

Dr. G. Lapraik, in general practice among Thames miners, stated that—

> The cases of miners' complaint which have come under my notice have been contracted some time, and I have not seen during the last four years any fresh case of true miners' complaint; I found the disease diminishing.

Dr. Denis Walshe, Medical Officer in charge of the Thames Hospital for four years and a half, stated that—

> Chronic lung-disease is very prevalent at Thames. Two years ago I examined forty-five to fifty men, and found that eight men, or 16 per cent., had that disease, but I do not desire that to be taken as typical. The persons examined were old miners, who had lived at Thames for many years.

Dr. E. H. Scott, in general practice at Reefton for seventeen years, stated that—

> As regards particular instances [of tuberculosis] in the Reefton district, the number of cases is very small for scientific purposes, and broad conclusions drawn from individual cases are apt to be very misleading. A number of deaths from the disease in Reefton have been those of Cornish miners, who have really been damaged in their constitutions and their lungs by working underground at too early an age. I have not noticed an increase in Reefton since I came there. We have had a number of cases of tuberculosis, but several of them are direct importations from Australia. Men come here simply to recuperate. I know of cases in which men have come and died here as the result of tuberculosis contracted in Australia. I do not think the men here now stop long enough at mining to contract pneumoconiosis.

Dr. W. Grattan Guinness, of Auckland, formerly in practice at Waihi, stated—

> I have not been in practice at Waihi during the last five years, but I will say that during my five years and a half's residence there I had more cases of pneumoconiosis from the batteries (*i.e.*, quartz-mills—dry crushing) than from the mines, though there were also a number of cases from the mines. I think the disease was fairly evenly spread over the whole period.

Dr. W. A. Conlon, Medical Superintendent of the Reefton Hospital for thirteen years, stated that—

> During the ten years ended 31st December, 1909, fifty-five men in the Reefton district died of miners' disease; for the two years and a half ended 18th October, 1911, sixteen died from miners' disease.

According to the evidence of Dr. Conlon it would appear that miners' phthisis in the Reefton district existed to a greater extent than elsewhere in New Zealand.

From the foregoing evidence it is apparent that the disease has not in New Zealand assumed such proportions as indicated by the returns from Cornwall, Bendigo, Queensland, West Australia, and the Transvaal. In proof to the same effect it should be stated that during the period between the 10th October, 1908, and the 24th December, 1909, when pneumoconiosis (a term which formerly was used to classify a group of diseases all similar in character, amongst which miners' phthisis is included) was a disease in contracting which a miner was entitled to compensation under the Workers' Compensation Act, not a single claim was made for compensation in respect of the disease.

The preventive measures considered by us, and which have been generally recommended by other Royal Commissions elsewhere, are as follows :—

(1.) The compulsory use of dust-preventing appliances, such as sprays, waterblasts, and atomizers.
(2.) Improved ventilation of mines.
(3.) Use of bath and change houses at the mines.
(4.) Prevention of indiscriminate spitting, and the destruction of tuberculous sputum.
(5.) Definite treatment of those affected with tuberculosis of the lungs in an advanced form.
(6.) Improved housing conditions and disinfection of work-places and living-quarters.
(7.) The exclusion from work underground of all persons infected with tuberculosis of the lungs.

The use of dust-preventing appliances is provided for under section 19 (*m*) of the Mining Act Amendment Act, 1910, viz. :—

> There shall at all times be used in and about the battery or place where such crushing or drilling is done an adequate jet or spray of water, or such other appliances as in the opinion of the Inspector will effectually keep the air pure and prevent dust circulating in the place where such operations are being carried out, and for this purpose an adequate supply of water shall be provided.

In addition to which it would be advisable that an approved waterblast be used immediately after blasting in mines, a provision made compulsory in Transvaal for the purpose of allaying the noxious gases, smoke, and dust caused by blasting in close ends. The use of a waterblast of the James type is recommended

by the Transvaal Royal Commission, and is thus described in Dr. Haldane's "Report on the Health of Cornish Miners":—

> At the mouth of the level a piece of 6 in. iron pipe or a small cylinder, provided with a side tap, is let into the ordinary 2 in. iron pipe for carrying the compressed air for the drill (*vide* Diagram 1 and Fig. 1). Before the blast this is filled with water through the side tap from a cistern after the compressed air has been turned off. Immediately after the blast the compressed air is suddenly turned full on. The water is thus driven along the pipe with great velocity, and a mixture of finely divided water and air is discharged from the open end, which is directed towards the face which has just been blasted. By this means the dust is entirely cleared from the last 30 ft. or 40 ft. back from the blast, the air leaving quite clear immediately after. If a ventilating-pipe (vide Diagram 2, Fig. 1) is carried forward about as far as the compressed-air pipe, any dust which has been driven out beyond the reach of the jet can be rapidly carried off. This plan has the great merit that it implies scarcely any trouble, and no extra apparatus except the piece of 6 in. pipe and tap for filling it. The rock blasted is also thoroughly wetted, so that no dust is produced in shovelling it. The water partially washes out from the air any nitrous fumes which may be present, but, of course, no carbonic oxide, and for this reason, if no other, a ventilating-pipe is desirable in cases where the level or rise has been driven more than a few fathoms beyond the air-current.

Diagrams of these appliances accompany this report. The more adequate ventilation of all mines to a standard of quality, quantity, and fixed temperature is dealt with under the heading of "Ventilation" in this report.

The use of bath and change houses is elsewhere recommended by us.

The prevention of indiscriminate spitting appears to be a matter requiring urgent attention by local bodies and by the Government. The dissemination of directions regarding the destruction of tuberculous sputum is very necessary.

Improved housing conditions for miners and the definite treatment of tuberculous persons are matters which are being strongly advocated by many medical practitioners of this Dominion.

The exclusion from work underground of persons infected with tuberculosis of the lungs is a matter insisted upon by all authorities.

We therefore make the following recommendations:—

Preventive Measures.

Every working-place where rock-drills are in use shall be furnished with an approved waterblast or suitable appliance for laying the dust, smoke, and gases after a blast; and no man shall return to an end, rise, winze, or other close place until the air is free from dust, smoke, and fumes caused by blasting.

Measures of Relief.

That miners suffering, or suspected to be suffering, from fibrosis or superimposed tuberculosis of the lungs shall have free medical advice from the Government, such advice to be given by a medical expert appointed for the purpose.

That in addition to the homes and sanatoria already established adequate relief be provided from the Gold-miners' Relief Fund for those suffering from miners' phthisis, which for that purpose shall be subsidized £1 for £1 by the Government.

The qualifications for the above measures of relief to be five years' residence in New Zealand immediately prior to the application for relief, two years and a half of which shall have been occupied in mining underground or working at a crushing-mill in New Zealand.

VI. THE PROFITABLE UTILIZATION OF THE SOFT BITUMINOUS AND LIGNITE COALS OF THE WESTPORT DISTRICT OF NEW ZEALAND.

The question of the profitable utilization of the soft coals of the Westport district is one upon which little evidence was forthcoming.

Upon investigation we found that, approximately, there is an area of 5,000 acres of unmined soft coal carrying seams varying in thickness from 5 ft. to 20 ft. In addition to this there was produced in 1910 from the Westport

district, from 831,200 tons of coal mined, 230,049 tons of slack, equivalent to 27·7 per cent. of the total output. It is a reasonable assumption that at least 25 per cent. of the output of the mines in the future will be slack. It was with a view of trying to discover a use or market for this otherwise waste product that our investigations were mainly directed.

So far as we could learn there have been only two uses to which this slack has been put—firstly, as bunker coal for steaming purposes; and, secondly, for the manufacture of briquettes and eggettes at Westport by the Government. In regard to the former the market is limited, and the demand is not nearly sufficient to utilize the large quantity of slack produced during the operations of mining.

A small quantity may in the future be used for manufacture into coke, the Westport Coal Company having recently erected six coke-ovens at Granity in connection with their Millerton mine. But, again, the New Zealand market in this direction is limited, and the demand for coke is not likely to absorb any great quantity of the surplus soft coal and slack.

Our attention has been directed to a new steam boiler in which pulverized coaldust is used as a fuel. If this type of boiler were to come into general use in New Zealand no doubt a market would be created for slack coal, but, so far as we are aware, no such boilers are in use in New Zealand, and there is nothing to indicate that they will come into such considerable use in the near future as to create any such market.

Dealing with the question of the manufacture of briquettes and eggettes by the Government, the evidence before us goes to show that these operations have not resulted in a financial success, though the article produced is of a good marketable quality. The works were established in 1907, and up to the present the bulk of the output has been used by the Government Railway Department. The returns for the year ending 31st March, 1911, show that out of a total of 8,564 tons manufactured 7,343 tons were used by the Railway Department, 4 tons by other Government Departments, and 1,217 tons by the general public. It has been shown in evidence that the value per ton of briquettes and eggettes for railway purposes is less by 2s. and 1s. 6d. respectively than that of screened coal. The following analyses made by the Dominion Analyst show the relative values in calories and evaporative powers between coal from different mines and briquettes :—

Mines.	Fixed Carbon.	Hydrocarbons.	Water.	Ash.	Total Sulphur.	Percentage of Coke.	Calories.	Evaporative Power in Pounds; Water at 212° Fahr.	
								Theoretical.	Practical (assuming 60 per cent. efficiency).
Coal.									
Denniston ..	57·36	39·61	1·55	1·48	2·18	58·84	8,230	15·35	9.21
,, ..	56·62	38·40	4·30	0·68	0·56	57·30	7,762	14·48	8·69
,, ..	55·73	40·08	2·37	1·82	0·55	57·55	7,923	14·78	8·87
,, ..	58·75	37·24	3·61	0·40	1·74	59·15	7,708	14.38	8·63
Millerton ..	57·67	41·14	0·91	0·28	4·62	57·95	8,227	15·35	9·21
,, ..	60·50	34·39	0·83	4·28	3·92	64·78	8,135	15·18	9·11
Seddonville ..	51·12	42·24	4·36	2·28	4·94	53·40	7,402	13·81	8·29
,, ..	52·27	41·20	4·65	1·88	4·99	54·15	7,345	13·73	8·24
Seddonville—									
Briquettes..	48·84	41·46	5·54	4·16	3·62	..	7,249	13·53	8·12
Eggettes ..	46·93	42·05	8·03	2·99	3·74	..	6,969	13·00	7·80

The outside market has been particularly small. It has been suggested that this market has not been sufficiently pushed, but the evidence before us does not

justify such a suggestion. Moreover, the loss does not lie in the lack of sufficient outside market, but in the cost of manufacture. We find that the best binder is pitch. The proportion of pitch used in the production of briquettes or eggettes is, approximately, 8 per cent. The average cost of pitch imported is £4 12s. per ton. This, on an 8-per-cent. basis of pitch, gives the cost of pitch per ton of briquettes or eggettes at 7s. 7·98d. The total cost of manufacture is 16s. 6·69d. To this must be added the cost of freight, handling, general trading expenses, interest, and depreciation, amounting to 11s. 3·5d.; making a total cost of £1 7s. 9·16d., leaving a loss of 6s. 1·3d. per ton.

It does not appear to us that any material saving can be effected in the manufacture. It was suggested that the labour of one man might be saved, but this would make no appreciable difference in the cost of production.

We were unable to obtain locally satisfactory quotations for pitch. The price quoted was much higher than that above mentioned, but even if pitch could be landed at half the former cost, which is impossible, there would still be a considerable loss on the manufacture of briquettes and eggettes with pitch as a bond.

We made inquiries into the question of other bonds, and it does not appear that any bond would enable briquettes or eggettes to be produced on a payable basis. One new patent bond was brought under our notice, with some reports thereon, but this was in the experimental stage only—that is to say, no quantity of briquettes or eggettes has been manufactured with this bond and placed on the market, the sample submitted to us having been hand-made in a laboratory. The cost of this bond, as estimated by the patentee, is about 2s. 3d. per ton of briquettes or eggettes, as against 7s. 7·98d. for pitch as bond, leaving an apparent balance in its favour of 5s. 4·98d. per ton. Excluding the question of a working profit, this saving would not meet the loss per ton on the manufacturing cost. We have no evidence of the calorific properties of briquettes produced by this bond. The most that is said is contained in a letter from Professor Easterfield—namely, that "the briquettes, after three days' keeping, were sufficiently firm for commercial purposes, and burnt satisfactorily in an ordinary fireplace." In the absence of a more exhaustive test and a chemical analysis of the calorific value of these briquettes this is not sufficient to warrant us in recommending this bond, nor is there any guarantee that briquettes or eggettes can be produced at a payable price and command a sale.

It has been suggested, further, that a more modern plant would effect a saving, but no definite evidence or opinion could be obtained on that point.

In view of the foregoing facts we have to report, briefly,—

(1.) That there is at present a considerable quantity of slack going to waste in the Westport district; that at least 25 per cent. of the coal still to be produced in the district will be slack, and, in addition to this, there is a large area of unmined soft coal.

(2.) That this slack and soft coal are suitable for briquetting, bunker coal, coking purposes, or to be used as fuel for a specially constructed boiler.

(3.) That the cost of manufacturing briquettes with a pitch bond precludes the briquettes from competing in the market with coal as a fuel.

(4.) That it has not been shown to us that any other bond is available which will allow briquettes to compete successfully against coal.

(5.) That with regard to bunker coal and coke the market is limited, and we see no prospect of any great increase in the demand at present.

(6.) That the new type of boiler above mentioned appears to be suitable for the consumption of slack or pulverized soft coal, but it is not at all probable that existing boilers will at present be displaced by the new type to any great extent. We would, however, recommend that consideration be given to these boilers where new boilers are being installed or old ones replaced by new.

We would suggest the advisability of offering a premium or bonus for some process, including a suitable bond, which will produce briquettes or eggettes of a good quality from New Zealand soft coals or slack, and at a marketable price.

Conclusion.

In conclusion, we are asked to say "whether any, and if so what, fresh legislation is necessary to give effect" to our recommendations. We have already, under the various heads of our report, pointed out the amendments in the different Acts necessary to bring about the changes and reforms we have advocated. So far as we are aware no fresh legislation is required other than the amendments hereinbefore referred to.

Given under our hands and seals, at Wellington, this sixteenth day of December, one thousand nine hundred and eleven.

N. D. COCHRANE.
JOHN DOWGRAY.
J. S. EVANS.
GEORGE FLETCHER.
HERBERT S. MOLINEAUX.
W. E. PARRY.
FRANK REED.

MINORITY REPORT.

While we agree in the main with most of the conclusions arrived at by the Commission, we wish to express our views upon several important questions on which we are not in agreement with the majority of the Commissioners.

One of the most important questions which the Commission has been called upon to consider is that dealing with the prevention of miners' phthisis. While we think that some of the recommendations made by this Commission, when carried into effect, will mitigate the disease to some extent, we have learned from the evidence and observation that the two chief contributory causes of this malady are the contract system and the night shift.

In many instances, apart from the cost in money, a great deal of time is wasted and numerous lives are lost in trying to deal effectively with certain evils without legislating to embrace the most important contributory causes, and hence we find we are dealing with the effect instead of with the cause.

Although this question of the contract system was mentioned in the findings of the British Commission and recommended for consideration, we are basing our conclusions in this report upon the evidence gathered by the present Commission, which evidence undoubtedly constitutes a strong indictment of the methods in vogue. All the witnesses on behalf of the workmen admitted before the Commission that the contract work and night shift were responsible for bad health and the major portion of the accidents, notwithstanding that their earnings are a little larger under the contract system than under the day-wage system. Knowing, as the miner does, that his occupation is hazardous, dangerous, and unhealthy, in order to launch out in some other avenue of employment he endeavours to try and make a cheque, and takes full advantage of the time spent underground to accomplish the object in view. The result is we find the men impatient; the pace, as a rule, is set by the strongest man physically in the contract party, and each member of the party is expected to do the same amount of work, and in the attempt the last particle of energy is expended. Not only is the "rushing" a cause of serious accidents, but, as a consequence of the hard nature of the work and the vigour with which it is sustained, the men themselves are frequently so tired that they spend the largest portion of their time in bed when out of the mine, which time should be devoted to exercise and health-seeking. When to fatigue is added severe strain the effects may be lamentable, as, for example, the pushing of heavy trucks, each of which weighs from 1 ton to 25 cwt., and the lifting of heavy machines, which all tends to lower the vitality and wreck the constitution. The worn appearance of the men in those districts where these systems are in vogue is a practical exemplification of the loss of vitality. This was noticed by the members of the Commission at Waihi, and in order to ascertain the state of the health and condition of the men in general they made a requisition to the Government to appoint a medical expert to join the Commission. We regret that the Government did not see fit to grant the request, for had this been done we feel sure the conclusions would have been more satisfactory.

Dr. Conlon, in giving evidence before the Commission, said, "The contractors are the men who suffer most; the good miners always go under quicker." In answer to a question by the Chairman on the subject, he further stated that the more the men exerted themselves the more likely they were to get the disease, and that "the men who worked hard frequently go away from the district because their health is affected. A man cannot work underground and extend himself as he can on the surface. If you look through a list of the men who have suffered from the disease you will find that they are the men who worked as contractors." Continuing his evidence, in reply to a Commissioner, he said that the work lowers a man's vitality, and he runs into places without waiting for the dust to settle, thus taking bigger risks; further, that the average age of men dying in the Reefton district, during a period of twelve years and a half, would probably work out at fifty-five.

We also quote valuable information by Thomas Oliver, M.D., F.R.C.P., from his work on "Diseases of Occupation." He quotes Dr. H. Bremridge, who is on the medical staff of the Kolar Goldfield, India, as follows:—

> In the Kolar gold-mines there are 40,000 coolies employed; the rock is hard. Dr. Bremridge went to India expecting to meet with miners' phthisis, but failed to find evidence of the disease except in men who came from the Transvaal. He found that the native and white men kept good health. He attributes the freedom from miners' phthisis partly to the fact that the men take more leisure, and are not so eager to make a fortune as the miners in the Transvaal.

Dr. Oliver also says,—

> The miners on the Rand are paid for piecework; they are impatient, and as they prefer to run risks some persons may say the men are not altogether to blame. They rush back too soon after blasting to recommence work in the particular part of the mine, the air of which contains a slight excess of CO_2 when the explosion has been complete, and always a large quantity of dust. They neither allow the smoke to clear away nor the dust to settle.

These circumstances show the desire on the part of the men to run these risks in order to earn one or two shillings a day more, not only in this country, but in every other country where this system is in operation; and we are of opinion that the system is also responsible for the bad distribution of air, as the men do not seem to give any consideration to the ventilation, in case doing so may impede them in their work. They push on for footage and tonnage, which determines the amount of wages they receive, and thereby assist the companies in evading the provision of adequate ventilation. In many cases it is more economical for the companies to give a prize to the men than establish proper ventilation. We contend that any system which embraces a decoy for men to run risks underground—returning too soon after firing, &c.—is dangerous to health, limb, and life. Circumstances show that the broken rock tends, after blasting, to imprison poisonous gases. The subsequent liberation of these becomes a source of danger when the work is carried on before the air of that vicinity is perfectly clear from dust and all poisonous gases.

We have observed that accidents are far more numerous in the districts where mining is carried on under the contract system than on day wages. This was also observed by Mr. Coutts, the late Inspector of Mines for the Hauraki District. He reported in the *New Zealand Mines Record* of the 17th January, 1902. He brought a charge against Pile and Perry, at the Warden's Court, of having committed a breach of the Mining Act by neglecting to tell their mates, who were relieving them on shift, as to an unexploded charge. Mr. Coutts pointed out that he had brought the present case forward as a warning, especially in view of the fact that there had been more accidents at the Waihi Mine during the last six months than had been the case for ten years previously. He was sure these accidents were in a large measure due to the contract system, as the men went to work hurriedly and they left as quickly, and somehow there did not seem to be the amount of care exercised when explosives were being dealt with that was necessary. In our opinion this statement by Mr. Coutts (who had had years of experience) amply proves that the contract men do their work more hurriedly, and consequently more risk is incurred, and at the same time shows that more accidents happened for the last six months than had been the case for the previous ten years, considering the ten years mentioned was worked on the day-wage system.

Here we quote Thomas Oliver again. He said, in regard to phthisis amongst Cornish tin-miners,—

> Taking this view of the malady, tin-miners' phthisis can be to a large extent prevented by laying of the dust by water-spraying, by the men not returning too soon to the particular part of the mine after the use of explosives, and by care taken in removing the ore.

This authority advises, not only in one place in his valuable work, but right through his book, that one chief factor in the prevention of the malady is for the men not to return too soon after firing, and our contention is that any system of work that allures men to run these risks is a danger to the men employed and a menace to the community.

The night shift, more commonly known as the "dog watch," is abhorred by all miners, and is known to be an enemy to the health and vitality of the worker. It was unanimously agreed by the Commission that it was detrimental to the health of the worker under the most favourable conditions, and yet the majority did not feel disposed to recommend its abolition. According to the evidence men become very nervous on this shift, owing to the broken rest and the unnatural times at which they are compelled to take their meals, and consequently they are not in a fit state to exercise that care which mining demands in dealing with dangerous grounds and the use of explosives.

The night shift, especially when added to the contract system (which undoubtedly fosters the continuation of night shift and makes it more frequent), has a most injurious effect on a man's health, hence his constitution becomes run down and leaves the worker an easy victim to phthisis. Dr. Oliver said, "When a man is low in vitality it predisposes him to disease." We here quote Dr. Frazer-Hurst, of Waihi, who stated in evidence before the Commission—

> My first experience with regard to accidents in Waihi was this: that I found almost in every case I underestimated the duration of a man's incapacity as compared with what I had been accustomed to regard as sufficient in other places. That was for two reasons: firstly, because the men did not seem to have the recuperative power that one might expect from that type of man; then, a man might be well enough to return to ordinary work, but he would not be fit to go back to a hazardous occupation such as mining, where other men's lives depend on his being well.

He further stated,—

> My work in the Old Country brought me into touch with men in outdoor occupations, such as shipyards and docks, and there my impression was that the duration of an injury is shorter than it is here.

He also stated that boils and poisoned hands were very common here, which, he said, was usually a sign of lowered vitality. Then, in regard to this matter of lowered vitality he further said,—

> One thing which has struck me forcibly in regard to that [lowered vitality] is the nervousness that one meets with in able-bodied men. It has occurred to me that the broken rest that a man on the shift system has to content himself with has something to do with it. They do not seem to get accustomed to a set hour for sleeping before it is changed again and they have another sleeping-time, and thus their rest is not always so complete. I think that also affects the women in the district. It has struck me while I have been in practice here how very neurotic they are, and I have put that down to the broken rest as well as to the anxiety in regard to accidents; that is the effect those things have upon their general health. Then, of course, the working at irregular hours causes digestive troubles, as does also the frequent alteration of the meal-times.

We also quote from an essay by Mr. McCombie, mine-manager, who received the third prize from the Government for his essay on "The Present Condition and Future Prospects of the Mineral Resources of New Zealand, and the Best Means of Fostering their Development":—

> *Night shift.*—Generally speaking, this shift begins at 12 midnight, and terminates at 8 a.m. It is variously termed the "dog watch" or the "graveyard shift," and it is cordially hated by every one who is unfortunate enough to come under its rule. Speaking from a long experience of the night shift, I have not the slightest hesitation in saying that it is injurious to the health and well-being of those who have to work it, and it is not profitable to employers. Turning out at 11 p.m., after a restless sleep of a few hours, men are not fit to undertake the duties of an ordinary miner, with its everpresent danger, and the work they perform is not up to the required standard either in quantity or quality. It is an indisputable fact that towards the end of a week spent on the night shift the average miner is scarcely able to drag one leg after the other, and he is working under protest all the time. When in this condition it is absurd to expect a man to do a fair eight-hours' "graft," or to protect himself from the risks incidental to his occupation. As a rule, there are more accidents in a mine on the night shift than is the case upon either of the other shifts, and I attribute this entirely to the fact that the victims of such accidents are so enervated through want of rest as to be incapable of taking ordinary precautions to save themselves. Of course, it is absolutely necessary to employ three shifts in a great many instances in connection with mining and milling gold- and silver-bearing ores, and in this respect it would be unreasonable to lay down a cast-iron rule for the guidance of mine-owners. At the same time I think the three-shift system is often carried out where it could be avoided to a very large extent, and it is a blot on our twentieth-century civilization to permit its continuance wherever it can be economically abolished.

Another important matter which we wish to bring under your notice is the payment of workmen's inspectors. The miners employed in any mine are entitled, under subsection (48) of section 40 of the Coal-mines Act, 1908, and section 264 of the Mining Act, 1908, to appoint two persons to inspect the mine on their behalf at least once a month, in order to ascertain its condition. This provision has not been taken advantage of to the extent we would wish. Various reasons have been advanced as to why the rule has not been carried out. All witnesses examined on behalf of both management and workmen agree as to the benefits to be derived by observing this rule, but they differ in their reasons as to why the appointments were not made and the examinations carried out. Some miners' unions gave as their reasons that they could not afford to pay two men, while others contended that the workmen's inspectors appointed under the Act had no power, and therefore they did not see any reasons for making the appointments. But by far the greater number suggested that the chief reason for this rule being neglected was that the workmen who might be appointed, and who might give an adverse report on the conditions prevailing in the mine, were afraid of being victimized. Although no cases could be cited in which dismissal of workmen under such circumstances had actually occurred, the witnesses maintained that there were more ways than one of making men suffer apart from discharging them.

Further, a remarkable feature about the reports brought before Coroner's inquests in this Dominion by workmen's inspectors is their unanimity of "No blame being attachable to any one." We are inclined to think that there are some grounds for the men being afraid to express an honest opinion. Mine-managers are anxious for the workers to appoint inspectors under existing conditions, and they deny that there is any ground for being afraid of unfair treatment.

We have given some attention to this subject, and we feel it would be better for all concerned if the workmen's inspectors were appointed and paid in the same manner as prevails in France. We have no hesitation in saying that if the same system were adopted in this Dominion it would give entire satisfaction to all concerned. The French miners have had many years' experience of the system, which entitles them to appoint a person from their own number who shall devote his whole attention to the examination of the mines. Those who are appointed are generally thoroughly experienced miners of more than average intelligence, and so far as we can learn, this examination has given absolute satisfaction, and the French miners believe that it has done more to increase the safety and comfort of the miners than the general inspection by the Government Inspector of Mines. The Governments of Britain, Germany, and Austria have been making careful inquiries as to how the system works in France, and the miners of those countries are also urging their Governments to give them powers similar to those possessed by the French miners in any future mining legislation. It has been argued by the members of the present Commission that this would remove the control of the workmen's inspectors from the hands of the miners themselves by making them Government officials; but this is not so in France. It is not a dual inspection; and, although the Government pays these inspectors, it in turn recovers their salaries from the mine-owners. The Government under these circumstances has no control over them. It has also been argued that friction might arise between the mine-managers and the workmen's inspectors, or between the Government Inspectors of Mines and the workmen's inspectors; but we would point out that under both the Coal-mines and Mining Acts the workers have the right to appoint inspectors, and the only difference would be that the Government would pay them instead of the miners; also that they would be permanently employed rather than occasionally, as at present. This would place them in a position to express their opinions freely, independent of any one. We append an extract from the French law on the subject:—

> The French law of 8th July, 1890 (amended by the laws of 25th March, 1901, and of 9th May, 1905), provides for the election of delegates by the working-miners for the regular inspection of the mines. The duties of these delegates are to examine twice a month all the underground workings in their districts and places where serious

accidents have occurred. The districts are fixed by the prefect, who is guided in his decision by the reports made by the Government Inspectors and the statements submitted by the mine-owners. As to the extent of these districts, it has been laid down that the workings belonging to one and the same owner, which can be inspected carefully in not more than six days, form one inspection district. In the Pas-de-Calais Coalfield, where, according to M. Leon, the Chief Inspector of this district, about 65,000 men are employed below the surface, there are seventy of these delegate inspectors. The reports made by the delegates must be entered in a book kept by the owner for that particular purpose. The owner may make his remarks on the delegate's report. Both delegate and owner must immediately forward a copy of their remarks or reports to the Prefect of the Department, who must communicate them to the Mines Inspectors. The Government Mines Inspectors have no direct communication with the delegates. They must not give them orders. Thus the delegates do not form a part of the official French mines inspection; they are described in an order issued by the Minister for Public Works, dated 17th February, 1891, as *visiteurs rapporteurs* (visiting reporters). The Government Inspectors may require the presence of the miners' delegate on their visits of inspection. The number of days employed for inspection by the delegate varies according to the size of his district. The maximum is twelve days. Accidents necessitating the presence of the delegate are not reckoned in the number of days employed by him in inspection work.

Electorate, Eligibility, Remuneration.—The electorate is composed of all actual underground workers of French nationality. Eligibility: Any elector having worked for not less than five years underground (two of which must have been spent in the district or an adjacent district, provided that ten years has not elapsed since he last worked) is eligible if he is twenty-five years of age, able to read and write, and has not been guilty of any infraction of certain mining laws and articles of the penal code. Delegates and deputy-delegates are elected for the space of three years. The remuneration varies. It is computed by the number of days spent in examining the pits. If these days number twelve per month (the maximum) the delegate receives twenty-four times the daily wage of a first-class hewer. No delegate is supposed to have spent less than ten days per month in inspecting mines in which 250 men are underground; these ten days give him the right to a monthly salary equal to twenty times the day-wage of a first-class hewer. Services rendered in case of accident, &c., are paid extra, but no delegate can receive more than thirty times the above-mentioned standard day-wage. (This standard wage is fixed yearly by the prefect.) The delegate's salary is paid by the Government with moneys contributed by the mine-owners.

We therefore recommend for your consideration—

(1.) Prohibition of the midnight shift.
(2.) Abolition of the contract system.
(3.) Payment of workmen's inspectors.

W. E. Parry.
John Dowgray.

I concur in the above report so far as it relates to the payment of workmen's inspectors.
N. D. Cochrane.

Wellington, 16th December, 1911.

APPENDIX.

No. 1.—Table showing Number of Deaths from Accidents at New Zealand Mines during the Years 1906 to 1911.

(Compiled from the New Zealand Mines Department's Annual Reports.)

Cause of Accident.	1906.	1907.	1908.	1909.	1910.	1911.
At Metalliferous Mines.						
Explosion	3	..	3	2	2	..
Fall of ground	3	2	2	1	1	2
In shafts	1	..	1	3	5	..
Miscellaneous: Underground	..	..	2	1	..	1
,, On surface	1	2	6	5	3	3
About dredges	6	3	1	2	4	1
Total killed	14	7	15	14	15	7
Number of employees	8,716	9,389	8,880	7,651	8,121	..
Rate of persons killed per 1,000 employed	1·60	0·84	1·69	1·83	1·84	..
At Coal-mines.						
Explosion of firedamp	..	..	..	..	..	1
Falls in mine	2	5	4	4	10	11
In shafts	..	2	..	..	1	..
Miscellaneous: Underground	3	3	..	2	5	1
,, On surface	1	2	1	1	..	2
Total killed	6	12	5	7	16	14
Number of employees	3,692	3,910	3,894	4,191	4,533	..
Rate of persons killed per 1,000 employed	1·62	3·07	1·28	1·79	3·55	..

Summary for Ten Years ended 31st December, 1910 (with Addition for 1911 to Date).

Year ended 31st December.	At Coal-mines.			At Metal-mines.		
	Number of Persons		Rate per 1,000 employed.	Number of Persons		Rate per 1,000 employed.
	Killed.	Employed.		Killed.	Employed.	
1901	3	2,754	0·91	14	12,732	1·09
1902	2	2,885	0·69	14	11,398	1·04
1903	4	2,852	1·40	19	10,210	1·86
1904	4	3,288	1·21	15	10,898	1·37
1905	6	3,269	1·83	21	9,362	2·24
1906	6	3,692	1·62	14	8,716	1·60
1907	12	3,910	3·07	7	9,389	0·84
1908	5	3,894	1·28	15	8,880	1·69
1909	7	4,191	1·79	14	7,651	1·83
1910	16	4,533	3·55	15	8,121	1·84
1911	14	..	..	7	..	..

Frank Reed, Inspecting Engineer, Mines Department.

No. 2.—New Zealand Quartz-mines: Temperatures of Mine-air at Deepest Workings.

Name of Mine.	Date.	Place where Observations were taken.	Temperature in Degrees Fahrenheit.	
			Dry Bulb.	Wet Bulb.
			°	°
Coromandel Goldfield—				
Old Hauraki	14/9/10	220 ft. level, main drive	74	71
,, ...	,,	,, face of stope	74	71
,, ...	,,	300 ft. level, drive on reef	76	74
,, ...	,,	,, crosscut	74	72
,, ...	,,	400 ft. level, main crosscut	69	67
Kapanga	11/8/11	1,000 ft. level, drive west at 500 ft.	83	83
,, ...	,,	,, drive east at 60 ft.	77	76
,, ...	,,	920 ft. level, drive north	76	75
,, ...	,,	940 ft. level, drive west	77	76
,, ...	,,	,, rise 30 ft. up	77	76
,, ...	,,	900 ft. level, drive east at 100 ft.	76	75
Thames Goldfield ..	12/8/11	Outside shade temperature	55	51
May Queen	,,	1,000 ft. level, face of south crosscut ..	84·5	83·5
,, ...	,,	,, Exchange reef	82	82
Saxon	,,	,, face of main crosscut at 730 ft. from shaft	80	80
,, ...	,,	,, end of 22 in. air-pipe 700 ft. from shaft	76	73
New Sylvia	15/8/11	Outside shade temperature	55	51
,, ...	,,	Adit (intake aircourse)	65	64
,, ...	,,	,, ,, leading stope ..	71	71
Watchman	,,	Outside shade temperature	62	56·5
,, ...	,,	Adit level, Dunedin lode	64	63
Waitangi	,,	Outside shade temperature	62	58
,, ...	,,	Beach adit level, end of air-pipe, 2,271 ft. in ..	70	69

Mine-temperatures.

Date.	Place where the Observations were taken.	Temperature in Degrees Fahrenheit.	
		Dry Bulb.	Wet Bulb.
	Waihi Mine.	°	°
18/8/11 ..	Outside mine, in shade	62½	56½
	Martha east drive from No. 2 shaft	75	74
	Welcome, west of Richard crosscut, 30 ft. in	74	73
	Edward, east of Perch crosscut, about 200 ft. in	73½	73
	Edward, 570 ft. in from Perch crosscut	83	82½
	No. 4 shaft crosscut, 1,000 ft. in	61	59
	Reptile crosscut, 800 ft. in, end of blower-pipe 800 ft. in ..	82	82
	Empire, east face, 617 ft. in	81½	81½
	Royal face, 800 ft. in	78	78
	Face of crosscut	77	77
	Perry's stope, 24 ft. up, Empire	70	69
	Brown's stope	72	70
	Martha south, Robinson's stope	68½	68
	Dutton's drive	82	81
19/8/11 ..	Outside mine, in shade	62½	54
	Royal east face, 900 ft. in from No. 4 shaft	77	76
	Pearson's stope, 88 ft. up	79	78
	,, other end	79	79
	Napier's stope, 50 ft. up	75	74
	Royal Elsegood's stope, 40 ft. up	81	81
	Scorpion crosscut, face, 600 ft. in	82	80
	Edward and Welcome, 80 ft. up	75½	75
21/8/11 ..	Outside mine, in shade	54	45
	Edward level, under Bullock's pass	80	79
	Bullock's stope, 90 ft., west end	82¾	82
	,, 90 ft., east end	82	81½
	Empire, east Williams's stope, 70 ft. up	77	70
	Furey's stope, 60 ft. up	78½	77½
	Regina section, Martha Prisk's place	70	69½

MINE-TEMPERATURES—*continued.*

Date.	Place where the Observations were taken.	Temperature in Degrees Fahrenheit.	
		Dry Bulb.	Wet Bulb.
	Waihi Mine—continued.	°	°
21/8/11 ..	No. 1 shaft, north-west crosscut	61	59½
	Martha south, Truscott's stope, 85 ft. up	70½	70
	,, north, Cameron's pass, near fallen ground	82½	82
	Edward filling-shaft, first observation	83	82
	,, second observation	81	80
	Royal, Healey's place	78	77½
	The observations were taken in the warmest places in this mine.		
	Waihi Extended Mine.		
26/8/11 ..	Outside mine, in shade (wet day)	50	49
	No. 5 (960 ft.) plat at winding-shaft	83	79½
	,, west crosscut at timber stopping (no work being done here)	90	89
	Waihi Grand Junction Mine.		
28/8/11 ..	Outside mine, in shade	55	52
	No. 5 (944 ft.), return air from mine at fan	69	69
	,, plat at shaft	63½	60
	,, No. 1 winze, Grace lode, 40 ft. down	82	79
	,, Ferguson's stope, Empire lode, 900 ft. east	76	73
	,, on level under Ferguson's stope	70½	64½
	,, Lindwall's stope, Royal east	73½	70½
	,, Adams's stope	84	83
	,, Keen's stope, 40 ft. up Mary lode	83½	83
	,, ,, other end	75	70
	,, on level under stope	71	67½
	,, at connection with Extended	84½	73
	,, Henderson's stope, 42 ft. up	79	78
	,, ,, another place	81	78
	,, under Henderson's stope at level	74	71
	The observations were taken in the warmest places in this mine.		
	Talisman Mine.		
4/4/11 ..	South face drive, No. 13 (1,875 ft.) level	79	78
	Bonanza stopes south, No. 15 rise, same level	79	78
	No. 13 winze, below No. 13 (1,875 ft.) level	83	81
	Mullock rise, between Nos. 12 and 15 rises, same level ..	82	81
	Bottom of No. 12 winze, south face, same level	80	79
	North face, bottom of same winze, same level	78	77
	Face of north drive, No. 12 (1,675 ft.) level	69	68
	,, drive, Shepherd's lode, same level	69	68
	Bonanza stopes, intermediate level	77	75
	,, above No. 12 (1,675 ft.) level	78	77
	Same stope north of No. 12 rise, same level	77	76
	Stopes on east branch north No. 7 winze	76½	75½
	Main crosscut, river level	67	65
3/8/11 ..	Main crosscut, 70 ft. above No. 13 (1,875 ft.) level, leading to Woodstock shaft	60	56
	Main crosscut south of shaft No. 13 (1,875 ft.) level	62	60
	Main drive on reef north of No. 12 winze	70	64
	Face of drive on main lode north, over 1,000 ft. from shaft ..	77	76
	No. 16 rise, 20 ft. north of above face, height 100 ft. ..	74	72½
	Welcome winze, east crosscut No. 13 level, depth 62 ft. ..	80	78
	North face, bottom of No. 12 winze, 140 ft. below No. 13 level	76	73
	South face, from bottom No. 12 winze	80	75
	New Zealand Crown Mines.		
7/8/11 ..	Main crosscut, No. 4 (1,675 ft.) level	55	54
	Edwards's stope, above No. 4 level	59	56
	Hodges' rise, 32 ft. above No. 4 (1,675 ft.) level	62	59
	Wall's rise, below No. 4 level, Welcome reef	64	62
	Radcliffe's stopes, 100 ft. above No. 4 (1,675 ft.) level ..	69	65
	Robinson and parties' drive south on Welcome reef ..	58	56
	Rise on same cross-lode, above this level 16 ft.	60	58
	Main crosscut, No. 5 level	58	56
	Main shaft	56	53

No. 3.—Table showing the Temperature and Analyses of Mine-air, Reefton Quartz-mines. Observations taken 30th September, 1911, by T. O. Bishop, Inspector of Mines.

Name of Mine and Section.	Temperatures.		Analyses.			Remarks.
	Wet Bulb.	Dry Bulb.	CO_2.	CO.	O.	
	°	°				
Progress Mine.						
No. 2 east intermediate ..	70·0	71·0	0·54	..	20·65	Dead-end; compressed air.
No. 10 (1,266 ft.) level, 27 east	..	..	0·94	..	19·32	Rock-drill place, shovelling.
No. 9 level	..	..	0·46	..	20·13	Air from No. 10 stopes.
No. 11 (1,416 ft.) or Pioneer stopes	78·0	79·0	0·53	..	20·00	No current.
Ditto	75·3	77·0	..	..	..	In the current.
No. 2 east intermediate ..	71·0	72·0	0·45	..	20·39	Opposite end from No. 1 sample.
Pioneer stopes	74·0	75·0	0·41	..	20·44	Lower level than sample No. 4.
Energetic Mine.						
No. 10 stopes north ..	73·5	74·5	0·25	..	20·64	
No. 11 (1,860 ft.) level ..	73·0	74·0	0·36	..	20·58	Dead-end.
No. 8 stopes	73·0	74·0	0·28	..	20·62	Close of uprise to No. 7.
No. 10 stopes south ..	72·0	73·0	0·23	..	20·70	50 ft. from pass.
No. 6 (1,234 ft.) level footwall drive north	..	..	0·30	..	20·61	Dead-end.
No. 9 north stopes ..	74·5	75·5	0·33	..	20·57	No current.
Keep-it-Dark.						
No. 7 (1,074 ft.) stopes ..	70·5	71·5	0·15	..	20·90	Appreciable current.
Blackwater.						
No. 1 level	..	..	..	0·005	..	After firing in stopes.
No. 2 north stopes ..	60·0	60·0	0·42	..	20·63	
No. 3 level crosscut ..	..	..	..	0·005	..	In face 30 minutes after firing.
,, ..	..	..	..	0·008	..	50 ft. back.
Big River.						
West intermediate stopes ..	70·0	71·0	0·33	..	20·68	
No. 10, leading stope north ..	71·0	72·0	0·35	..	20·61	28 ft. wide.
South-west level stopes ..	..	..	0·53	..	20·36	
New east intermediate ..	..	..	0·34	..	20·55	
Progress Mine.						
No. 10 (1,266 ft.) Progress drive	..	..	0·04	..	20·88	Dead-end.
No. 11 (1,416 ft.) south crosscut	..	..	..	..	..	Lost in transit.
Ditto	..	..	0·69	..	20·45	
Crosscut from south rise ..	..	..	0·25	0·010	20·58	50 minutes after firing.

No. 4.—Air-measurements taken at Waihi Grand Junction Mine, 28th August, 1911.
(Ventilated by Sirocco fan.)

Locality where Measurements taken.	Quantity of Air circulating per Minute.	Total Number of Men on Day Shift.	Average Quantity of Air per Man per Minute.
Intake Air.			
No. 5 level (944 ft. deep)—	Cub. ft.		Cub. ft.
South crosscut	16,293	50	325
North crosscut	14,492	12	1,208
No. 4 level (794 ft. deep)—			
North crosscut	4,738	18	263
No. 3 level—			
North crosscut	9,332	8	1,166
Quantity descending main shaft	44,855		
,, other inlets	2,710		
Total intake	47,565		
Return Air.			
Returning *via* Extended Mine at No. 5 level ..	11,550		
Returning through Sirocco fan	36,015		
Total measured return	47,565	88	540

Note.—The fan is of Sirocco type, double inlet, 19 in. diameter, electrically driven: estimated B.H.P., 34; observed W.G., 1·12 in. at fan.

	Wet Bulb.	Dry Bulb.
Temperature of outside air in shade	51½°	54°
,, mine-air discharged by fan	69°	69°
,, ,, maximum observed	83°	83½°
,, ,, minimum observed	64½°	70½°

DIAGRAM No 1, to illustrate the "JAMES" WATER-BLAST

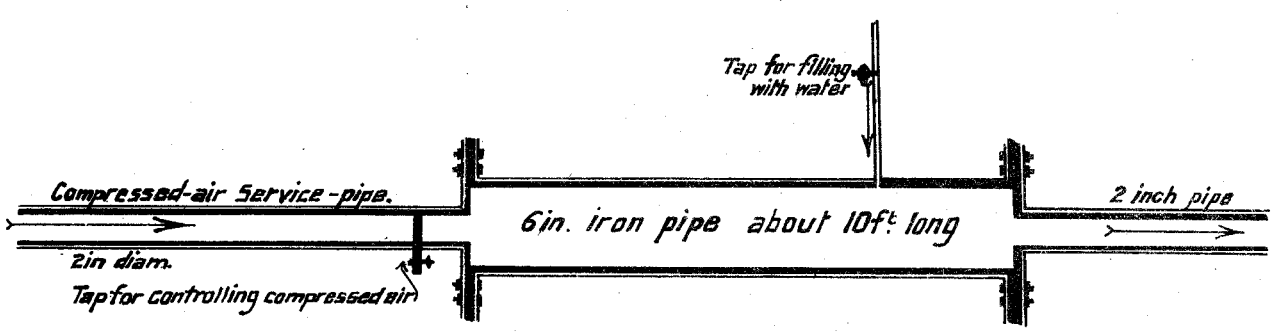
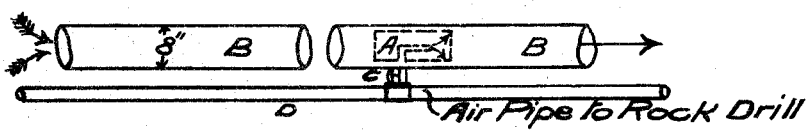
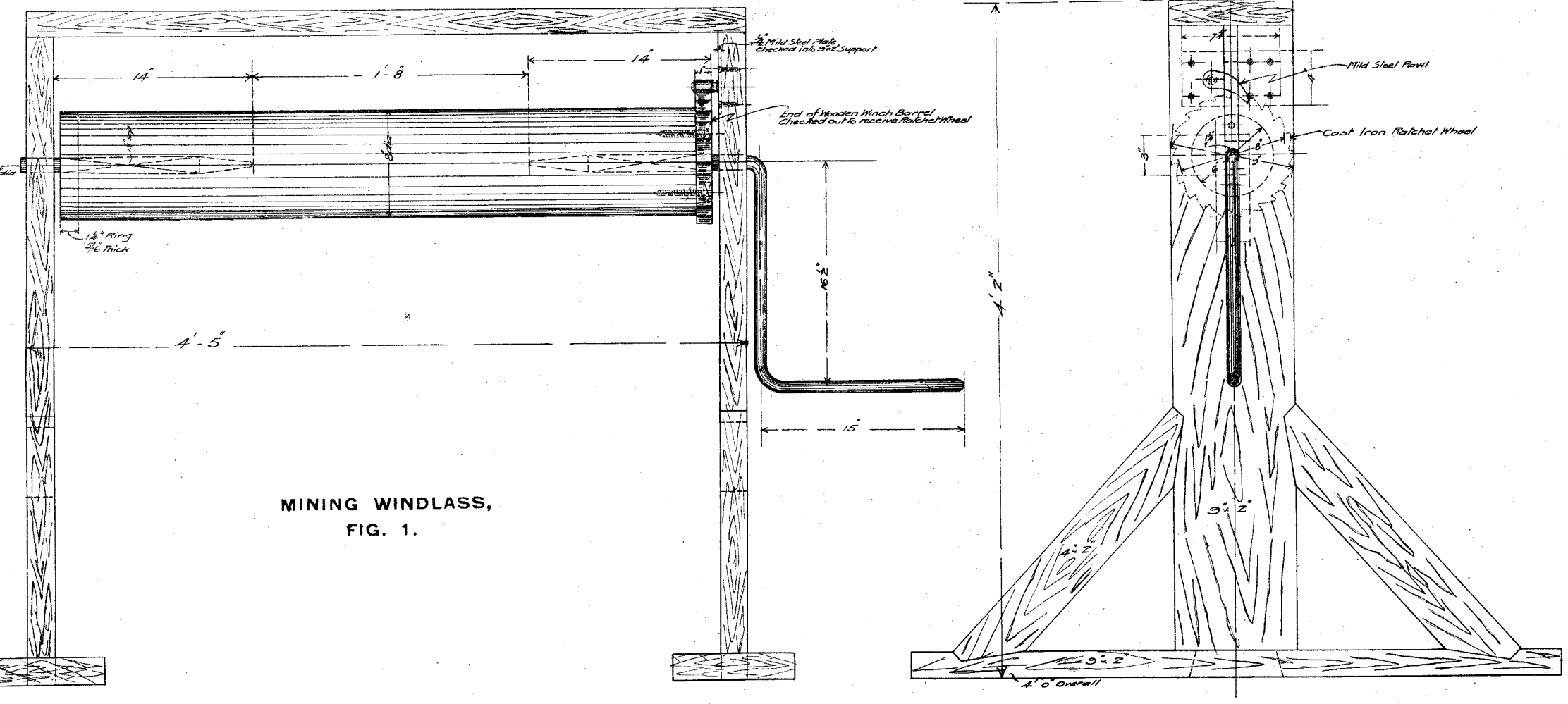


DIAGRAM No. 2 to illustrate a useful form of VENTILATING PIPE.

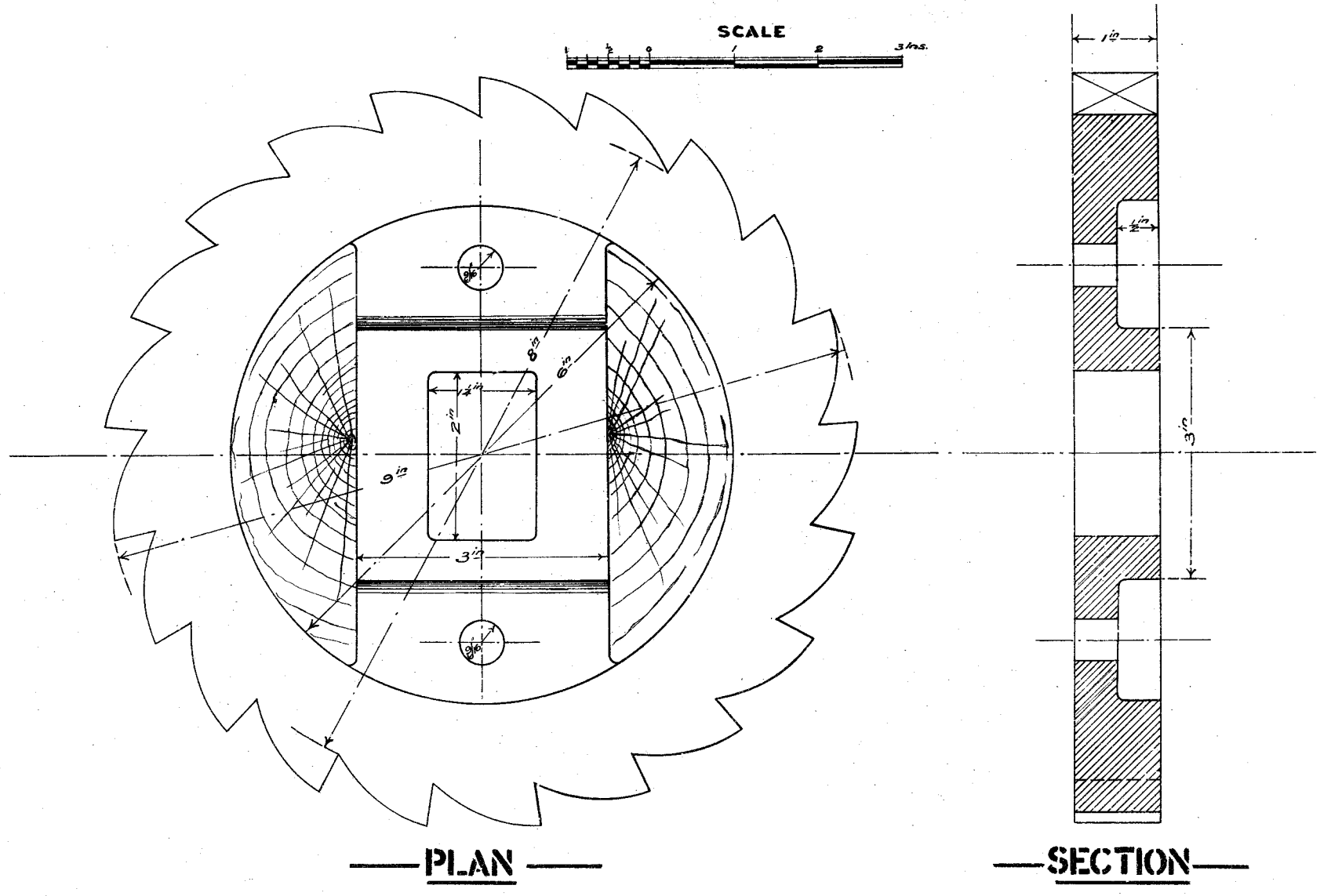


A Small reversible air nozzle inserted in the ventilating pipe B to induce an air current either to or from the development point.
C Air valve connected to air pipe D



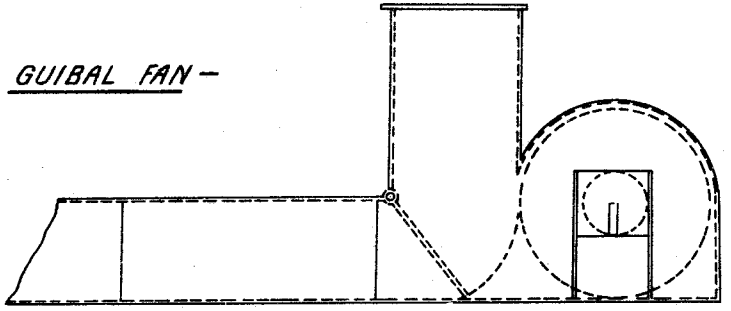
MINING WINDLASS,
FIG. 1.

MINING WINDLASS
CAST-IRON RATCHET WHEEL,
FIG 2.



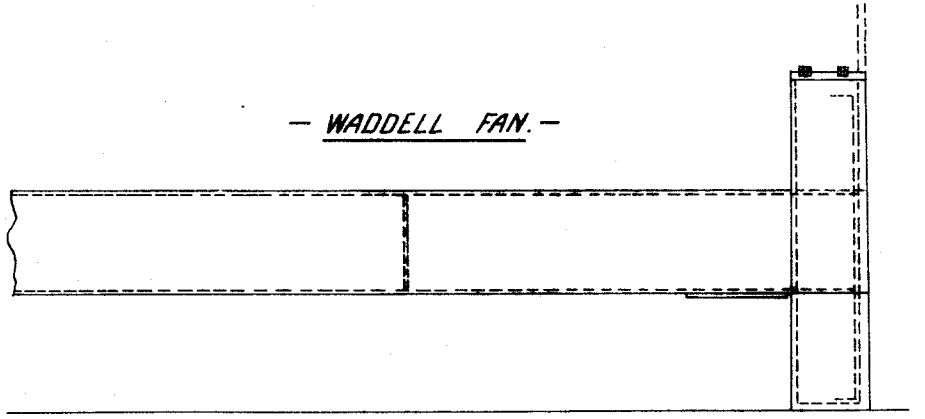
— AN ARRANGEMENT FOR REVERSING THE AIR CURRENT. —

— GUIBAL FAN —

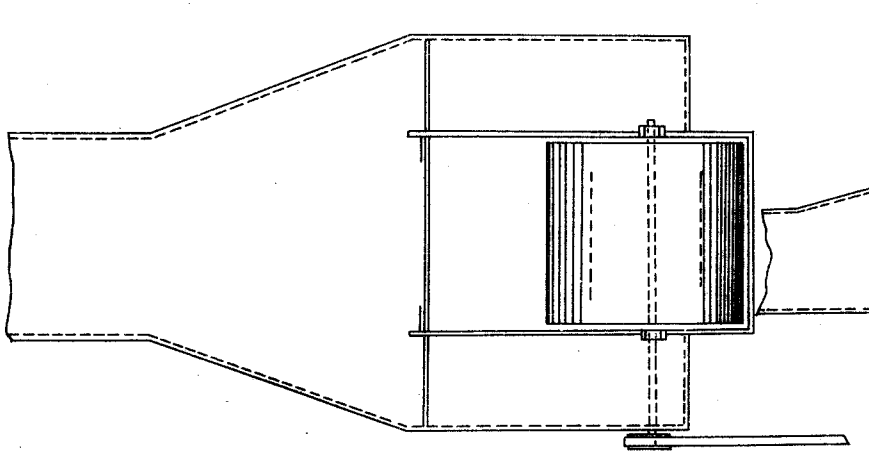


— ELEVATION. —

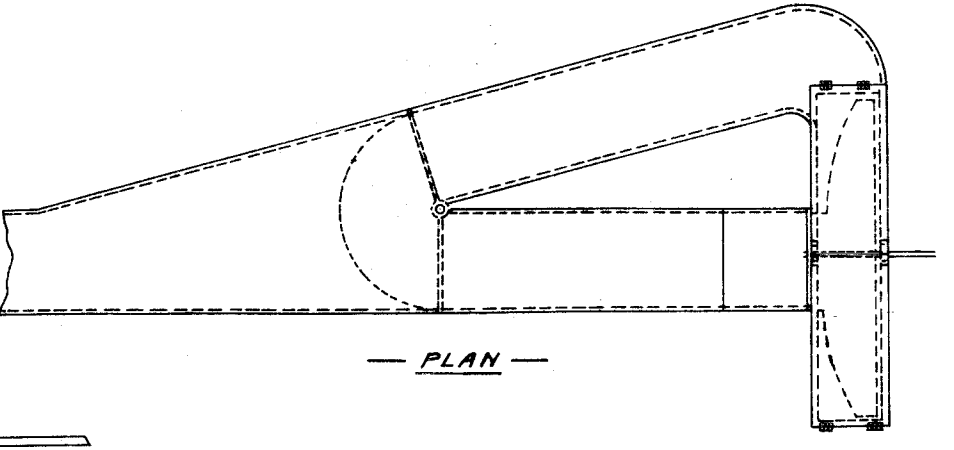
— WADDELL FAN. —



— ELEVATION. —



— PLAN. —



— PLAN —

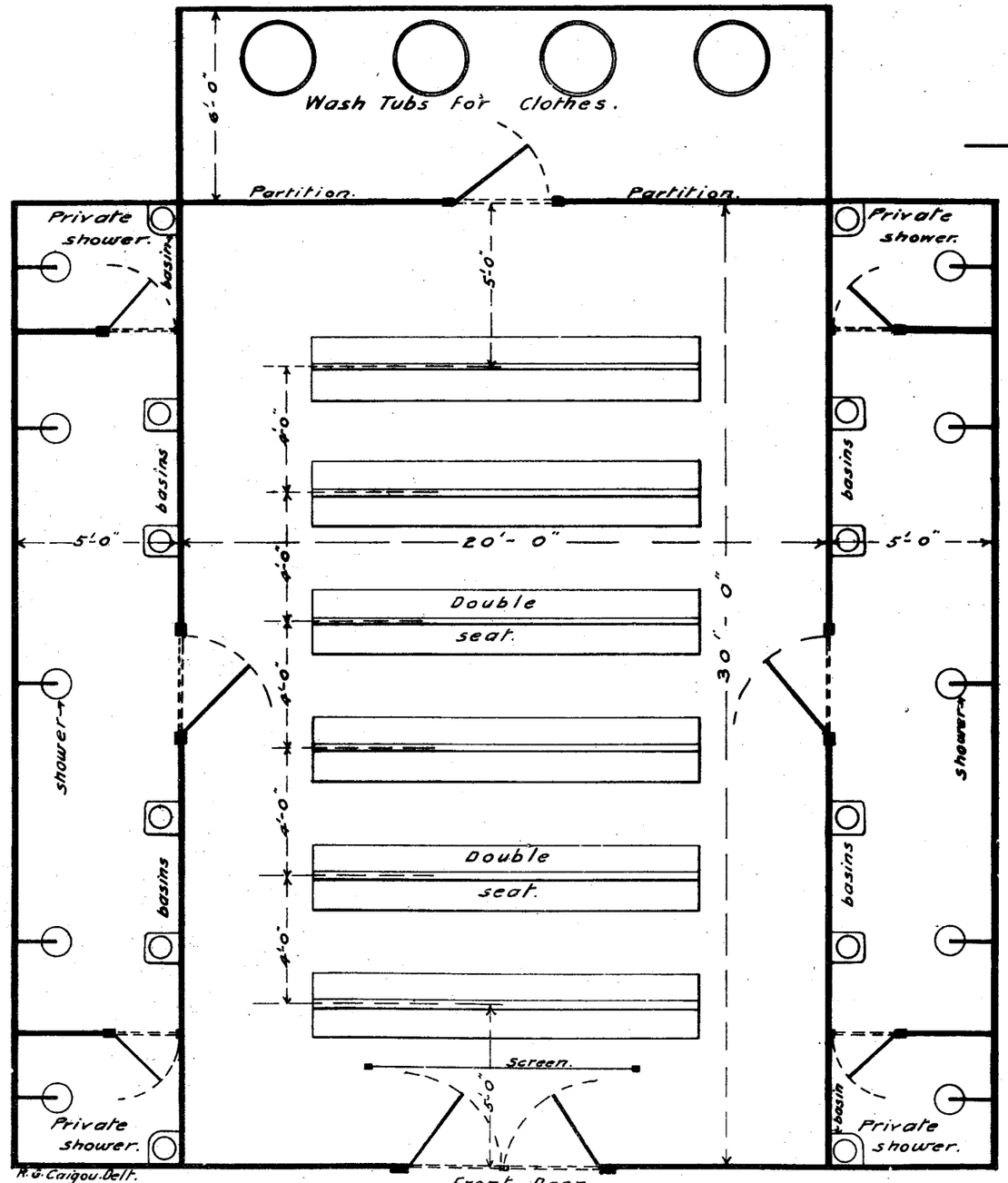
— SUGGESTED DESIGN —

— FOR —

— CHANGING ROOM & BATHS FOR MINERS. —

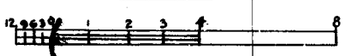
(— CAPACITY, — 50 MEN ON ONE SHIFT.)

— To Accompany the Report of the Royal Commission on Mines N.Z. 1911. —



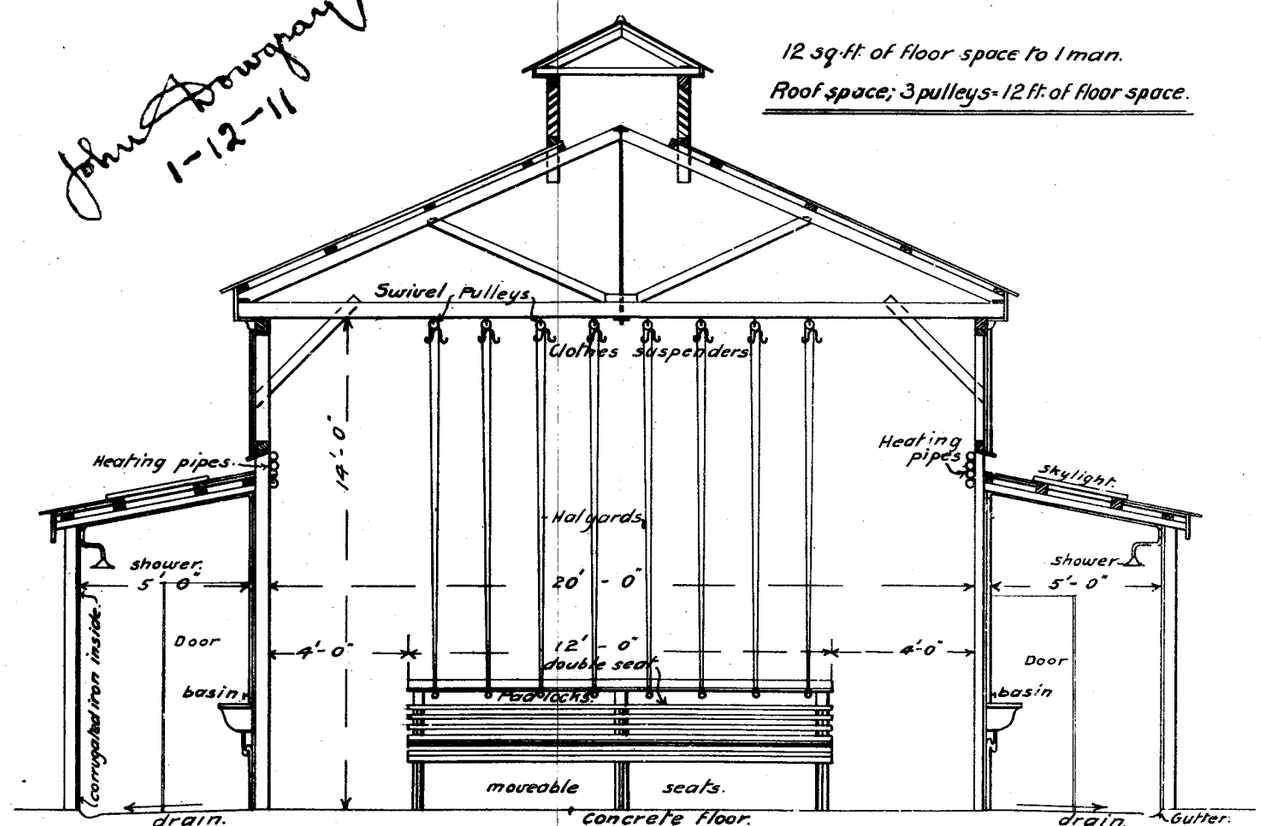
R.G. Caigou. Delt.
1250.2.12.1206.

Scale



John Bowgay
1-12-11

12 sq. ft. of floor space to 1 man.
Roof space; 3 pulleys = 12 ft. of floor space.



INDEX TO WITNESSES.

INDEX TO VOLUME

MINUTES OF EVIDENCE.

COAL.

WHANGAREI COURTHOUSE.—9TH AND 10TH AUGUST, 1911.

MATTHEW WALLACE sworn and examined. (No. 1.)

1. *The Chairman.*] What are you, Mr. Wallace?—A miner.
2. Do you hold any other position?—Yes, I am secretary of the Hikurangi Miners' Union.
3. How long have you been a miner?—Five years.
4. Where have you mined?—Only at Hikurangi.
5. Under whom have you worked?—Mr. W. R. Dunn and Mr. W. Morgan, mine-managers.
6. The whole of your mining experience has been gained in that one mine?—Yes.
7. Will you tell the Commission briefly what you have to complain of, Mr. Wallace?—About the temperature of the mine, the ventilation, and the question of change-houses, and also as to the sanitary arrangements at the mine.
8. You do not make complaint regarding accidents or as to the safety of the mine?—No; the accidents are very few, considering.
9. *Mr. Dowgray.*] To whom have you complained about the ventilation?—We complained to the Inspector of Mines on several occasions, and also through the House, regarding the ventilation of the Northern Mine.
10. *The Chairman.*] Through the House—in what form?—Through Mr. Mander, M.P.
11. *Mr. Dowgray.*] And was the ventilation remedied?—Yes, to a certain extent.
12. But it is still defective?—Yes.
13. Do you consider the air in which you are working at present is properly directed round the working-faces?—No, I do not.
14. *The Chairman.*] In what way is it diverted?—The air is not actually brought to the places where the men are working.
15. How could that be remedied?—By proper stoppings the air could be taken to the different sections where the men are working.
16. *Mr. Dowgray.*] And we may take it there is no method of taking the air round the working-faces?—There are not sufficient stoppings.
17. *The Chairman.*] Have you asked the manager at any time to put in sufficient stoppings?—We have not actually asked him, but we have complained of the ventilation.
18. *Mr. Dowgray.*] Do you keep the check inspectors' reports upon the colliery?—Yes.
19. Have you the reports that have been made up to date?—Yes.
20. *The Chairman.*] Have you the book with you?—Yes. [Report-book produced.] The usual way is this: we inspect the mine and enter our report in the manager's book at the mine. Then we put a copy of our report into our book.
21. Who are the check inspectors?—Mr. Harris and myself. We are both present to give evidence.
22. The manager has a copy of those reports—they are official records?—Yes.
23. Give us the points to which you wish to draw our attention, by quoting from your reports as to the state of things complained of, and as shown in your reports?—Before quoting from the reports I wish to mention that I overlooked, in enumerating our complaints, a reference to the neglected state of the travelling-roads. They are very wet, and the water has a serious effect on the feet of the truckers.
24. In your report, dated the 17th December, 1909, there is a complaint entered about the ventilation of the mine?—Yes.
25. Were any steps taken after that to remedy the complaints made in that report?—No steps were taken to remedy the defects mentioned.
26. Then, in your report of the 18th June, 1910, there is a complaint about the ventilation in one portion of the mine, and also a complaint about the presence of water on the travelling-ways?—Yes.
27. And also about insufficient timbering?—Yes.
28. Was anything done to remedy any of these conditions?—The only way to get at that is by referring to the next report, dated the 22nd October, 1910.
29. In that report you complain again of the ventilation, the timbering, and the travelling-ways?—Yes. I think that is the last report that has been made.
30. There has been no report made since then?—No.
31. How often are these reports supposed to be made?—There is no standard time; they have the right to take them every month.
32. What has the average condition of the mine been since you ceased making those reports?—I do not think the reports made the slightest difference to the condition of the mine, because there has been no difference since the last report was made in October last.
33. If the conditions have been sufficiently bad to warrant complaint, why have you not complained since last October?—Because, though we were continually complaining before, we got no remedy. The workers' inspections have had no effect on the conditions of the mine.

34. *Mr. Dowgray.*] You consider the air was not properly conducted round the working-faces?—Yes.

35. You are of the opinion that by a little expenditure on brattice the ventilation could be much improved?—Yes, if proper stoppings were put in to carry the air to the working-faces.

36. In your reports you frequently make mention of places being insufficiently timbered: have you had many accidents in the mine?—No, there was only one accident, and I would not say that that was the result of insufficient timbering. The man had his back badly hurt.

37. *The Chairman.*] How long ago?—About two years ago.

38. *Mr. Dowgray.*] By a fall from the roof?—Yes.

39. When you complained about the timbering, was it remedied?—Yes, sometimes.

40. It was more apt to be remedied than the ventilation?—Yes, they were more ready to remedy that than the ventilation.

41. You make reference to water on the trucking-roads?—Yes, the water affects the feet of the men, and they lose sometimes a week or more; the toes get the skin worn off, and they get raw. I have suffered that way myself.

42. And that could be remedied by keeping the water off the trucking-roads?—Yes.

43. *Mr. Parry.*] You have been working in those places for five years, and the temperature has been very high, has it not?—Yes, I have worked in some very hot places.

44. Have you felt any ill effects from working there?—Yes. One is not able to get the same sleep, and one loses his appetite.

45. *The Chairman.*] Can you give us any idea of the temperature?—Yes. I hung the thermometer on a prop alongside of where I was working, and when I knocked off work it was registering 82°. That was about three months ago.

46. Did you draw the manager's attention to that?—Yes, directly I came out of the mine.

47. What did he say?—He simply listened to me, but that was all—nothing was done.

48. *Mr. Parry.*] Have any men fainted through the excessive heat while you have been working in the mine?—No.

49. *The Chairman.*] Have you known of any man leaving his place on account of the heat?—It is quite a usual thing for a man working in these places to go out when he fills his skip and wait till the skip comes back.

50. Have you known any case where a man has refused to work in any particular place because of the heat?—No; but in No. 6 district there was a place being driven to get to the back of a creep, and during that time six-hour shifts were worked.

51. Where was the nearest cool place—how far would the men have to go after filling the skip, as you stated?—The distances vary.

52. *Mr. Parry.*] Would it be any advantage to the miners to have proper change-houses and drying-apparatus?—Yes, a great advantage. A man after working in these hot places gets wet through with sweat, and after ceasing work has to walk perhaps a mile in his wet clothes. Otherwise he could have his bath at the mine, change, and walk home dry. Then, again, a man getting wet on his way to the mine is at present forced to work through the whole day in his wet clothes, whereas if he had a change-house he could work in dry clothes.

53. *The Chairman.*] What accommodation would be required?—There are about twenty-four to twenty-six men on a shift, and with the addition of the truckers and so forth there would be between forty and fifty on each shift. They would need about half a dozen baths with hot water—the coal-miner always washes in hot water.

54. Both plunge and shower?—No, just a shower.

55. You would not want to build baths in?—No.

56. *Mr. Parry.*] Have there been any obstacles put in the way of the workmen's inspector?—No.

57. He has had free access to the mine?—Yes.

58. What inconvenience are you put to in regard to sanitary appliances in this mine?—The men require them, as at present, if they want to go to the surface, it takes perhaps half an hour; naturally, the man is not going to lessen his wage (they are on tonnage rates) by going out, and he therefore uses the mine.

59. You think sanitary arrangements are very much needed?—Yes, they are very necessary.

60. In regard to your complaints to the mine-manager, you really thought when the complaints were made he would remedy them?—Yes.

61. *Mr. Reed.*] Mr. Wallace, you stated that this is the first mine you have ever worked in?—Yes.

62. You have had no other experience?—No.

63. Do you expect the temperature of the mine to be equal to that of the outside air?—No.

64. You stated that your last report was made in October last: have you made none since then?—No.

65. Is it not a fact that a fan has been installed since then?—Yes.

66. Has the fan not improved the conditions of the mine?—Only the conditions in one section of the mine.

67. *The Chairman.*] Which section?—That to which the fan is nearest.

68. Is that one of the sections complained of in your reports?—No.

69. Are you aware that 27,000 ft. of air is being returned by the fan?—Yes.

70. Do you think that improves the conditions?—It only benefits the short circuit of the mine; it is not present through the whole distance.

71. How long is it since the fan was erected?—About six months.

72. Is it a fact that since the fan was erected you have never made a complaint?—Yes, we have made no complaint.

73. *Mr. Reed.*] Have you been nervous of making these complaints or reports?—No.

74. *The Chairman.*] Had you any reason for not making them?—They put the union to expense, and we gained nothing by them.

75. *Mr. Reed.*] You stated that some truckers were off for a week or a fortnight through getting their feet wet?—Yes, I was one of them; Dunsmuir was another.

76. Did you or he see a doctor?—No.

77. And the names of the others?—J. Romo was one; he was under Dr. East's care. There was also P. Whorskey.

78. You stated that in some places the men worked a six-hour shift: who decides whether it shall be a six-hour shift?—The officials of the union and the manager.

79. What are the conditions which constitute a six-hour place?—If it is a wet place. In this case it was the heat of the place.

80. What payment do they receive in that case?—They get eight-hour wages for a six-hour shift.

81. What is the normal shift?—Eight hours.

82. Then it is an advantage for a man to have a six-hour place sometimes?—Yes, in a way.

83. You stated that you just took a maximum temperature of 82° in the mine: was that dry or wet?—Dry.

84. Do you know the wet-bulb temperature?—No.

85. Are you aware that you could get that temperature in Queen Street, Auckland, in the shade?—No, I was not aware of that.

86. Do you consider 82° dry an excessive temperature?—Yes, for a man to work in.

87. You spoke of change-houses: would the men always use them?—Yes, as far as I know, they would. Certainly I would myself.

88. If you were living near the mine?—There are no houses near the mine.

89. In the event of a small company with little capital and very few men having to provide change-houses and bath-houses, on whom do you consider the cost of these should fall?—On the company, I take it.

90. Would you believe in the men contributing towards the cost of these bath-houses?—No.

91. *The Chairman.*] What water is there available at your mine, for instance?—There is a spring flowing not far from the mine.

92. Would they have to erect tanks, or would the natural watercourse give sufficient pressure?—The spring is there summer and winter.

93. *Mr. Reed.*] Is the water for the boiler easily got in the summer?—Yes; the miners use it also.

94. *The Chairman.*] What is the flow—half a Government head?—I could not say.

95. *Mr. Reed.*] Have you made complaints to the Inspector of Mines, as recorded in your check inspectors' reports?—Yes, I have personally explained the matters to him, and these reports are open to the Inspector and he can see them for himself.

96. In regard to sanitation, are you aware that coaldust is a disinfectant and deodorant?—Yes.

97. Have any ailments been experienced by the miners as the result of these return airways being utilized for sanitary purposes?—Not that I am aware of.

98. *Mr. Cochrane.*] In regard to your complaint about the change-houses, Mr. Wallace, was it in regard to the want of change-houses or in regard to the lack of heating-accommodation?—There is a shelter-shed. We want proper bathing-accommodation.

99. Is there at present a change-house?—Yes, but it is used for storing harness, &c.

100. Is there any fire in it?—There is a fireplace.

101. *The Chairman.*] Have there been any fires in it?—Only now and again—not often during the past winter.

102. You told us you found 82° in your working-place?—Yes.

103. How did you take that—with your thermometer?—I hung the thermometer on a prop all day while I was working there, and that is what it registered.

104. Was there a good current of air passing?—No, there was no air-current.

105. *Mr. Cochrane.*] Can you tell us the size of the conduit to which a man would have to retire for the purpose of nature?—They usually go into any part of the mine which is far away from the men.

106. We saw the return airway: can you tell us the size of that in No. 6 section?—No, I cannot tell you.

107. *Mr. Dowgray.*] Have you tried to see whether the air was moving round at all at the faces?—We usually take the anemometer with us when we are making our inspections, but at times we have not been able to get the anemometer to move.

108. *Mr. Cochrane.*] Are you aware that your anemometer may show no reading and still a very large current of air may be passing—thousands of feet?—No.

109. What do you add for friction?—Thirty feet.

110. *The Chairman.*] Will you explain what you mean by saying it is an advantage for a man to have a six-hour place?—There is no real advantage as far as the mining is concerned. The only point is that if there is excessive heat in a place he has to work only six instead of eight hours.

111. He has no pecuniary gain?—No; he gets the same wages.

ROBERT CLELAND CHERRIE sworn and examined. (No. 2.)

1. *The Chairman.*] What are you, Mr. Cherrie?—A miner.

2. How long have you been mining?—Thirty years.

3. Where have you gained your experience?—I was mining for three years in Scotland, and the rest in New Zealand.

4. In what mines in New Zealand have you worked?—At Brunner, Wallsend, Tyneside, Hokonui, Kaitangata, Benhar, Mokau, Huntly, and the Northern Mine here.

5. What are you doing now?—I am working on the coal.

6. Have you any certificates?—I hold a second-class coal mine-manager's certificate.

7. How long ago did you obtain it?—Over ten years ago.

8. What mine are you working in now?—The Northern.

9. Have you any other position apart from that of miner?—I am president of the union.

10. Are you a check inspector?—No, I have not been a check inspector in this district.

11. Will you give the Commission a brief outline of your complaints?—We complain that the air is not properly conducted round the working-faces as required. The sanitation, also, is not what it ought to be. Then, the roads are very wet in the Northern Mine. Sometimes I have had to complain about insufficient timbering on the main roads. I also believe it would be an advantage to have change-houses.

12. How long have you been in this mine?—About three years.

13. There have been no fatalities since you have been there?—No, but there have been a few truckers hurt.

14. By trucking or by falls of coal?—By trucking.

15. By reason of defective ways?—No, I do not think so.

16. Too much uphill on the roads?—Yes; there are some of the roads too steep, and there is too much strain.

17. Have you known any miners to be injured through falls from the roof or by their own carelessness?—No, I only know of one man who got his back hurt, as has already been stated. I myself suffered an injury to my foot.

18. *Mr. Dowgray.*] Have you heard a complaint from the miners as to ventilation?—I have complained myself to the manager and to his deputy about it.

19. You say there is general dissatisfaction in regard to the matters you have referred to?—Yes.

20. How does this coal-mine compare with those others in which you have worked?—Very unfavourably.

21. There is a general dissatisfaction in regard to these wet roads: do the truckers work a six-hour shift?—No.

22. A wet road does not, then, constitute a wet place?—It does sometimes, when flood-water comes in; they then give a slight increase in wages for a day or two.

23. Do you know of any trucker who has been put to any disadvantage through refusing to work on a wet road?—Yes, one trucker was fined in this Court £4 because he would not work on a wet road.

24. *The Chairman.*] By whom was he tried?—By Mr. Scott-Smith, S.M.

25. But that is not an answer to Mr. Dowgray's question: it is as to whether any one has suffered any inconvenience because he refused to work on a wet road?—I cannot prove that there is any unfairness meted out to truckers who have refused to work under such conditions.

26. *Mr. Dowgray.*] You are aware that a fine has been inflicted during the last six months?—Yes.

27. Has the ventilation been improved?—No, I cannot say that there has been any difference. The only difference I could see was that the main roads were nice and cool. At my working-face I had occasion to complain to the manager, and he said he would put a cut through as soon as possible, but that was of very little benefit.

28. *The Chairman.*] Why?—The air was not conducted to the face.

29. *Mr. Parry.*] Do you ever feel any ill effects from working in a hot place?—Yes, I have worked in hot places in the Northern Mine on a six-hour shift, when they were opening out No. 6. I had to do two hours' trucking in the wet road, or maybe on the dry road, and then do six hours in that place.

30. What effect has it had on your health?—I found that I could not eat my food and could not sleep the same as if the ventilation had been good.

31. *The Chairman.*] Do you know anything about actual temperatures or air-measurements there?—I have not taken any in the Northern Mine, nor have I seen any taken.

32. *Mr. Parry.*] As a man with a great deal of mining experience, what is the difference between working with a temperature of 82° dry on the surface and underground with the same temperature: where would you sooner work?—On the surface, to be sure.

33. What advantage do you think it would be to the miners to have proper change-houses and drying-apparatus?—It would be very beneficial to their health. They could bath when they come out of the mine overheated, and not have to walk home in their clothes saturated with perspiration. They would be much more comfortable walking home dry.

34. *The Chairman.*] Have you had experience where they have had baths?—They have never had any where I have been.

35. You do not call the hut a change-house?—No, it is a shelter-shed.

36. *Mr. Parry.*] In regard to men living close to the mine, on the average the coal-miner has not many conveniences?—No, as a rule, he has not.

37. In order to take that extra work off his wife's shoulders he would prefer to change before going home?—Yes, I know I would.

38. What inconvenience are you put to in regard to sanitary appliances?—You have got to go to the most convenient place—sometimes it is to the intake, and sometimes to the outlet. The smell, as a rule, is very offensive, especially if the air happens to reverse in the section. I have had occasion to draw Mr. Morgan's attention personally, and also that of his deputy, to the matter, and asked him to have a proper system installed, as they have at Huntly. He said he would warn the parties for the filth alongside the roads.

39. In regard to the temperature, would you sooner work in a temperature of, say, 77° dry for eight hours or in a temperature of 83° for six hours?—Certainly at 77° for eight hours.

40. *Mr. Reed.*] You stated that at times the water-tables were flooded in the mine?—At the parts of the mine to which I was referring there are no water-tables.

41. *The Chairman.*] What distance on the road is wet when it is flooded?—Some of the roads have 3 chains at a stretch very wet in this mine.

42. *Mr. Reed.*] Is it possible to get rid of the flood drain water?—It is quite possible in some sections.

43. How would you do that?—By having a drive parallel with the drainage drive, or a back heading.

44. You suggest that the company should go to that expense to take away a little water?—The company could keep one drive clear for the drainage or anything like that, or for both drainage and intake of air.

45. In regard to the man who you stated was fined for refusing to work on a wet place, was it not because he refused to work out his notice of fourteen days?—The excuse that he gave His Worship was that he was put on trucking on a wet road.

46. What was he fined for?—For not working his fourteen days.

47. Did he get work elsewhere?—Yes.

48. Had he previously worked in the Northern Mine?—Yes, but not in that section.

49. You have had considerable experience, you say: have you in Scotland or in other New Zealand mines experienced ill health through the miners using the returns for natural purposes?—I have never suffered ill health in my life, but I can tell the difference between working in a good mine and a bad one.

50. Have you known any miners becoming ill from the effects of other miners using the return-air course to obey the calls of nature?—The men have openly complained to me—that is all I know. I am not a doctor, and cannot say whether they experienced ill health or not.

51. Have you heard of an illness as the result of the presence of this excreta?—No.

52. Are you aware that coaldust is a good deodorant and disinfectant?—Sometimes they do not use it as they ought.

53. Then it is the men's fault if they do not put coaldust on the excreta?—I consider rather that the company ought to provide proper accommodation.

54. Do they do that in Scotland, where you come from?—No, they do not.

55. Are you aware that the Scottish colliers this year are protesting against washing at the pit before going home?—I have read that.

56. Are you aware that, in connection with a Coal-mines Bill before the British House of Commons, the miners protested against using baths at the collieries?—I do not hold with that.

57. Do you consider that the cost and upkeep would be too heavy?—No, not for half a dozen baths.

58. Would you recommend or advise that miners be compelled to use the baths?—No; they may have reasons against doing so.

59. Would you propose that a small company should provide and maintain the baths even if the men did not use them?—Some might not use them; but, speaking for myself, I would.

60. Would you be in favour of the miners contributing a small sum towards the upkeep of those bath-houses?—No.

61. Why not?—Because I do not see that it is their place to do so.

62. At Home they have to pay for their own soap and towels?—They would prefer to use their own soap and towels, and ask the company to provide the water.

63. Would you regard the Northern as a safe or unsafe mine?—It is a fairly safe mine.

64. *Mr. Cochrane.*] I think you told us, Mr. Cherrie, that this mine compared very unfavourably with the other mines you had worked in?—Yes.

65. Would that apply to the whole of the Northern Mine or only to portions?—The whole of the mine except my present working-section; it is the best I have worked in.

66. Your complaint, then, only applies to the pillar-workings?—Yes, only to the pillar-workings.

67. Then you told us that the shelter-shed would serve as a change-house?—No; a proper change-house should be lined and not simply covered with corrugated iron.

68. Would you consider it sufficient as to size?—Yes, it is a fair size.

69. Then you spoke about the timbering: what was the fault there?—I have had occasion to speak to the deputy on the matter, but I may say that he has mostly attended to the matter within a day or so. He has attended to complaints honestly.

70. Then, in regard to the air-returns, where the men require to go in the absence of sanitary arrangements, about what size are these air-conduits?—They were originally supposed to be 8 ft., but some of them are filled up with mullock. 8 ft. was supposed to be the maximum width.

71. And the minimum?—Just the size of a skip.

72. And what size was that portion that was bratticed off?—About 2 ft.

73. *Mr. Reed.*] Has any man ever been hurt, to your knowledge, in that mine from a fall of roof?—I have been told that a man was hurt.

74. *The Chairman.*] How long does it take you to go to the surface from the place you are working in?—About a minute; but in the other sections that are not so well situated it takes longer, of course.

75. What is the longest?—It would take about fifteen minutes to go from some of the places at a fair walk—that is, to go only one way.

76. What is the average time?—It would be impossible to say.

77. How long would it take from No. 1 and No. 2 sections?—In where the hard coal is it would take that time (fifteen minutes), but in the new stone drive I could not say because I have only once been into it.

78. *Mr. Parry.*] If anything were to happen, what would be the position of the men back in the workings: is there any place to get out?—From No. 5 or No. 6 section there is an air-outlet. I do not know, however, if the men could get into it. Where the members of the Commission were yesterday there is no outlet. It is simply closed in. They would have to dig the men out.

79. *Mr. Reed.*] Have you ever known of a colliery having separate surface connections with every portion of the mine for use in case of a fall?—No. I would say it was nonsense, but all mines are not worked on the same principle.

80. *Mr. Parry.*] Is it reasonably feasible in that mine to have another outlet?—Certainly, it is quite possible.

81. *Mr. Cochrane.*] Why cannot you go back by the air-returns?—Because they are filled up. It would be a matter of impossibility unless he was going there every day.

82. *Mr. Reed.*] How many outlets to the surface are there in that mine?—I do not know; I have never counted them.

83. Do you think there are about six tunnels?—To the lower sections, but not to Nos. 5 and 6 sections.

84. In any of the Scotch collieries will you find six means of egress?—No, they have three.

85. So that there are twice as many here for use in case of disaster?—Yes, but not in Nos. 5 and 6 sections. They are in Nos. 1, 2, 3, and 4.

86. Are you aware that the law requires only two exits?—Yes, but the law also provides for a return.

87. *The Chairman.*] From your experience, have you any practical suggestion on which legislation could be based to meet the difficulties you have noticed during the course of your work in this mine?—I consider that the front and back headings should be kept as clear as possible. If a fall occurred in the mine the back heading would then be available for the men to get out.

88. And you consider that should be made so by legislation?—Yes, I think it should be made compulsory by legislation.

89. *Mr. Parry.*] Do you consider that there should be a standard temperature for a six-hour place in a mine?—Yes.

90. And should be fixed by law?—Yes.

91. *The Chairman.*] Can you say what you consider a maximum heat?—I would consider that 75° dry Fahr. would be high enough for any man to work in.

92. *Mr. Reed.*] Regardless of the wet-bulb temperature?—I have never studied that.

93. Is there a ladderway in these shafts?—No, not as far as I know.

WILLIAM STEEL sworn and examined. (No. 3.)

1. *The Chairman.*] What are you, Mr. Steel?—A miner.

2. How many years' experience have you had?—About sixteen years.

3. Where have you gained your experience?—In New South Wales and New Zealand.

4. Which mines have you worked in?—At the Sea Pit, Newcastle, Burwood, Hikurangi, and the Northern Mine.

5. How long have you been in New Zealand mines?—I was in the Hikurangi Mine about four or five years before I went to the other side, and I have been in the Northern Mine about seven years.

6. You do not hold any certificates?—No.

7. Do you hold any other office in the mine—that of underviewer or anything?—No, I am just a miner.

8. Will you tell the Commission what you have to complain of?—The temperature, the foul air, the sanitary arrangements, and the change-houses.

9. *Mr. Dowgray.*] To whom have you made complaints?—To the officials of the union.

10. And to the management of the mine?—No.

11. Just to the check inspectors?—Yes.

12. How does this mine compare with the New South Wales mines in regard to ventilation?—It is not nearly so good as where I worked in New South Wales. While I was in the Hikurangi Mine I was trucking, and had no occasion to complain; but I was never in the face.

13. *The Chairman.*] What do you say now is the fault?—I say the air is not good enough.

14. What is the particular fault?—It is not circulated round the faces. In the district where I am working I do not think there is enough air in the working-places. We could not keep a light in it on Monday night—that is, in No. 6 section. We were working in a pillar and cut through a hole, and black damp came through.

15. *Mr. Dowgray.*] What remedy do you suggest?—If the bratticing had been run a little further up the air would have got round about the face. About a chain back there was a good current of air, but it did not reach the face.

16. Is there any companion road to this No. 6 section?—Yes, within about a chain of it.

17. Have you had any occasion to complain about the timber in that section?—No.

18. You trucked in that mine for some time?—Yes, a few years ago.

19. Did you feel any bad effects on your feet caused by the water?—No, I have never lost any time; of course, it was wet, but I have never suffered any ill effects.

20. *Mr. Parry.*] You are working in a warm place—in Steel's place?—Yes, I am Steel; it is my place.

21. Have you felt any bad effects while working in that hot place?—Well, on the shift I am working this week I have been pretty bad. When I get home frequently I cannot eat anything, and I do not sleep too well.

22. Do you feel any bad effects on your heart?—There are times when I feel knocked up.

23. What advantage would there be if change-houses were built and drying-apparatus provided?—The advantage to me would be that I could change and go home in dry clothes instead of wet ones.

24. *The Chairman.*] How far have you to go?—About two miles.

25. *Mr. Parry.*] Would you sooner work below at a temperature of 84° or on the surface at the same temperature?—I would sooner work on top.

26. What do you think should be fixed as the temperature for a six-hour place?—I am not a judge of temperature—I only know when it is hot and when it is cool.

27. Do you think there should be a maximum fixed for a six-hour place?—Yes, I think it would be much better.

28. Is there any inconvenience caused through not having sanitary appliances?—Yes. If a man has to run outside, and he is working a good way from the surface, he may lose a turn.

29. You say you have had no experience of taking temperatures?—No, none at all.

30. *Mr. Fletcher.*] What is the number of the place you work in?—No. 6.

31. How far back from the face do you find the current of air?—About a chain.

32. If a brattice were put up from that point to your place would that improve it?—Yes; there is a good current of air, and the brattice could easily be put up.

33. Is there plenty of room there?—There is not too much room; it is pretty narrow.

34. Have you complained to the manager about the heat and ventilation being bad?—No. I have never made a complaint to the manager. I may have said, "It is a bit warm."

35. Have you complained to the deputy or underviewer?—No, I have never made a complaint.

36. *Mr. Reed.*] Are there not two air-shafts to the surface from Nos. 5 and 6 sections?—I do not know. I only know of one.

37. Have you known of any ill effects from the men using the returns for the purpose of obeying the call of nature?—No, I have not.

38. At your place in No. 6 are you occupied in pillar-extraction?—Yes.

39. You find the place very hot and unpleasant?—Yes.

40. At times, when you are tapping the gases from the goaf, do you find the lamp burns dimly?—Yes, we found it so particularly on Monday night.

41. Are you aware that the presence of carbon-dioxide makes it burn dimly?—Yes.

42. So that you know that when the lamp burns dimly the air is bad?—Yes.

43. Does the humidity in the atmosphere cause you to feel exhausted?—Yes, that is so.

44. Consequently, do you not think it would be to the company's advantage to give you better air—you could then do more work?—Yes.

45. As regards the timbering leading to your place, does the company keep it well repaired?—Yes.

46. In the event of a standard of temperature being fixed for such places as yours, and if the company could not provide that temperature without great expense, would you propose to stop those places altogether and knock the men off?—They may be able to work them with a shorter shift.

47. If that place were a little wider—wide enough to enable the brattice to be put in—do you not think there would be greater danger from falls?—Well, they would have to put in stronger timber.

48. In answer to Mr. Fletcher you said that a chain away from your place there is a good current of air?—I would not say it is exactly a chain, but I think that is about the distance. There is a good cool current of air.

49. Do you regard the Northern as a safe mine to work in?—Yes.

50. Have you made any complaints to the Inspector of Mines about the temperature of the mine?—No, I have not.

51. Are you enjoying good health now?—Yes, except that sometimes I have a headache.

52. When did you work in that place last?—Monday night.

53. *The Chairman.*] You have a return airway a chain back from the face?—Yes, within a chain.

54. So that if anything happened to the intake you could return quite safely?—Yes.

55. You were instructed to drive that place narrow?—Yes; the brattice would have been in the way of the skip.

56. You found the air good last week?—Yes, it was fairly good up till Monday night.

57. Do you think the fan has improved the general ventilation of the mine throughout?—I do not see how it could improve Nos. 5 and 6 sections, nor the Majuba district.

58. You have just said there was a good current of air a chain back?—But that has nothing to do with the fan; it is a mile away from there.

59. But, then, you said that Nos. 5 and 6 sections were the worst district in the mine?—Yes, I think it is—in the working-face, where the air is bad.

60. It is only a matter of a short time when you will have that place finished, is it not?—Yes.

61. Do you think it will be all right then?—Yes, as long as the return road is kept clear.

62. You say there is no ill health resulting from the utilization of the return-ways by the miners for depositing excreta. Is there no inconvenience apart from ill health—no unpleasantness or inconvenience in other ways?—Yes, the smell is very bad. I do not know that the manager knew anything about it, or probably it would have been shifted.

FRANK LITTLE sworn and examined. (No. 4.)

1. *The Chairman.*] What are you, Mr. Little?—A miner.

2. How many years' experience have you had?—Thirty-six years.

3. Where have you gained your experience?—In England, New South Wales, and New Zealand.

4. What length of time were you working at Home?—I was in the Charlotte Pit at Newcastle-on-Tyne for ten years; in New South Wales for eight years—at Stockton, Bullock Island, Wallsend, and Tenilba. In New Zealand I have worked at Denniston and Seddonville (which was then the Cardiff Company's mine), and here at the Northern Mine.

5. How long have you been here?—Two years and ten months.

6. Will you tell the Commission briefly the nature of your complaints?—I complain of any company not being forced to have fans for ventilating the mine, the sanitation of the mine, and the change-houses.

7. Have you had any experience of bath-houses?—No; but I want to try them.

8. How far have you to walk from the mine to your home?—Nearly three miles. There is no township nearer the mine than that.

9. *Mr. Dowgray.*] Have you ever made any complaint about the ventilation?—I have made a complaint regarding the ventilation in a place where they had me working a six-hour shift, but I generally come out when I find the air too bad.

10. How often have you had to come out?—I have not come out now for a long time. I would like to see something recorded here to ensure a current of air being provided by a fan.

11. Are you aware that there is a fan in the Northern Mine?—Yes.

12. *The Chairman.*] Since the fan has been installed, in what sections have you been working?—I have been in Nos. 5 and 6 sections, but the fan has never done that portion of the mine any good. There is one shaft sunk to ventilate No. 5 and another for No. 6, but the drive should be made big enough to bring the air after you.

13. *Mr. Dowgray.*] What distance are the drives away from the stentons?—The place I am referring to is through the pillars and through old bords that have fallen. But I consider that any drive should be taken wide enough to get the brattice up to you.

14. Is it not the custom to take it so?—No, it is the custom to take it in narrow work. I suggest that it should be wide enough to bring the air into you.

15. *The Chairman.*] Do you use much dynamite?—Yes, in the stone.

16. What time do you leave the place after a shot?—I generally wait fifteen minutes before going in again. If the drive was wide enough I could go back straight away.

17. *Mr. Dowgray.*] How do you account for those Nos. 5 and 6 sections not benefiting from the fan?—I say that there should be legislation passed to provide for the air being drawn in one direction. These sections are isolated. The only section to which the fan does any good is near the fan itself. It has no chance to do any good except the wind is in certain directions.

18. The fan has not had any effect upon these sections?—No, the only thing which affects them is natural ventilation. Sometimes there is an intake and sometimes a return. I have been working close alongside the bottoms of these shafts.

19. Have you had any experience of the wet trucking-roads which have been referred to?—No.

20. Is it possible for the return for one section to be the intake for another section?—Yes, up there where those two shafts are.

21. How does this mine compare with the other mines you have worked in as regards ventilation?—It compares very unfavourably, because the drives are too narrow. It is all haphazard.

22. *Mr. Parry.*] You say, Mr. Little, that when a place gets too hot you quit?—Yes.

23. Have you suffered any bad effects at all from working in these hot places?—Yes, you cannot eat as well; that is the only bad effect it has had on me. Sometimes I have come home with half my "tucker" in my tin.

24. Which do you think is the more fatiguing—working on the surface in a temperature of 84°, or working below at the same temperature?—I could not tell you. I have never worked outside a mine.

25. You think it is a great disadvantage not having change-houses and drying-apparatus: you are anxious to see them provided?—Yes, especially where the men have a long way to walk home.

26. Have you had any experience at all of taking temperatures in mines—as a check inspector or as a workmen's inspector?—No; but I can speak from experience of Mr. Wallace's place. He said it was 82°, and I can only say it was quite hot enough for me.

27. Do you think there should be a maximum heat laid down by law for a six-hour place?—Yes, I do.

28. As regards sanitary appliances?—I think there should be pans kept, where a man has a certain distance to walk out to daylight. In some places a man has to walk seven, or eight, or perhaps ten minutes, and that means a quarter of an hour in a man's day's work. In places where they are handy to the surface it would be better for them to go outside.

29. What is your opinion as to the maximum temperature?—I think 75° is high enough.

30. *Mr. Fletcher.*] In regard to Nos. 5 and 6 shafts, where you say the wind changes the air-current, are those two shafts downcasts?—I do not know what they are supposed to be. The air will be coming down one day and going up another day.

31. Then, what have those shafts been sunk for?—They are isolated. The shaft they had there was closed by the creep; they drove a drive up, but the old shaft collapsed.

32. The next shaft they put down was meant for a downcast?—No, that was in a separate section; there was no return round to them at all.

33. Are neither of those shafts connected with the main return so that the fan could have an effect upon the air going down the shafts?—No, I do not think so; that is what makes me think that the fan has no effect upon the two shafts.

34. *Mr. Reed.*] You stated that you have generally been working in places in the Northern Mine where the conditions were good?—Yes, generally speaking, I have been lucky enough to cavil good places.

35. How many places have you worked in ?—I have cavilled six or seven quarters.

36. Did you ever know of a mine where every place was good so far as the conditions were concerned ?—No; but I think it is possible to have good air in every place.

37. So that in this respect the Northern is the same as the others in which you have worked ?—No, I do not agree with that. It seems a peculiar mine to work.

38. You complain of the air ?—No, I have not complained. Whenever I asked for brattice I have always got it.

39. It is too narrow, you said: do not you think it is safer ?—Yes, I agree it is safer.

40. Do you not think the management has made the drive narrow to protect the men from falls ?—I do not know what is the risk from falls.

41. You say it was sometimes fifteen minutes after blasting before you went back ?—The air is good enough after that time, but it is not really good.

42. Do you not think that was a short time ?—No.

43. Do you regard the Northern as safe a mine as any you have worked in during your thirty-six years' experience ?—Yes.

44. You think it would be outrageous to expect the company to provide bath-houses ?—No.

45. In regard to places requiring timbering, do the company's officials have them well repaired ?—Yes, I have not had occasion to complain of that.

46. You think 75° is an excessive heat to work in ?—I do not know anything about the wet or dry bulbs, but where Mr. Wallace was working it was quite warm enough for me.

47. Are there not two air-shafts connected with the surface in that mine ?—Yes.

48. In some well-managed collieries is it not a fact that there are some places where at times you cannot get the best of air conditions ?—Yes, in the best of collieries that will happen, but not so much as it happens here.

49. Now, in pillar-workings where the temperature is high, would you recommend that work in those hot places be stopped, or that the management be put to great expense to install a new fan: what would you recommend ?—The working of short shifts.

50. *Mr. Cochrane.*] If there were another alternative—the bringing of good air from these shafts to the faces—would you prefer that ?—Yes, I would rather work eight hours in good air than four hours in bad air.

51. In regard to judging temperatures, do you know anything about working in saturated air ?—No, I know nothing about bulbs.

52. Then you have been judging the whole facts as an experienced man ?—Yes.

53. *The Chairman.*] While you were driving that place in No. 6 section you were working on shift work ?—Yes.

54. Did you use much explosives ?—No, none.

55. You were driving to make a connection to the old shaft ?—We holed a little place there to sink it for the air-current.

56. In driving you were working through the falls and creeps ?—Yes.

57. Do you think it would have been wise to drive a wide place ?—Well, if you have any distance to go, I do not know why you should not take the air with you.

58. Do you think you could have driven a wide place through there with safety ?—Yes, wide enough to take the air in.

59. What do you call a wide place ?—It depends on the ground. Some places where I have worked have been 6 yards wide.

60. *Mr. Parry.*] You stated, I think, that a large amount of the face in which you were working was well ventilated ?—Yes.

61. Could you give us an estimate of how many faces had 100 cubic feet circulating at the face ?—Not at the face. I do not think there were any.

62. *Mr. Reed.*] Have you ever measured air ?—Yes, with an anemometer.

63. In the new mine ?—No.

JOHN MCINTYRE sworn and examined. (No. 5.)

1. *The Chairman.*] What are you, Mr. McIntyre ?—A miner.

2. How long have you been a miner ?—About ten or eleven years.

3. Where did you gain your experience ?—In Australia and New Zealand.

4. How long in Australia ?—About four years and a half.

5. In what mines ?—Corromil, South Bulli, and South Coast.

6. And at what mines in New Zealand ?—Denniston Hill and Northern.

7. What is your complaint ?—The ventilation, the temperature of the mine, sanitation, and change-houses.

8. *Mr. Dowgray.*] Have you made any complaints: if so, to whom ?—I have made them on different occasions to the manager and also to the Inspector of Mines, Mr. Boyd Bennie.

9. Were the matters attended to ?—No.

10. You were working in the mine when the fan was installed ?—Yes, about six months ago.

11. Has it made any difference ?—Only to the sections of the mine near which it is installed.

12. What do you consider the defect as regards the air ?—The current is not properly conducted. The fan, no doubt, is capable of supplying the mine throughout if the air was properly conducted.

13. What would you suggest ?—To put in proper stoppings and systematic bratticing. In the main haulage-road there is a door, certainly, but it is not often shut.

14. Do you consider the return airways sufficiently clear of debris ?—There is a certain amount of dirt stowed on the side, which stops the air to a considerable extent, and the airway is only driven 8 ft. wide.

15. Have you had any experience of trucking on those wet roads?—I have trucked on them, but it has never affected me. I found the roads fairly dry at the time I trucked.

16. As regards the timbering?—When I went round with Mr. Wallace we condemned the timbering in No. 1 drive.

17. There were no accidents on account of the lack of timber?—Not to my knowledge.

18. *Mr. Parry.*] Did you work on the surface in Australia?—Yes.

19. Have you worked in hot places in New Zealand?—Yes.

20. What effect does working in those hot places have upon you?—I find that one cannot eat one's food as one ought to. It is also impossible for a man to work at home in his leisure. I worked in No. 6 drive through the creep, and I have had to leave that place—I have had to go out into the fresh air. On one occasion Mr. Morgan, the manager, and his deputy found me lying down—the foul air had got the better of me.

21. You became fairly exhausted through working in the hot place?—Yes, that is so.

22. You say you have worked on the surface in Australia. I want to know if it is more fatiguing working on the surface at a temperature of, say, 84° than it is working at the same temperature underground?—It is more fatiguing underground.

23. Do you think that a maximum heat should be fixed for a six-hour place?—Yes.

24. What temperature would you fix?—Not over 75°.

25. Have you had any experience with the thermometer?—No.

26. You do not know the difference between the wet and dry bulb?—No.

27. You know what effect working in hot places has upon you?—Yes.

28. Would it be any advantage to the miners to have proper change-houses and drying-apparatus?—Yes, a great advantage. Last week I went home saturated with sweat as the result of working about those pillars. I might state that the management has done as much as possible to get the air there, but the fan does not do its duty to the mine. The brattice has been taken from the corner of the pillars, and the fan will not draw the air round the pillars. It is not being drawn through that section of the mine, though there is absolutely good air back from the face.

29. Do you think that change-houses would be of benefit even if the men were living handy?—Yes.

30. What inconvenience are you put to in regard to sanitary appliances?—From most parts of the Northern Mine it is a long way to walk to the surface, and a man is liable to miss his turn of skips. It takes him quite five minutes to walk each way, and from some sections it takes much longer, and it is outrageous to expect him to walk right outside.

31. What is the result?—The smell of the filth is very offensive.

32. Do you ever feel sick at all as a result?—No, I cannot say I do.

33. Would you not feel sick if you came into contact with a place of that description after having crib?—If you stopped amongst it; but one must get away from it and avoid it.

34. And you think it would be a great advantage both to the companies and to the men if a maximum temperature were fixed?—Yes, I think it would.

35. You say that you made complaints to the Mining Inspector and also to the management of the mine?—Yes.

36. And no improvement has resulted?—No, none at all.

37. *Mr. Fletcher.*] You spoke about a door: do you pass through that door on your way to work?—Yes.

38. Does the air go to the left or to the right to get to your section?—To the left.

39. And you say that that door is often open?—Yes.

40. Is there no trap-boy to attend to it?—No.

41. *The Chairman.*] Are there any instructions issued by the management on the subject?—I do not know of any.

42. *Mr. Fletcher.*] Of course, it is to your advantage to have that door open?—Yes.

43. *The Chairman.*] Can you say why it is not shut?—I cannot say.

44. Do you know of anybody having been interfered with for shutting it?—No.

45. Have you known of any one asking to have it shut?—No.

46. *Mr. Reed.*] You have sworn that you have been working in mines for ten or eleven years in New South Wales and New Zealand?—Yes.

47. How long have you been engaged as a hewer of coal?—About nine years.

48. And the one year?—Trucking.

49. You referred to an occasion when you had bad air?—Yes.

50. Is it a fact that the fan was drawing the air from the extraction pillars—an abnormal condition?—That is a different time altogether.

51. From where did your section get this air?—From the back of the mine.

52. Consequently the door referred to would have no effect no the condition of the air?—No effect at all.

53. In that mine are hot places the rule—are most of the places hot?—No, not necessarily.

54. Is there a high proportion of the places hot?—No, only in Nos. 5 and 6 sections.

55. Have you ever worked in a mine where there were no hot places?—No.

56. There is good air in your place?—Yes.

57. Have you ever left the mine on account of the heat?—No.

58. In regard to the bath-houses and change-houses: You stated that you had a long way to walk home. If you were living close to the mine, would you prefer to use the bath-house at the mine?—Yes.

59. Do the Northern Company's officials keep the mine reasonably well timbered?—Yes, they do.

60. In New South Wales, where you were working, what sanitary arrangements were there?—There were none. We were allowed to use the return-air course.

61. Would you regard the Northern as a safe mine?—Yes.

62. During your period at this mine have you observed that the air has improved?—Yes, it has improved.

63. *Mr. Cochrane.*] Which section are you working in?—It is called the "old stone drive."

64. Is it simply a single drive or connected with the other workings?—It is connected with the other headings.

65. Do you get natural ventilation?—Yes.

66. In regard to the door you spoke of, it would not matter if the door were shut or open?—Not for that portion of the mine.

67. *Mr. Parry.*] Did you ever suffer from indigestion?—Yes, a lot.

68. For how long?—I have been suffering with it for twelve months.

69. Have you consulted a doctor about it?—No.

WILLIAM MORGAN sworn and examined. (No. 6.)

1. *The Chairman.*] You are manager of the Northern Company's mine at Hikurangi, Mr. Morgan?—Yes.

2. What certificates have you?—A first-class coal-mine manager's.

3. How long have you been a certificated manager?—About seven or eight years.

4. How many years of mining experience have you had?—Twenty-eight years.

5. Where?—Seven years in England, two years in Newcastle, Australia, eighteen months in Tasmania, and the balance in New Zealand.

6. What mines have you worked in in New Zealand?—Waihi, Kaitangata, Castle Hill, Huntly, Brunner, and Northern.

7. Has all your management been in connection with this mine?—No, I was manager at Huntly for over twelve months, at Brunner for twelve months, and I have been here between three and four years.

8. How many men do you regularly employ at the mine?—Above ground 10 to 12, and underground about 65.

9. *Mr. Fletcher.*] We were through your mine yesterday. How long do you think that No. 6 section will take to work out?—It all depends how far you mean back.

10. So as to get into better air?—About three days.

11. What is the cause of the air not being circulated properly?—We are merely taking out the pillars that have been buried, and the heat is coming from the falls.

12. Did that creep take place before or since you took charge?—A short time before I took charge.

13. Were those two shafts in sections 5 and 6 sunk for ventilation purposes?—Yes; they were intended to be upcasts at that time.

14. With natural ventilation?—Yes.

15. Is there any means of connecting one with the air-return so that the fan could have an effect upon that portion of the mine?—Well, they are connected, but still that shaft acts as an upcast.

16. That may be, but the witnesses have stated that the air reverses, and so it would appear that you cannot depend on it?—I have not found that since the fan was installed. The current has always been in the one direction since then.

17. Have the men complained very much about the ventilation generally, or have they done so since the fan was erected?—Not so much.

18. The heat is the result of those falls?—Yes.

19. *Mr. Cochrane.*] In regard to the pillar-workings, Mr. Morgan, do you know of any practical method by which you could extract perhaps two or three pillars, so that the air could circulate round? Are there other circumstances present which tie you down in regard to that?—At the present time the circumstances are such that the pillars have so fallen as to render it out of the question to take out more than one at a time. Where it is practicable we take out two or more pillars at once.

20. Will you please explain the plan to me [plan referred to]. You can take out only two or three pillars at a time?—Well, where the pillars are of sufficient size I take out two or three at a time, but where they are very small I just take off a portion, because it does not pay to drive to take the other portion.

21. *Mr. Reed.*] How many men have you working in the mine now?—About sixty-five.

22. Did you inform me yesterday that there were fifty?—Yes, but that was on one shift.

23. So that the maximum number working at one time is fifty men and three horses?—Yes.

24. Have you measured the air in your fan-drift?—Several times.

25. What is the average quantity of air passing per man?—From 600 to 1,100 cubic feet.

26. What is the total quantity?—25,000 ft. to 28,000 ft. per minute.

27. What would that average per man employed underground?—It has averaged from 600 ft. to 1,100 ft. per man per minute, according to the number of men on the shift.

28. By what quantity does that exceed the statutory requirement?—Well, the statute requires 150 ft. for a man and 600 ft. for a horse.

29. If you have such a large quantity, why do you not manage to give the men more air?—Well, I think the mine is very well ventilated.

30. Do you consider Steel's place ventilated at all?—No, not at present; his place is about finished.

31. And Wallace's place?—It is ventilated, but not sufficiently.

32. During the course of your experience of twenty-eight years have you not found it is impossible on all occasions to have every place well ventilated?—I have found it is not practicable to do so.

33. Do not circumstances occur to make the air dull at times?—Yes.

34. Have the men complained to you about the deposition of excreta in the mine?—No, but I have had occasion to caution them about going into certain parts for that purpose.

35. How long ago?—Pretty well ever since I have been in charge.

36. Have the men asked for bath-houses and change-houses at the mine?—No, they have not asked me for them.

37. Does your company give you a free hand regarding timber for the mine?—Yes.

38. As regards a fixed standard of temperature?—I think it would be hard to fix a standard to be applicable to every place.

39. Why?—The conditions would hardly warrant it.

40. As regards the oxygen standard, would you be in favour of having that incorporated in the law so that a minimum quantity of oxygen should be provided?—The same thing would apply to that as to the other.

41. Does the Inspector of Mines frequently visit your mine?—Yes, about three or four times a year.

42. Does he thoroughly investigate all the working-places in the mine?—He does not go into all parts of the mine.

43. Do you consider that he makes a thorough examination?—Yes.

44. Is he strict with regard to you?—Well, I can only say that I think he carries out his duties conscientiously.

45. Does he give you orders?—Yes, he points out things sometimes which he considers require attention.

46. In driving your places narrow, what is your object?—Well, our bords in the solid workings are driven 8 ft. wide. It is not practicable to drive them much wider, because the roof will not stand it. The narrower bord ensures safety.

47. As the result of driving them narrow, have you made the men safe from falls?—Yes.

48. Does that narrowness make it more difficult to ventilate the section?—Yes, it does, more particularly when there has been a creep.

49. Your gain in safety, then, makes up for your loss in ventilation?—I admit that I do not get the same results in regard to ventilation.

50. In case of falls from the roof, how many means of escape have the men from the mine?—There are six tunnels through to the surface.

51. How many more is that than the statute actually requires?—We have four more than the law requires.

52. Regarding the wet state of the mine: where does the water come from?—We are troubled sometimes with water when we get heavy rains—it finds its way down where the pillars have been extracted. It is flood-water.

53. Would it be possible to drive a water-level to take that water off?—No.

54. Have you ever found any inflammable gas in your mine?—No.

55. Do your men carry out the daily examination with a safety-lamp?—Yes, the deputy does, to make certain that the mine is safe.

56. Has he ever found firedamp in the mine?—No.

57. Did the Inspector draw your attention to the necessity for a ventilating-fan nine months ago?—I think the matter was brought up more than nine months ago. A fan was practically promised before my coming here.

58. Are you aware that the Inspector was for years urging your company to get a fan?—Yes, previous to my coming here.

59. When was the fan erected?—Shortly before last Christmas.

60. Have the men ever informed you that the fan has improved the ventilation?—No, they have not informed me.

61. Have the men ever suffered through falls of roof?—There was one case where a man was hurt, but he had been cautioned by the deputy about timbering his working-place.

62. Did he enter it in his book?—No. I do not know why.

63. Then the deputy neglected his duty?—Yes, but not intentionally.

64. You consider the mine to be a safe mine as regards timbering?—Yes.

65. *Mr. Dowgray.*] In reply to a question by Mr. Reed you said, Mr. Morgan, it was not possible—or, rather, not practicable—to prevent there being hot places in the mine?—It is not practicable under the conditions we are working in.

66. What standard of temperature do you fix for six-hour places?—We fix no standard of temperature; it was simply agreed between the union officials and myself.

67. *The Chairman.*] What would be a reasonable temperature to require the reduction to a six-hour shift?—It depends upon the conditions of the mine. Sometimes a peculiar smell in the old workings would bear on the point.

68. Can you give us any idea of a temperature that you might fix?—We may fix it at 80°.

69. Was your attention drawn to the temperature in Wallace's place three months ago?—Yes, about that time.

70. Are those shafts that have been referred to upcasts?—They are both upcast shafts.

71. If they are both upcasts, how can the fan have any effect on them?—The fan has no effect upon them.

72. Then the fan has no effect upon that section at all?—No, it has not the effect I would like it to have.

73. Then, will you explain how it could have an effect? Do you wish to convey the impression that you want it to have an effect?—It creates a large circulation of air at the foot of those workings.

74. Where do they get their intake?—From Nos. 3 and 4 districts.

75. In regard to the door to which reference has been made—is it oftener open than shut?—No; it is shut to prevent the fan from drawing through that roadway—to keep the fan from making a short circuit.

76. It will affect the volume of air at the bottom?—Not much. I have tried it both ways several times.

77. With your experience of the ventilation in that mine, do you believe that a fan was the best means of ventilation?—Yes, I believe in the fan.

78. In your travels through the mine have you noticed an excessive amount of filth?—No; I have warned the men on several occasions and told them to use certain roads.

79. Has your attention been called to it?—I have noticed it myself and drawn the men's attention to it.

80. Have there been any men carried out of your mine on account of bad air?—None.

81. Are you sure?—Positive.

82. You are positive that there was not a man called Thompson and a deputy called Dole carried out?—Not through the effects of bad air. It was the result of a bad shot—they went back too soon, and were overcome by the fumes.

83. In regard to the Inspector's examination, would it be safe to say that he examines only half the mine?—Sometimes more than half, but on no occasion does he examine the whole mine.

84. *Mr. Parry.*] Do you consider, Mr. Morgan, that the drive in No. 6 section that leads to Wallace's face is a well-timbered drive?—I do not consider it a well-timbered drive, but it is sufficiently timbered.

85. When you say that, you know that the timber is broken?—Yes.

86. Yet it is safe?—Quite safe. My experience has taught me that that drive is safe.

87. Has the Inspector of Mines spoken to you of the broken timber?—Yes.

88. Have you obeyed his orders?—If a complaint is made to me I have complied with any orders on the matter. Of course, with the class of timber we use nowadays, it may be all right to-day and broken to-morrow.

89. You said, in answer to Mr. Reed, that you could not put in a wide drive in those places simply because you were afraid of the roof falling in?—Yes.

90. Yet it was necessary for you to drive that drive?—Yes, in order to get that coal.

91. And you say that it would be impossible to fix a maximum heat for a six-hour place?—I did not say it would be impossible.

92. You said you did not see how it was practicable?—Yes.

93. Well, seeing that it is necessary to make that drive small, and that you are not able to convey the ventilation properly into the face, how are you going to better the conditions for the men who have to work there?—Under certain conditions we drive a place small because there is not much room.

94. But, Mr. Morgan, that man has to live in that place?—Yes.

95. What do you offer that man?—In what way?

96. You say it is necessary to get the coal out, and yet you contend it is not practicable to fix a maximum heat. What are you going to do?—When certain conditions obtain we will put them on a six-hour shift.

97. You admit a six-hour shift is necessary?—I do not say it is necessary, but we do it.

98. Do you admit that a maximum heat should be fixed for a six-hour place? That is my question?—I do not admit it.

99. If you could not conduct the air there you admit that there should be a reduction in the shift?—Yes.

100. If you admit it in the one case you must admit it in the other?—Yes.

101. Then you do admit it?—Under certain conditions a maximum may suit, but not under others.

102. *The Chairman.*] Can you suggest a case in which a difficulty might be met with in trying to fix a maximum?—The conditions of a mine may be such that a peculiar smell may be given off from fallen strata: if you fixed a maximum for that place it might not be suitable for another place.

103. As a practical and experienced mine-manager, is there any way by which you could determine the condition—a fair thing to the men and a fair thing to the management—an average working condition which calls for a six-hour shift?—I could not suggest any standard myself.

104. Can you suggest anything that would prevent a man arriving at a standard?—What would be a standard suitable in one place would not be suitable in another. I know of no medium.

105. *Mr. Parry.*] You agree with the general principle that a maximum heat should be fixed?—No, I do not agree on that.

106. What is necessary in the first place to constitute a six-hour place? If you cannot conduct the air into the place would a man be entitled to a six-hour shift?—Well, of course, the temperature would be taken into consideration.

107. *The Chairman.*] What temperature would you consider necessary?—I would not like to suggest any temperature.

108. Can you not suggest an idea of the temperature?—Well, 80° wet is good sometimes. I might reduce with that as a standard.

109. Have you ever reduced to six hours at a less temperature than 80°?—I may have done so, but the temperature was not taken—just the general conditions were taken into consideration.

110. Well, then, what other conditions besides the temperature would operate in determining a reduction to a six-hour place?—A place may be wet and dirty, or, again, it might have a peculiar smell, and these conditions would influence me in reducing the hours to six.

111. Can you say, as far as the temperature alone is concerned, what you would fix it at?—Well, with general conditions, I would fix it at 80° wet.

112. If there were other conditions present would you reduce it at less than 80°?—Yes.

113. Can a man work eight hours with credit to himself and satisfaction to his employers in a temperature of 80°?—Probably not.

114. Can you say, considering the temperature alone, at what heat a man can in ordinary health and under average conditions do a fair, honest day's work without taking too much out of himself, and yet doing fair justice to his employer?—I should think that above 75° it would be trying, and at 80° I would reduce to a six-hour shift.

115. *Mr. Parry.*] You say that you have never been asked by the employees for change-houses until just lately?—Not that I am aware of. The question has not been brought before me as a grievance—a serious one.

116. Would you take it seriously if the secretary to the union had asked you?—Yes.

117. Have you not been approached in that way?—No, not that I am aware of.

118. But you have a recollection of the matter being discussed?—I am not certain on that point. I do not think I have any correspondence on the matter.

119. What is your opinion, Mr. Morgan, in regard to the necessity for change-houses and places for the men to wash?—My general experience among coal-miners is that they prefer to wash at home.

120. You have never heard any complaints about the men washing at home, and the inconvenience?—No.

121. Which would you prefer—to change at the mine and wash, or walk home in wet clothes?—It depends how far one had to walk. If I lived close to the mine I would go home.

122. What do you call "close to the mine"?—Say, half a mile.

123. If you were approached by the organization would you provide change-houses?—That would be a matter for the company to deal with.

124. *The Chairman.*] Would you recommend it?—If I thought it would benefit the miners generally, and if I thought they would utilize the change-houses, I would recommend it.

125. *Mr. Parry.*] Your recommendation would have some weight?—Yes, I think it would go a long way towards it.

126. Do you have any interference by the superintendent of the mine?—That is a question I would prefer not to answer.

127. Have there been representations made to you by the superintendent regarding the betterment of the mine which you have ignored?—No.

128. In connection with the temperature standard, do you mean 80° wet to be saturated?—Yes.

129. Of course, you have already said that you think a man is not capable of doing justice to himself at that heat?—He is not so capable.

130. You consider your mine a safe mine to work in?—Yes.

131. You have only had one serious accident?—Yes, and, of course, a few minor ones.

132. Have less accidents happened under you in this mine than in any other mine that you have managed?—No, I cannot say that.

133. Do you know anything about a man becoming exhausted through working in the heat?—I heard him say so.

134. Do you agree with that?—No, I cannot say it is a fact.

135. I presume that you have worked in hot places?—If a man follows mining for twenty-eight years he probably has done so.

136. Have you felt any bad effects from working in such places?—I have worked in places where I did not feel quite as fit as I would have felt had I been working in a cool place.

137. What effect did it have on you?—A man gets exhausted sooner. A man's appetite is not quite so good.

138. And your sleep?—He may not sleep quite so well if his place were very hot.

139. Have you suffered from indigestion through working underground?—I cannot say that I have.

140. Have you heard any complaints from the men that they suffered from indigestion?—Not to my knowledge.

141. Do you think that mining is a healthy occupation or an unhealthy one?—I do not consider it a very unhealthy occupation.

142. Do you consider working on the surface more healthy than working underground?—Working on the surface is more healthy.

143. Much the healthier?—I could not say to what extent.

144. Believing that working underground is unhealthy, what would you advise to improve the condition and prolong life, speaking as a man with long experience?—Good ventilation is necessary.

145. And in the place of bad ventilation, what would you suggest?—An attempt to improve it.

146. And where good ventilation cannot be provided?—The hours of work should be reduced.

147. *Mr. Reed.*] Do you consider your mine is being managed in the best interests of the men as far as working conditions are concerned?—At the present time, yes.

148. And you have taken every precaution in the interests of the men?—Yes.

149. *Mr. Parry.*] In regard to that question, do you say that the mine is worked in the best interests of the miners?—In the best way under the conditions prevailing.

150. *Mr. Reed.*] Under usual conditions of mining, is it worked in the best interests of the men?—Yes.

151. *Mr. Parry.*] But working in the best interests of the men would be detrimental to the company, is that not true?—Yes, that is so.

152. *The Chairman.*] About these bath-houses: can you give us any idea as to what it would cost to erect a house with a set of showers such as you have heard described, and whether such a scheme is workable, and what would be the probable cost?—I do not think it is workable. We have not sufficient water. Our water-supply is very limited in the summer, and if we had bath-houses we would be short.

153. Is there not water to be obtained from the creeks?—No, it is mineralized. It is the water from the mine, and could not be utilized for either boilers or baths.

WILLIAM LEVI HARRIS sworn and examined. (No. 7.)

1. *The Chairman.*] You are a miner, Mr. Harris?—Yes.
2. How long have you been mining?—Twelve years.
3. Where?—Kiripaka for seven years, and also at Hikurangi.
4. What is it you complain of?—Sanitation, ventilation, and change-houses.
5. *Mr. Dowgray.*] I understand that you were check inspector?—Yes.
6. In the course of your inspections, have you had occasion to make complaints?—Only once or twice in the Hikurangi Mine.
7. Were the matters remedied?—Not always.
8. To whom did you complain?—To the deputy.
9. You did not consider the air in the mine to be properly conducted round the face?—No, I did not.
10. What remedy would you suggest?—The bratticing should be kept up. It is allowed to remain too far back.
11. Have there been any accidents in that mine?—Not that I am aware of.
12. You consider it fairly safe and well timbered?—Yes.
13. Do you consider it safe in so far as there is only one outlet to the mine?—No.
14. There is no egress by the shaft?—I could not say; it is full of steam-pipes.
15. What would you suggest as a remedy?—I would suggest a shaft in the far end.
16. Is there any danger from an inbreak of water?—Yes, a little danger, but it is not very great.
17. If this water broke in the men in the dip would be shut off?—Yes.
18. *Mr. Parry.*] Have you worked in hot places?—Yes.
19. Have you felt any bad effects from working in such places?—Yes, it makes my head ache terribly; sometimes I become light-headed; and I get sick, and can hardly sleep at night.
20. Are you troubled with indigestion?—A little.
21. What advantage would change-houses and drying-apparatus be?—You could change and walk home in dry clothes instead of in wet ones.
22. *The Chairman.*] How far have you to walk?—About two miles.
23. What is the average distance that the miners have to walk?—From a mile to two miles and a half.
24. *Mr. Parry.*] Have there been any obstacles placed in your way during your inspections?—None at all; they have always given us every facility.
25. What inconvenience are you put to in regard to sanitary appliances?—In our mine it is very awkward to get out to the surface.
26. *The Chairman.*] What is the effect on you when you come out hot?—One is liable to get a chill.
27. *Mr. Parry.*] Do many of the miners suffer from pleurisy?—Yes, one or two.
28. How long did you say you were working underground?—Twelve years.
29. Do you think it is a healthy occupation?—No, I do not.
30. Would you sooner work on the surface at a temperature of 84° than underground at the same temperature?—I would not work below at 84°.
31. Have you heard many men complaining of chest-ailments?—No.
32. Do you think it is advisable, both from the miners' point of view and the companies' point of view, to have a maximum heat fixed for a six-hour place?—Yes. A man would do as much in six hours as he could do in eight in a very hot place.
33. *Mr. Dowgray.*] Seeing that there is only the one means of egress from this mine, is there any feeling of uneasiness on the part of the men?—Mr. Dunn promised to put a shaft down at the 9-chain peg, but it was never done.
34. *The Chairman.*] When was that?—27th March, 1911.
35. *Mr. Dowgray.*] In connection with these main headings and approaches to the old workings, were the boreholes kept?—Not as far as I know.
36. *Mr. Reed.*] How long has the present dip section been opened?—About ten months.
37. How long have you worked in it?—Seven months.
38. Have you ever experienced or heard of bad ventilation in that section?—No, not of really bad ventilation.
39. What are the conditions in this mine—is it dry or otherwise?—Practically dry.
40. Have you ever found a shortage of timber in this mine?—No.
41. You said there was only one means of egress?—Yes.
42. Are you aware that there is another shaft in addition to the one referred to?—No, I do not know of it.
43. Are the men generally satisfied with the conditions?—Yes, except as regards the water accumulated in the old workings.

44. Are you positive that boreholes have not been driven ahead in compliance with the Act?—I do not know of them.

45. You do not really know anything as to whether they have been driven or not?—No.

46. Have you exercised your right as a check inspector since the section was opened for coal-mining?—No.

47. Why not?—There was no reason. It is nine months ago since we did any check inspecting.

48. Were you intimidated or frightened?—No.

49. So that if there had been any cause for an inspection you would have made it?—We would have been told by the union to make an inspection.

50. How long does it take you to reach the surface for the purpose of relieving yourself?—Seven minutes.

51. What are the sanitary arrangements at the mine?—There is a w.c. outside.

52. And you can get to it in seven minutes?—Yes.

53. Do you consider that a long time?—No, but it is long enough.

54. What distance do you live from the mine?—Two miles.

55. Do you think the men in that section of the mine want a bath-house and a change-house?—I think most of them would use it if it were provided.

56. Have there been any accidents in the mine?—One man had his wrist broken about five months ago; it was a pure accident.

57. You think it is a safe mine?—Yes.

58. Are you aware that there is another shaft in course of construction within 10 ft. of the present one?—I have heard some talk about another shaft.

59. Does the Inspector of Mines frequently visit the mine?—He has been down once since I have been there.

60. Has there been any occasion to make a complaint?—No.

WILLIAM ROBERT DUNN sworn and examined. (No. 8.)

1. *The Chairman.*] You are the mine-manager at the Hikurangi Coal-mine, Mr. Dunn?—Yes.

2. What certificate do you hold?—First-class coal-mine manager's certificate.

3. How long have you had your certificate?—Ten years.

4. Over what period does your mining experience extend?—Fifteen or sixteen years.

5. Where?—Mostly in the Auckland Province—in the Thames goldfields. For five years I was manager of the Northern Mine, and I have been in my present position for three years.

6. Can you give us any idea of the probable life of your mine?—Well, the seams in the north are very patchy. The mine has been in existence for eighteen years, but it is difficult to say how long it will be before it is worked out.

7. You have no reason to think it will peter out?—Not for a year or two.

8. *Mr. Fletcher.*] How do you ventilate your mine?—We are using a steam-jet.

9. Is that satisfactory?—Yes, so far as our mine is opened out. As time goes on we will have to put in a fan.

10. Has the Inspector urged the necessity for a fan?—He has discussed the matter with me as manager. The company is looking forward to putting in a fan.

11. How many men have you employed underground per shift?—About fifty-three men. There are also a few in another section of the mine.

12. Does the quantity of air going into the mine reach the requirements of the Act—150 cubic feet per man?—Yes.

13. Are you going to put in a fan shortly?—Yes, the company is looking out for a fan.

14. *Mr. Cochrane.*] In the event of the incline being blocked, what means of escape would the men have?—There is about 3 chains of the incline which is not yet duplicated, but in the event of that being blocked there is another shaft in course of construction which will be completed in two or three days. Then we will have three exits from the mine. I was in hopes of lowering the water sufficiently to enable the men to go through that section.

15. By what means are you lowering the water?—By tapping it from the present mine. We have lowered it 20 ft.

16. How do you tap it?—It is tapped underground by keeping sufficient boreholes in.

17. You say the air is quite up to the statutory amount: is that so at the working-faces?—Yes, the air is fresh going through the mine; it never becomes very warm.

18. Then why do you not guide it up in the ordinary way?—We are carrying it in the ordinary way. As a crosscut is holed a brattice is put up. If there is a complaint made it is always seen to.

19. Yes, but the current does not seem to be carried right up to the working-faces. The bulk of it appears to be short-circuited?—There is certainly some leakage.

20. *Mr. Reed.*] Are you putting boreholes horizontally in to test for water?—This water question is practically finished. We have tapped the water by extending the boreholes.

21. Have the men any reason to be frightened of its coming in?—Not now.

22. Have the men ever applied to you for bath-houses to be erected?—No; I have never had it mentioned to me.

23. Yours is a practically new mine?—Yes, we have only had it opened nine months. It is practically in a state of development yet.

24. As regards the sanitation, what sanitary arrangements have you provided?—I have put up a w.c.

25. What is the average time that would be occupied by the men in getting to it?—It would take about ten minutes from the working-face and back again.

26. Do the men use this place?—I have never known an instance where it has not been used.

27. As regards the fixing of a temperature standard, do you think it would be possible to fix such a standard by law, and would it be possible to apply it?—No, more especially in the mine previously under discussion—the Northern Mine.

28. Would spontaneous heating prevent the fixing of a standard?—It would in that mine, but not in our mine. The Inspector of Mines has told me at times that some of the hot places in the Northern Mine were on fire.

29. You prefer the existing state of affairs under which the Inspector is the arbiter as to the temperature?—Yes, I think it is best.

30. In preference to the fixing of a standard?—Yes, it is better for the Inspector to decide, under the conditions existing in the north here.

31. Have you had any complaints in regard to the timber in your mine?—Not in the new section.

32. Have you had any accidents in the new section?—No, except that one man injured his arm.

33. Does the Inspector frequently visit your mine?—Yes, he has been there three times during the last nine months; he makes a thorough examination when he comes.

34. Does he frequently draw your attention to matters requiring attention?—Yes; if he finds anything that needs doing he draws my attention to it.

35. Do you obey his instructions?—We endeavour to do so.

36. *Mr. Dowgray.*] In connection with this matter of the water, Mr. Dunn, I understand there was danger feared, and you gave the workmen authority to examine the plan?—I asked them to examine the plan, and we went into the matter together. The trouble is quite settled now, and the water is at the miners' feet, whereas previously it was at their heads. The water is reduced to their level.

37. Is the existing shaft satisfactory?—It is not in a workable condition.

38. Can it be put in workable condition?—They will not have to travel up the shaft at all. We are putting down a second shaft in addition to this one, which will be finished in a week.

39. Do you agree to this suggestion to sink another shaft?—I did not agree to it.

40. This new shaft will meet all requirements?—Yes, the ladder will be put in it.

41. It is in a suitable place?—Yes.

42. You stated that in your opinion there was a sufficient quantity of air entering the main intake to comply with the requirements of the law. Would it surprise you to hear that the measurements show that the air does not come up to the quantity prescribed by the Act?—I think, according to Mr. Reed's reading, it worked out satisfactorily.

43. *The Chairman.*] How often do you take your air?—We do not make a regular practice of it. When the Inspector of Mines comes round we take it together.

44. In lowering the water are you going to tap it down below?—The balance of the water will be syphoned over lower down. After reducing the water we will put in another drive.

45. What is the main reason for putting in another drive?—At the present time we are going to use that one as a huge sump, closing it back on Sundays, and letting it off during the week.

46. Do you prefer artificial to steam-jet ventilation?—Any form of artificial ventilation is superior to natural ventilation.

47. *Mr. Parry.*] Would you sooner have the workmen's inspector making inspections or not?—We prefer him to do so. It takes a certain amount of responsibility off our shoulders, and we feel more satisfied ourselves when he makes inspections. We are always willing for them to go round and see what is to be seen.

48. In answer to a question regarding the sanitary arrangements you said it would take the men ten minutes to go to the surface and return: do you not think that is a long time to ask a man to waste for that purpose?—No. It is not customary for a man to make a trip more than once in three days. It is not a case where a man is absolutely pushed for time.

49. You have had sufficient experience underground to know that a man will try to avoid going out if he can?—I do not know that he would.

50. Do you not think that he would avoid going out if he could?—Not if he can get to the surface in five minutes.

51. But the mere fact of his trying to avoid going out is detrimental to his health, is it not?—Yes, if he does so.

52. In answer to a question regarding the fixing of a maximum heat you said it would be impracticable, because the temperature, if taken 2 ft. from the face, would be a great deal higher than that taken 6 ft. or 7 ft. from the face?—Yes, I have noticed that difference.

53. You consider that is the impediment in the way of fixing a standard heat?—The difficulty is in fixing a uniform temperature.

54. If the air in a man's working-place exceeds a certain temperature, do you not think it is advisable to make a reduction in hours?—Yes.

55. What is the cause of its being hotter in pillar-workings?—As the strata falls the coal heats, and the temperature of the atmosphere becomes higher.

56. The circulation of air cannot be very good if the temperature is high?—It usually is high in pillar-workings.

57. You agree that it is necessary, but you do not think it is practicable, to fix a standard heat?—I think the Inspector of Mines should be the arbiter in this matter.

58. *The Chairman.*] Assuming that the Inspector was a permanent resident within a few hours of the mine that would be all right, but heat will generate in a short time, and how could he act as arbiter if he were stationed at the Thames, say, and you wished him to decide as to the heat in your mine?—It might be a case of gases causing the heat, and then it would probably pass off in a day.

59. The question has been submitted to the Commission with a view to fixing a limit at which to reduce the hours?—In a working-place you might get a temperature of 84°, and in a corner of it the temperature might only register 75° or 77°.

60. If that is so does it not prove that there is a lack of circulation?—Yes; but even with a current of air blowing into the face that condition might be present.

61. *Mr. Parry.*] Is that the only point which will be an impediment in the fixing of a temperature?—Yes, the only thing I know of at the present time.

62. Do you think it is a serious obstacle?—Yes.

63. *The Chairman.*] The centre of a man's place might be 6 ft. from his broken ground?—Yes.

64. Have you had any experience of reducing to a six-hour shift?—No, very little. The custom came in after I took charge of the Hikurangi Mine.

65. *Mr. Parry.*] Have you worked in hot places yourself?—Yes, but only on the goldfields.

66. You are not in a position to give an idea of the injurious effect that a hot place has on a man?—Well, I am not in a position to give a solid opinion from my own knowledge.

67. If you were working in a coal-mine yourself, Mr. Dunn, would you not prefer to change at the mine?—Not unless I lived more than a mile away. We find that you cannot get the men to change—they prefer to change at home. If I lived within a mile I would prefer to change at home.

68. Do you not think it would be better to change and wash at the mine?—It would certainly be better if they would do so conscientiously; it would be more healthy for them.

69. Is the Mining Inspector the arbiter now as regards hot places?—Yes, as far as I know.

70. Under what section of the Coal-mines Act has he that power?—I could not quote the section, but, of course, he has power to inquire into matters of dispute.

71. Do you think, Mr. Dunn, that mining is a healthy occupation?—Well, there is no reason to say it is not a healthy occupation.

72. You have not worked in hot places?—I have worked in many such places on the goldfields.

73. Have you heard men complain about their health?—No.

74. As a general thing, have you heard of miners suffering from indigestion?—No, I have had no complaints on that ground.

75. Have there been any men carried out fainting when working under you?—No.

76. *Mr. Reed.*] Is it a fact that the company would be the losers by having hot places in a mine?—Yes.

77. Does it pay to have hot places?—No, it does not pay.

78. So it is to your advantage to keep the places cool?—That is so. We endeavour to do so.

79. You use your discretion in the matter of temperature?—Yes.

80. You have worked yourself on the coal?—Yes, both on the coal and in gold-mining.

81. You stated that, owing to irregularity of temperature caused by the heating of the coal, it would be very difficult to fix a standard or to maintain one?—The spontaneous heating during the falls of strata would make it very difficult.

82. Would it be wise or practicable to go to the expense, when approaching a holing, of putting in a supplementary fan for that single place?—No, it would not.

83. Are you aware that that is the reason why most of the other countries do not adopt a fixed standard?—I do not know for certain, but it is a sound reason.

84. *Mr. Parry.*] Is it not a fact that the man who actually works in those places is the best judge of the effect it has upon him?—Yes, I should think he would be in the best position to judge.

85. *The Chairman.*] If a place is hot, how often do you take the temperature?—It is very rarely taken. You feel it, and judge from the condition of the air in the place.

86. What is to prevent you doing that from day to day? When it is up to a certain heat, how does it make any difference whether you determine the matter by the feel or by the actual temperature?—A dry place may be fit to work in up to a certain temperature higher than a moist place. It is generally the smell of the atmosphere which is coming from the fall of strata as much as the temperature that determines the matter.

87. You admitted to Mr. Reed that it is not advantageous to the company to have hot places?—Yes, I said it was not economical in the interests of the company to have hot places.

88. *Mr. Parry.*] If you consider it a sound reason for fixing a maximum temperature, then it is equally a sound reason for not putting in good ventilation. Seeing that it does not pay to do one it cannot pay to do the other?—In driving in a case like that you are generally driving for ventilation. You generally drive two headings, and one leads to the other.

89. Seeing that it is necessary to have hot places, do you not think that some different arrangements should be made for men working in such places than for other men?—Yes; but there are already recognized provisions for that.

90. You have heard the witnesses state to-day that they would sooner work in a temperature of 84° on the surface than in the same temperature underground, which goes to prove that working underground is the more fatiguing?—The bulk of the men have worked underground since they were boys. They are making that statement from hearsay. I suppose the surface conditions would be better.

91. Well, now, what would you suggest as a maximum heat?—Some places are fit to work in up to 80° if the air is pure, while other places may be foul with a temperature as low as 76°.

92. Would you suggest, then, that a temperature be fixed at 75° to 77° moist and 79° dry?—Well, I have not taken a great deal of temperatures in hot places.

93. Then you tell us again that you are not in a position to suggest a maximum heat simply because you have not had sufficient practical experience?—With the reading of the thermometer.

94. *The Chairman.*] Are you in a position to give a valid reason why a statutory standard cannot be fixed? Would such a standard be unworkable?—I have met with hot and cold places.

95. Has that given you sufficient personal experience to enable you to express an opinion?—I think so.

96. You think it is not possible to fix a statutory standard?—Well, in answer to that, I would point out that heat is not the guiding factor in deciding.

97. You think, then, it is not necessary to fix the heat?—It would be a very difficult matter to settle for a six-hour place.

98. *Mr. Parry.*] Do you think that a man is able to do justice to himself under heated conditions?—No, I do not think so.

99. Then what are you going to suggest?—Well, the shortening of his hours.

100. *Mr. Reed.*] By 80° do you mean dry or saturated atmosphere?—I mean saturated atmosphere.

101. You have heard the miners this morning express their opinion on standard temperatures: do you think you know as much as they do on the subject?—Yes.

102. Do you think that a man who admits he knows nothing on the subject of temperature is capable of fixing 75° as a standard?—No, I hardly think so.

WILLIAM MCKINLAY sworn and examined. (No. 9.)

1. *The Chairman.*] What are you, Mr. McKinlay?—A miner.

2. How long have you been a miner?—Twenty-nine years.

3. Where have you gained your experience?—At Shag Point, Denniston Hill, Mokihinui (Cardiff Coal Company), Brunnerton, Hikurangi, Drury, and Kiripaka. I have also been ten years gold-mining with the Kauri Gold Estates Company, and in the Kathleen, Crown, Waihi, and the Phœnix Mines.

4. What is your present position?—I am a miner, and also president of the Kiripaka branch of the miners' union.

5. What is your complaint in regard to Kiripaka?—We have no complaint respecting Kiripaka except that we plead for a sanitary system and change-houses; also for improved conditions to prevent accident.

6. Have you had any accidents at Kiripaka?—We have had a fair sprinkling.

7. *Mr. Dowgray.*] Have you no complaints in regard to ventilation?—We have been very well blessed with good ventilation during the last two years; it has been satisfactory to all concerned.

8. In regard to accidents, were they caused by inexperienced miners working on coal?—In regard to one fatal accident, two men were firing two shots together in one hole each. One shot went off, and the man whose shot did not go off returned thinking the fuse had failed to light, and while he was looking to find it it went off and killed him.

9. How long did he remain away?—Three or four minutes.

10. Was it not unwise to return so soon?—I admit that it was very unfortunate.

11. Do you not consider that it was his own fault?—Well, yes, it really was.

12. Are we to understand that the miners fire their own shots? Is it not contrary to the rules?—These men were not working on coal.

13. What remedy would you suggest?—I should say that electricity should be used wherever more than one hole is to be fired.

14. Have you had any experience of firing with batteries?—Yes; they give every satisfaction.

15. If they were used a case like this could not possibly occur?—No, it could not.

16. Have you had any other accidents?—There have been a few, but that was the only serious one.

17. *Mr. Parry.*] You say there are no complaints about the ventilation?—No.

18. You quite understand what it is like working in hot places?—Yes, it is very exhausting.

19. Will you describe the effect to the Commission?—The average miner works fairly hard while he is at it. When he has done about half an hour's work he has to get out and lie down.

20. *The Chairman.*] What do you call a hot place? Have you had any experience of temperatures?—Not of temperatures taken with a thermometer.

21. *Mr. Parry.*] Do you find that the heat affects you in any other way—as to your sleep, for instance?—No.

22. Do you think a standard temperature should be laid down for a six-hour place?—Yes, just as for a wet place.

23. What is the heat you consider sufficient to make it a six-hour place?—I could not really say, but a standard should be laid down.

24. What is your opinion about change-houses?—That they are a necessity; also baths. We have men in Kiripaka who wash and change at the mine with the good will of the engine-driver.

25. How many men have you working there?—About forty.

26. How long will that mine last?—I cannot say—possibly about twelve months.

27. As regards the sanitary appliances, do you think they should be provided?—Yes. About eighteen months ago Mr. Tattley, manager of the mine, asked me to see about getting a sanitary system installed in the mine. I must admit that I neglected to follow his instructions. The matter was not attended to, though Mr. Tattley gave me instructions to have it done.

28. Do you find that mining is a healthy occupation?—To some men it is just as healthy as any other occupation, but to others it is not. There are scores who have ruined their health through following mining closely.

29. *Mr. Cochrane.*] You say that you know scores of men who have injured their health?—I mean gold-miners.

30. *Mr. Reed.*] You were an underviewer last year?—Yes, just about a year ago.

31. Are you a certificated underviewer?—No, I failed at the examination.

32. How far is the telephone-station away from the mine in case of accident?—About a quarter of a mile.

33. You stated that the life of this mine would be about a year?—In the present workings they are doing the final extraction of pillars. It is possible that that district may be worked out in the time I mentioned.

34. Do you think they would be warranted in providing lavatories for that short period?—I do not think there will be much need to worry about Kiripaka, but at the same time we should have them. It is possible that by the time a law is passed Kiripaka may be worked out.

JAMES ROLFE sworn and examined. (No. 10.)

1. *The Chairman.*] What are you, Mr. Rolfe?—A miner. I am also secretary of the Kiripaka Miners' Union.

2. Do you hold any other office at the mine?—No.

3. How many years have you been mining?—A little over three, all at the Kiripaka Mine.

4. What is your complaint?—As regards sanitation, change-houses, and I should also like this Commission to consider the necessity for connecting the mine with a telephone, so that the doctor could be communicated with at all hours of the night; also we consider that men should pass an examination before men go on the coal.

5. *Mr. Dowgray.*] In connection with this telephone business, has any inconvenience been caused as the result of delay in the arrival of a doctor?—There has not, but if an accident occurred a messenger would have to be sent here, and another hour would be spent by the doctor riding out. In all such cases there should be telephone connection at all times with some centre.

6. In connection with this suggestion in regard to men going on the coal?—To prevent accidents my union would suggest that a man should have three years' experience before being allowed to work on the coal—not necessarily at one mine. He might have put in a year at Hikurangi, a year at Kiripaka, and a year at Huntly. That would entitle him to apply to the Inspector of Mines for a permit to take charge of a face.

7. Do you consider he would then be fully qualified?—Yes.

8. Are you aware that there is a somewhat similar provision in the English Coal-mines Act?—Yes, it is from that that we got the idea.

9. *Mr. Parry.*] You have no complaints to make about the ventilation?—No.

10. What effect does working in hot places underground have upon your health?—It has a very bad effect on me. I had a very trying experience in the new section of the mine, which, until it was improved recently, was very bad; I suffered from loss of appetite, and a man is not able to sleep at night.

11. What do you suggest for working in those hot places?—Some standard should be fixed.

12. Have you had any experience with the thermometer?—No.

13. But you believe that a standard is required?—Yes.

14. It would be the means of settling the matter as between men and officials?—Yes, undoubtedly.

15. As regards change-houses, baths, and drying-apparatus, will you tell us what you think is desirable?—They are all very necessary. As has already been explained, there are five or six men at the Kiripaka Mine who always wash and change before going home; they have small tins for washing purposes.

16. Have any obstacles been placed in your way by the mine-manager to prevent you from making examinations of the mine?—No.

17. What sanitary arrangements have you?—None. At the present time, however, it is no distance from where the men are working to the surface, but still the filth is there.

18. And you think that it is very necessary to have sanitary appliances provided?—Yes, certainly; I myself have vomited as the result of the filth.

19. Have you heard many complaints amongst the men as far as their health is concerned?—We have recently had an illustration out there when three men left the mine and took surface work because their health was being seriously impaired.

20. Do you suffer from indigestion?—No, but I have heard complaints about it.

ERNEST WILLIAM TATTLEY sworn and examined. (No. 11.)

1. *The Chairman.*] You are a mine-manager, Mr. Tattley?—Yes.

2. How long have you held a first-class certificate?—Thirteen or fourteen years.

3. Where did you gain your experience?—In the Waikato.

4. How long have you been in charge of Kiripaka Mine?—Five years.

5. How many men are you employing?—About fifty-five at the present time—thirty underground.

6. What is it you wish to place before the Commission?—I desire to say that it is not necessary to have sanitary appliances in our mine. The men are never so far in but what they could come out to the surface, and we have had a good deal of difficulty in making them do so, even now when the mine-mouth is only 3 chains from their work. We have threatened the men with instant dismissal if they are found using any of the waste workings.

7. What is the greatest distance they have had to come?—About 22 chains.

8. How long would it take them to walk out and in again?—About ten minutes out and in.

9. *Mr. Reed.*] What is the average distance that the men have to cover at the present time?—The extreme would be the average, because we are coming back with the dip pillars.

10. Have the check inspectors reported advising you to put a w.c. in the mine?—We have never had check inspectors at Kiripaka.

11. Have the men never taken advantage of making a check inspection of your mine?—No, they have not.

12. Have no complaints been made regarding defects at the Kiripaka?—No.

13. How frequently does the Inspector of Mines visit your mine?—About every three months.

14. What does he do when he examines your mine?—He has a look round and goes into every place, and generally through at least some of the waste workings.

15. Does he measure the air?—Yes, every time, with an anemometer.

16. Does he instruct you from time to time as to what he requires?—He has done so on two occasions, I think; but during every other visit he has found everything satisfactory.

17. There was a man killed by a blasting accident in your mine: how did it happen?—They charged two holes in a dip heading, lighting them both at once by placing a naked light at the end of the fuse. One fuse spit, but the other man could not get his to spit. They returned within five minutes, and the man whose shot had not gone off was scraping near the place to relight it, when it went off and he was killed.

18. What was the verdict of the jury?—"Accidental death; no blame attachable to anybody."

19. As regards temperatures in a mine, have you made a special study of the feasibility of fixing a standard?—No, I have not given it any consideration, but I think it would be a good thing to have a standard.

20. To be insisted upon under every condition?—No, because what may be a high temperature in one place would be quite comfortable in another place.

21. Do you know the difference between saturated air and dry-bulb air?—No, I have not given that any study.

22. What would you consider a suitable standard of wet-bulb temperature for ordinary conditions?—Possibly, about 80°; that would not be too high—that is, with a fair current and with the air fresh. Of course, in most of the hot places the air is stagnant, and that is worse than the heat.

23. If the air were dry and not saturated, what would you consider a reasonable maximum for the dry bulb?—Well, I do not know that it would make much difference. I am not an authority on that subject.

24. *Mr. Cochrane.*] With reference to that accident you described, have you anything to recommend to this Commission with a view to avoiding such things?—I have always been of opinion that where two or more holes are fired at once they should be fired by some patent apparatus, preferably a battery.

25. *The Chairman.*] Can you give us any information respecting the feasibility of your suggestion?—Yes, we keep a battery at the mine for that purpose, and those two men knew that we had it and could have had the use of it.

26. Does it put the men to any considerable inconvenience to use the battery?—No; I should say it is the more convenient method. The great difficulty is that they are so expensive that the men would not care to buy them themselves; they cost about £20 for a battery and a cable. Many of the men prefer to fire with fuse, as with a battery all the holes must go at once. It might be advisable to prohibit the use of fuse.

27. Are batteries used in the large mines?—Yes, to a great extent.

28. Do the workmen provide the batteries?—No, the proprietors provide them.

29. Is it unreasonable to expect the proprietors to provide them?—No, I do not think so.

30. Could these batteries be worked by ordinary miners, or do you require experts to work them?—No, you could instruct any intelligent miner in ten minutes how to use them with safety.

31. *Mr. Parry.*] You say, Mr. Tattley, that you threatened to dismiss men for depositing excreta in the mines?—Yes.

32. Do you give any orders to the underviewer to provide sanitary arrangements in the mine?—No; but I think I discussed the matter with Mr. McKinlay when he was underviewer, and I think we decided that it was not worth while putting them in because the men were so near the surface.

33. Do you think it would be necessary to make a statutory requirement that men must make use of the sanitary appliances?—I should say so, to protect them against ill health. I consider that where the men could not reasonably get to the surface to relieve themselves sanitary arrangements should be provided, and also a heavy penalty for making use of other portions of the mine for that purpose.

34. You have no experience regarding the wet-bulb and dry-bulb thermometer?—No.

35. Have you worked in hot places?—Yes.

36. What effect does it have upon a man?—None, as long as the air is fresh.

37. Would you sooner work on the surface in a temperature of 84° than underground at the same temperature?—Underground—that is, of course, allowing that the air was fresh.

38. With vitiated air?—We are not talking about that. I said, provided that the air was sweet.

39. *The Chairman.*] What would be an injurious temperature?—It would depend on the air and not on the temperature.

40. Is there any standard by which you could fix the injurious element?—I do not know of any. It would be a difficult matter to fix a standard.

41. Can you suggest any scheme by which a workable standard could be devised for determining a six-hour shift? You say that the temperature is not an injurious element unless it becomes excessive? Is there any way of gauging or fixing a workable scheme by which a standard could be established so as to meet the injurious elements?—I could not say. That would require to be carefully considered by two or three experts.

42. *Mr. Parry.*] You say, if there were a good fresh current of air, the heat of a place has no effect upon a man?—No, so long as it is not too hot. I should say that 85° underground with a good fresh current of air would have no ill effect on a man.

43. With a good fresh current of air, what would be the cause of the heat?—I was in one place in Waihi where the heat was attributed to the action of the water on the stone—that was the only explanation I heard of it. You could not go in there without perspiring, even when standing still. The same current of air which served that place also served other places which were quite cool.

44. Under those circumstances you say that if the air is fresh the heat must come from the ground?—No, nothing of the kind. It might come from several causes.

45. Is there any difference between the heat underground and the heat from the sun?—I do not think there would be much difference. 85° is not a very excessive temperature. Men work in hotter places than that—for instance, in torpedo-destroyers the temperature is sometimes 200°. 120° is a very common thing in a stokehole.

46. *The Chairman.*] What shifts do they work in a stokehole?—Four hours on and four hours off—twelve hours a day, seven days a week.

47. *Mr. Parry.*] Do you know that it would be impossible to live underground at a temperature of 200°?—No, I do not think so.

48. Do you think a man would live half an hour underground in a temperature of 200°?—If he could live in a stokehole at 200° he could live underground.

49. Have you ever been underground with the temperature exceeding 86°?—Yes, I have, working about pumps where the heat came from steam-pipes. There are many places where you get the temperature in excess of that.

50. What is the name of the mine where the temperature is so high?—You would get it in our mine, in the back—in the return airway; in Ralph's mine also. Of course, there were no men working there or travelling, except for making repairs.

51. They would not be constantly employed there, as in a coal-mine?—No, certainly not.

52. Do you think it is possible to fix a standard heat?—Yes.

53. What heat would you suggest—dry heat?—Well, I suppose 85° would be quite enough.

54. After exceeding 85° the place should be considered a six-hour place?—Yes, with the air fresh.

55. What is your opinion of the idea of change-houses and drying-apparatus?—The demand for them is very reasonable. They would add to the life of the miner if he would use them.

56. The change-houses to have half a dozen showers?—I do not think it unreasonable to ask that they should be provided. Of course, a lot of the men would not use them. I know of some men who go home and have a bath every day, though they have only a small bath-tub. It would not cost the company much, and it would undoubtedly be a convenience to the men.

57. *Mr. Cochrane.*] With regard to your evidence respecting the heat in the Waihi Mine, were you on a casual visit at the time you speak of, or were you working in the mine?—I was working in the mine; I worked there six months.

58. *Mr. Reed.*] Are you aware that temperature increases with depth?—Yes.

59. Would the air assume the temperature of the rocks?—It would undoubtedly be raised, and in a deep mine it would require a big current to keep it below normal.

60. And while the rocks raised the temperature of the air would it also be more vitiated?—I do not think it would, unless the air was mixed with gases exuding from the measures.

61. So that heat does not of necessity mean vitiation?—No; they are two different things.

62. *Mr. Parry.*] Still, Mr. Tattley, the heat would have some effect on a man working constantly?—Yes, it probably would.

63. How did you feel at night after working in that hot place?—As well as possible, after a good scrub.

64. Not at all exhausted?—No, not more than I would have felt if I had been working in a cold place.

65. I take it, then, that you would just as soon do a hard day's work in a temperature of 84° as in a temperature of 70°?—No; I have already said that 85° would be a fair maximum. How then can you expect me to say I would as soon work in a maximum temperature as in a lower one?

66. But you say you do not feel any ill effects from working in a hot place. Would you sooner work in a cool place?—Yes, that is only reasonable. It is like everything else—it is hard to know where to draw the line.

HUNTLY COURTHOUSE.—6TH SEPTEMBER, 1911.

BOYD BENNIE sworn and examined. (No. 12.)

1. *The Chairman.*] You are Inspector of Mines under the Coal-mines Act for this district?—Yes.

2. *Mr. Reed.*] I wish to ask you a question in connection with the ventilation of the Northern Colliery at Hikurangi. When the Commissioners visited that colliery there was a place called Steel's place, which appeared to be somewhat inadequately ventilated. We found the temperature 77° saturated, and there was a decided proportion of CO_2 present as indicated on the lamp. About a chain from where Steel was working there was a good current of air, but in those pillar-workings the air was very bad. It was the only bad place in the mine. Can you explain to the Commission the cause of those unsatisfactory conditions?—Yes, a creep took place amongst the pillars. In these pillars where Steel was working the system is to drive a 6 ft. place through the centre of the pillar, which is 14 ft. wide, leaving about 4 ft. of coal on either side of the roadway to support the roof. Two bords near that pillar have fallen in, and the crosscut ahead of it has also fallen in. Therefore it was isolated, and it was not possible to drive a current of air into that section. The reason why the bord has been driven 6 ft. wide is that there was only 14 ft. of pillar. If it had been driven wider it would be dangerous, and there was therefore not room to get brattice-cloth to conduct the air into the face. About a chain back from the face, through the roadway leading to one of the upcast shafts which ventilate that section, the air is good, and the miner having to fill the coal would travel the pass. It was much better to take the coal out in that way, even though it was inadequately ventilated, than it would be to leave the pillar in and run the risk of a fire in the mine.

3. So that the manager's reason for working that way was to avoid more serious consequences?—Yes.

4. The reason for the narrow roadway was to prevent falls?—Yes.

5. Did you observe the timber broken?—Yes.

6. That is an old seam?—Yes, it is an old mine; but in a few weeks the ventilation will be linked up with the present system.

7. At present that linking-up has not taken place?—No.

8. You heard one of the witnesses state that two air-shafts connect with Nos. 5 and 6 sections?—Yes.

9. In regard to another matter which came up in connection with the Hikurangi Mine, it appeared that the air was somewhat indifferently distributed in the new dip workings: will you explain to the Commission the reason of that?—The manager seemed to have an idea to allow this air to go into the faces, down the road, and up another ventilating roadway. That system I did not approve of. Since the Commission was there another shaft has been put through, so that now the return airway is very much improved, and, as the manager stated, a fan is to be put in. It is merely a matter of ventilation, and there is no reason why it should not be adequately ventilated.

10. I understand it is a mine in its early stages of development, and they have not installed a permanent system?—Yes, it is only about eight months since the mine was opened. They put the men into the new section without taking into consideration the quantity of air available.

11. Now, as to this Taupiri Colliery, will you deal with the ventilation system generally, and state whether the air is pure and the quantity prescribed by the law is provided, also as to whether the air is properly conducted to the working-faces?—The measurements taken by myself extend over about twelve months, and will show that the currents taken during yesterday's examination by the Commissioners coincide with them generally. I produce a tabulated statement showing the readings taken by me since the 5th September, 1910. In the north dip of the Extended Mine there was 24,375 cubic feet, giving 234 ft. per man. [Exhibit 14 put in.]

12. As regards your measurements in the Extended Mine, what is the minimum quantity of air per man recorded in any portion of the mine?—191·2 cubic feet per man per minute.

13. Those measurements extend over what period?—Over a year.

14. What was the highest temperature recorded in the Extended Mine during that period?—64° wet and 68° dry.

15. In Ralph's Mine what is the lowest quantity of air circulating in any place during the past year?—173 cubic feet; and the highest temperature was 63° wet and 71° dry.

16. Will you inform the Commission if you have found gas in either of the mines?—No, I have not.

17. Neither firedamp nor black damp?—No.

18. Not sufficient to indicate on the lights?—No.

19. How long have you been inspecting these mines?—About six years.

20. And during that time you have not observed gas?—Only once, in a borehole, when it put my light out, there was an indication of CH_4.

21. As regards falls, have you any remarks to make as to the safety of these mines?—The mines are very safe indeed.

22. Have any men been killed in this mine?—Two men were working the Taupiri West heading about twelve months ago, when a piece of fireclay came down and killed one of them.

23. What was the verdict of the jury at the inquest?—"Accidental death; no blame attachable to any one."

24. Have there been any serious accidents?—No.

25. As regards the ladderways in shafts?—They are fairly safe.

26. Now, as to the risk of inundation, there has been litigation in the past?—Yes.

27. Did you take action against the company?—The late Inspector Coutts took action. I was Assistant Inspector at the time. The manager reported that there was a creep amongst the pillars. Mr. Coutts and I inspected the area, and after the examination and a conference with the workmen's inspector and the manager we came to the conclusion that there was no immediate danger and work might be resumed. Mr. Coutts requested the management to provide a second outlet on the western side of the river. The company did not carry out his directions, and that led to the litigation.

28. It eventually resulted in the Inspector taking action?—Yes.

29. The inquiry was held before a Judge and two assessors?—Yes, Judge Denniston and two assessors, and they decided that this mine was the safest mine in the world.

30. Notwithstanding that the Waikato River overlaid the coal?—Yes.

31. The Government failed at law?—Yes.

32. *The Chairman.*] How long ago was that?—About four years ago.

33. *Mr. Reed.*] What happened eventually?—The company purchased the Taupiri West property and put in a drive connecting Ralph's and Taupiri West shafts.

34. Was that drive put in as a safety precaution?—Yes.

35. What is your opinion as to the safety of the mine from inundation?—It is safer than it was then, for the reason that the debris from the tunnels in the rock has been deposited amongst the damaged pillars, and whereas they were 20 ft. high they now average only 10 ft.

36. Do you believe in the trial before a Judge or Magistrate and two assessors?—I prefer the Warden and two assessors.

37. Your experience has tended to influence you in favour of the Warden alone as a tribunal?—No. I prefer a Warden and two assessors.

38. Now, in view of the requirements of the Act, is this a safe mine generally?—Yes.

39. Can you tell us of any defects you have observed?—The high working of the bords is the only defect I know of, and the company considers that to take the bords lower would be a great waste. To bench it would be very much safer.

40. Do the workmen's inspectors carry out their duties regularly here?—They make an inspection now and again. During the present year there have been three or four examinations made.

41. Are the minor accidents in the Taupiri Company's property very frequent?—Yes, there are a great many minor accidents, such as cuts and strains. One man broke his leg, and several miners have lost an eye as the result of flying coal.

42. But you are fairly well satisfied with the existing conditions here?—Yes.

43. When you draw the attention of the management to any defects, are they put right?—Yes; I have no trouble in that respect.

44. *Mr. Cochrane.*] In regard to the first part of your evidence with respect to the Northern Mine, what is the thickness of the pillars they are driving there?—They are about 14 ft. wide.

45. Then you said that the management could not link up the ventilation system so that the air could run through Steel's place?—I did not say it was impossible.

46. Coming to the Taupiri mines, you say there was a creep in Ralph's Mine?—The manager reported a creep.

47. What was the nature of it?—Mr. Coutts held the opinion that it was not a creep, but merely a contraction of the coals and pillars through cold air being admitted after the area had become heated.

48. Was there any movement in the floor?—No.

49. So that it was not a creep proper?—No.

50. Are any of the present workings under the river in either mine?—I think there are some in the Extended.

51. Are there any workings under the lake?—I think not.

52. Are there any in either mine under quicksand?—I do not know. The company said it was the safest overlying strata in the world. If it had been unsafe they would not have said so.

53. Are the old bords kept in order?—Yes.

54. How often are they inspected?—Once a week, I think.

55. *Mr. Fletcher.*] Can you tell us how much coal is left in the bords right across the river?—The practice is to leave not less than 7 ft. to 9 ft. of coal overhead. Pillars are not drawn there.

56. *The Chairman.*] Do you know the strata overhead?—Fireclay and a small seam of coal.

57. How do you know that? Have you seen bores?—I have seen a section of the strata exhibited in the Auckland Exhibition and in the company's offices.

58. *Mr. Dowgray.*] In connection with the Whangarei mines you said it was not possible to have good ventilation in Steel's place?—Well, you can imagine a pillar of coal 14 ft. wide, with bords on each side, the timber broken, and the roof coming down; then, to extract that pillar it is split, leaving a piece of coal 4 ft. on each side, and they work it back. If they were to take it wider they would leave but a small rib of coal.

59. Can you explain to us how that particular section where Steel's place is was ventilated?—Yes, by two shafts from the surface to those sections.

60. Did you hear Mr. Morgan give his evidence?—Yes.

61. Did you hear him state that these two shafts were upcast shafts?—That might be.

62. You remember reference being made to a door: was it not left open?—Yes.

63. Was that not the reason for its being left open—to ventilate the places in those two particular sections?—No. At times one of those two shafts may be drawing while the other is an intake, and it might happen if the door was open that they might both be uptakes, but not otherwise.

64. Mr. Morgan said they were both upcast shafts. The men complained that the door was left open, and it was necessary for the proper ventilation of the mine for it to be shut. Yet I found it had been left open?—Well, I say that it is not necessary to have it open.

65. Could those two sections be ventilated with the door remaining shut, and with the fan having no pull on it? Was it possible for Nos. 5 and 6 sections to act in conjunction with one another?—Yes.

66. Has one section a connection with the other?—Certainly.

67. Do you think it is a good way of ventilating a mine to have a second cutaway like that, and a fan installed?—I have just explained to Mr. Reed that a creep took place in the pillars. Formerly the mine was ventilated by natural means. I disapproved of natural ventilation and insisted upon the company installing a fan, but through falls in those pillars they could not connect up the two systems. The mine was originally laid off for natural ventilation, but these falls have made it difficult to ventilate it well.

68. Do you think it is well ventilated now?—Yes.

69. What about Nos. 5 and 6 sections?—I explained that perhaps on two or three days the ventilation might be bad, but at other times it would be perfectly good. I might say that at the request of the miners' union I visited and made an inspection of that place, and shortly after they backed down and said they had no complaint to make.

70. Is a system satisfactory where the ventilation conditions vary so quickly?—No.

71. In connection with the new shaft at Whangarei, in that particular colliery do you consider it a safe outlet for the men?—There is no danger from an inrush of water. Where is it to come from?

72. But there is water all round it?—No. There was water in the old workings, but it has been lowered to a point where it is safe and impossible to flood. A borehole was put down and the water was lowered 20 ft.

73. Are they still tapping it as they go down?—They cannot go down.

74. *The Chairman.*] From the lay of the workings you are satisfied there is no danger of flooding by water?—I am satisfied.

75. *Mr. Dowgray.*] Did you request the company to improve the ventilation by installing a fan?—Well, the point is this: at my previous visits the ventilation had been adequate, but there was a lesser number of men employed. As the other sections were worked out they put more men into the mine and so made the quantity of air insufficient. On my previous visit there was adequate ventilation, and so I could not insist upon any improvement.

76. What is your opinion as to adequate ventilation?—In a mine where there are no gases 150 cubic feet of air per man per minute is sufficient.

77. Where—at the face?—Certainly.

78. Of course, you know that there was not that amount entering the mine?—I am not aware of that. The returns will show different.

79. The returns show 140 cubic feet per man per minute. Coming back to the mines here at Huntly, do you think the men in the Little dip section of the Ralph Mine would have any hope of getting out in the event of water coming in? I want your opinion on that point. There is no suggestion that it might happen?—Yes, they could get out by passing through No. 6 main dip level, the crosscut, and into the Taupiri West, where we were yesterday.

80. *The Chairman.*] From where they are working could they get sufficient warning of the break to enable them to make their escape before the water would catch them?—The position is like a triangle, with the main haulage-road as the hypotenuse, the Little dip is the perpendicular, and the escape along No. 6 is the base. If a very serious fall took place the mine would be flooded instantly, but we do not anticipate that.

81. Could a telephone be installed both ways?—Yes, a telephone could be put down the Little dip to the plat. In the main haulage-way there is one already to No. 6 level, which we visited yesterday.

82. I take it that it is part of your duties to look after the general safety of the mine?—Yes, as defined by the Coal-mines Act.

83. You stated to Mr. Reed that a man had his leg broken: was that not through a fall of coal?—I understand he was working down a piece of coal after a shot, when a piece came away and broke his leg.

84. In connection with the method of conveying the air by brattice, do you not think it would be an improvement if the brattice were made the return?—That is a matter of opinion. Some miners think not. As far as the inspection of mines is concerned, as long as adequate ventilation is provided the Inspector has no say in the matter.

85. *The Chairman.*] As a matter of a recommendation, apart from the question of your interference as Inspector, would you consider that it would be better if the narrow airway were the return and the wide way the intake?—The circumstances sometimes decide which will be preferable. For instance, where the air comes through the split in the pillar the stenton is not right opposite, but is probably 30 ft. up, and in that case if you made the canvas side the intake there would be twice the length of canvas required to take the air to the face as compared with what would be required to return it, consequently there would be more leakage.

86. *Mr. Dowgray.*] I fail to see how it would make any difference?—It depends upon your system of working the mine.

87. It seems that the method in this particular mine is to use the brattice as the intake all over the mine?—Well, supposing it were the return the air would go up the bord and round the point of the canvas, but if the other method were adopted it would be thrown up under pressure. Would you be surprised to learn that there was 900 ft. passing through the canvas where the men were working?

88. Have any reports on these mines stated that there was gas present?—Yes.

89. Have any places in either of the mines been ventilated by compressed air?—Yes. Occasionally in development-works they carry 10 in. air-pipes into the face, and these are assisted by a jet of compressed air.

90. Is the compressed air used in the working-places?—I made an extract from the manager's report-book at the Extended Mine, which shows that the total return is 58,669 cubic feet, which means that 18,400 ft. ventilates the old workings. I did not observe to-day any places which were ventilated by compressed air, but on a previous inspection there was a section so ventilated, but it was only a temporary arrangement.

91. *Mr. Parry.*] In connection with Steel's place at Hikurangi, do you think that was a fit place to work eight hours in, in view of the fact that it was impossible to ventilate it?—Well, when the miners' union was registered under the Arbitration Act, had they appealed to me on the point I would have made a careful examination to see if there were any impurities in the air.

92. Under the circumstances in which we found it, do you consider it was a fit place for a man to work eight hours in?—Yes.

93. Did you see the candle burning?—No, we had a large torch, and it would take a large percentage of CO_2 to show on that.

94. *The Chairman.*] Did you notice during that inspection any indication of noxious gases?—No.

95. *Mr. Parry.*] How would you deal with that place to make it a six-hour place? Where would you get your power?—I said, "if they applied to me." I was Inspector of Awards, but I have no power under the Coal-mines Act because they cancelled their registration. My powers of arbitration are under the award.

96. *The Chairman.*] Have you any opinion to offer as to whether it would be possible to give you such powers under the Coal-mines Act as would enable you to fix six-hour places?—It would be somewhat difficult for me to undertake the work, because my district includes two provinces, and, the seam of coal being thin, the conditions change so rapidly that by the time I got there, unless the place were stopped, I would not be able to judge as to what were the conditions at the time of the complaint. I have been called in to decide sometimes when the pillar had been taken out, and it was impossible for me to do anything.

97. *Mr. Parry.*] Then, under those circumstances, is the suggestion not a good one to have a standard of temperature fixed by the Government?—No. The miners' union and the manager have always consulted one another, and in 70 per cent. of the cases they have decided between themselves.

98. In the event of their not being able to settle the matter between themselves?—I do not know what they would do then.

99. What would you suggest, then, in the event of their not being able to arrive at a settlement? Would you not be in favour of something being fixed by the Government?—As I stated at the Thames, it would be a difficult matter to fix a rule to decide these things, the conditions change so rapidly. In the morning it might be an eight-hour place according to the conditions fixed, and in the afternoon a six-hour place.

100. How are you going to provide for those men who are working, then?—They must exercise a little reasonableness between the management and themselves.

101. And in the event of their not being reasonable?—I have no opinion to offer.

102. And you cannot suggest anything to get over the difficulty?—No.

103. Would you suggest that power be given to you under the Coal-mines Act or Mining Act so that if you considered a place to be dangerous you could stop work there, and that your decision be final in the matter?—I think there is that power in the Coal-mines Act now for dealing with dangerous places.

104. In any of the Huntly mines have you found during any of your inspections the quantity of air supplied to be insufficient?—Not in either of the mines.

105. Have you found the current of air insufficient in any of the working-places?—No. My last inspection with the workmen's inspector was made on the 7th July, 1911.

106. On any occasion have you found the current of air insufficient?—I have not measured it in every place, but where I have done so it has been quite sufficient.

107. *The Chairman.*] Have you any reason to believe that it was not so in any places where you did not measure it?—No.

108. Your attention was never drawn to any doubtful place?—No.

109. *Mr. Parry.*] That being so, it was never necessary for you to speak to the management on the subject?—No.

110. Has your attention been drawn by the workmen's inspector to an insufficiency of air in any places?—In one of his reports (12th April, 1911), it is stated that he found only 88 cubic feet of air per minute per man in the north section of the Extended Mine.

111. *The Chairman.*] When was your next inspection made—12th May?—Yes, on that date, in consequence of the workmen's inspector's report, I visited the same section accompanied by the manager, and will give you the figures: No. 6, west dip, three men working, velocity 1,200 revolutions, giving 1,272 cubic feet per minute, equal to 424 ft. per man.

112. *Mr. Parry.*] But what were the conditions when the complaint was made? Have you those figures?—No. The check inspector's report does not supply that information

113. There was a month between the inspections?—Yes.

114. Were there not compressed-air jets introduced after the check inspector's visit and before your inspection?—I have no knowledge of that.

115. How was it ventilated when you were there?—I did not visit the whole of the mine. When I visit the mine I take a section at a time.

116. How was it ventilated on the date of your inspection?—By 14 in. air-pipes with compressed air.

117. You do not know when they were installed?—No.

118. Do you consider this new system of ventilation adequate?—Yes; I have not visited any place which was not adequately ventilated.

119. Do you consider that the man on top gets sufficient ventilation?—Yes.

120. Or would you suggest anything to improve the ventilation for him?—No, I cannot suggest anything. I could if it were necessary, but it has not been necessary.

121. Have you any complaints from the men working there?—No.

122. Does the workmen's inspector give you any assistance so far as inspections are concerned?—No.

123. Do you think the travelling-way going into Ralph's Mine is in a fit state as regards the dust there?—There are small sections of it where there is a little dust, but there are also great stretches where there is none.

124. Would you suggest any alteration being made to keep that dust down?—I believe they need it. Is there any particular section to which you refer?

125. In different places along the road. Have you had any complaints as to the dust in the travelling-way?—Not in Ralph's Mine. In the check inspector's report of the 11th July a complaint was made, and I saw the manager, who said that if he put water down it would make the place wet and the miners would complain. I have not been in that section since then.

126. Could you suggest anything to minimize the eye accidents which occur when the men are cutting coal?—I have seen goggles and pieces of gauze used to protect the eyes.

127. Is there anything in the way of a difference of system which would minimize that trouble?—What system would do it?

128. I am asking you. Can you suggest any different system of working which would minimize these eye accidents?—If the miners shot their coal out without cutting it they would have to trim both sides and roof, and the danger would then be present just as it is now.

129. *The Chairman.*] Do you think they can escape trimming by cutting out?—No.

130. *Mr. Parry.*] But the danger would not be as great to the eyes?—I am not sure there would be much difference. The shooting would damage the pillars.

131. Was your attention drawn to the signals at Ralph's Mine shaft?—Yes.

132. Did you see that that was put in order?—The manager has arranged to put in an electric signal from the brace into the engine-room.

133. How long is it since your attention was drawn to that?—About two months ago.

134. Is it in now?—I cannot say.

135. *Mr. Dowgray.*] You made reference, in connection with Steel's place, that the miners' union had cancelled their registration and you had no power to act as arbitrator: does the Arbitration Act give you power to act as arbitrator, or is it only the agreement which gives you that power?—They had an award with the company.

136. *Mr. Reed.*] Will you explain the matter in connection with the signal?—The necessity for the signal was brought under my notice, and on reading Special Rule 87 I believed that I had power to ask the manager to provide the signal. Afterwards, on more carefully reading the rule, I came to the conclusion that I had no such power. If you will look at the section you will find that it reads, "When persons are about to descend the banksman shall signal three times, which the onsetter shall answer by signalling once."

137. *The Chairman.*] Why should the onsetter signal an answer?—It is a rule that when any person is about to ascend or descend the opposite cage must be clear of any trucks. The object of the answering signal is for the onsetter to leave that cage clear, and he must signal once before the engine-driver can move that cage.

138. If the banksman signals the onsetter, does not the onsetter signal to the engine-driver?—Yes.

139. So that the lowering signal comes from the banksman to the onsetter, and from the onsetter to the engine-driver?—It is from the braceman on the top to the onsetter in the chamber at the bottom of the shaft that persons are about to descend, and he signals through so that the cage may be clear, and then the onsetter signals "All right."

140. To whom does he signal?—To the engine-driver.

141. *Mr. Reed.*] Now, will you explain this little misunderstanding: in conversation with the manager and after consulting the Act you found that your first letter to the union was not correct—that you were not able to compel the company to put the signal in?—Yes, I talked the matter over with the manager, and after referring to the Act I found I was in error. Then, the same evening I had other business with the miners' union committee——

142. Who was present?—Mr. Duncan, Mr. Fulton, and, I think, the treasurer. We talked the matter over and I pointed out that under the rule I had no power, but that the manager had agreed to put in an electric bell.

143. Did you tell the union officials what had previously transpired at your conference with the manager?—Yes.

144. Can you fix the time and place?—No, but it was the evening of the day I arrived here, and I had the conversation with the union officials in the union's office.

145. *The Chairman.*] At what hour?—I went along in the evening, and they asked me to come in.

146. Was it on the 6th? Apparently you made an inspection on the 7th, and the letter is dated the 13th?—In all probability it was on the 6th of the month following the date of my letter, the evening before the inspection.

JOHN EDWARD DUNCAN sworn and examined. (No. 13.)

1. *The Chairman.*] What are you?—A miner, and check inspector for the union.

2. How long have you been mining?—About twelve years.

3. How long have you been check inspector?—Nine months.

4. Which mine do you work in?—Ralph's.

5. Are you workmen's inspector for both mines?—Yes, with another.

6. Now, will you tell us as briefly as possible what it is you wish to lay before the Commission?—Well, first of all we consider that the report of the examination of the mine should be placed at the mine-mouth prior to the men going below, for the reason that the men may be lowered down into danger. Some time ago we wrote to the Inspector of Mines asking that there be installed a signal from the braceman to the engine-driver. I received a reply that he would see the manager and ask that the signal be put in, but it has not been done yet. It is necessary to have a signal, because the steam gets in the line of vision. We consider that the contract system and the tonnage system should be abolished, because under them the men rush their work and do not look to their safety as much as they would if they were employed on day wages.

7. Is that the fault of the price or the system?—It is the fault of the competitive system. The men undercut the prices to get the work. Then there is the matter of the travelling-way on the north side of the Extended Mine. The men travelling to the north side have to cross the main way, and there is danger in doing so. I believe that one of the men narrowly missed meeting with an accident on this particular crossing, and we consider that an overcast should be put over to avoid the risk. Then, again, the Inspector of Mines, when he examines the mine, should report to the union, because the members of the union consider that their lives are at stake. As matters are at present we have no means of knowing what condition the Inspector considers the mine is in. Under an agreement under the award by which we are working we cut and hole out coal to a depth of 3 ft., but in most instances it is cut to that depth, and the danger of accident is very great because the miner is working in a congested area. During the last year we have had twenty-five accidents which have put the men on the funds, and six very serious ones during the last two years. Four men have lost the sight of their eyes in these mines.

8. How would this holing, and cutting, and trimming the sides and roof be affected if you blasted the coal out?—You would not be working in a small place with your head in a cut. You would have some freedom, and more chance of averting an accident.

9. How is your light got?—You have it on your head. We also consider that the check inspectors should have increased powers. Their powers are very much curtailed at present. They should have the power to take action against the company if it is found that the requirements of the Act are not complied with. We consider that each district in a mine where there are not more than four districts should have a fresh-air split. In Ralph's Mine the Little dip section is ventilated from No. 7 north, consequently the air is very vitiated when it comes through the Little dip, having been breathed before reaching the men there. I consider that the quantity fixed per man per minute should be increased.

10. To what extent?—Well, more than it is at present. I have gone down the Extended Mine and found that a number of the men employed in some of the working-places did not have a sufficiency of air, and yet there was 150 ft. per man per minute.

11. How did you know that it was insufficient?—By measuring.

12. Have you any instances where the air was insufficient?—Yes, the north-west dip.

13. That has been remedied?—When I was down there was no compressed air taken in by the pipes. There was 87 ft. of air supplying two men. Subsequent to my visit, and prior to the visit of the Inspector of Mines, there was a compressed-air jet installed in both these places. We consider that the air should sweep the face. Perhaps at the end of the brattice there is a noticeable current of air, but sometimes the brattice is 16 ft. back from the face, and consequently it is very stagnant at the face. Then the bench-bords should be bratticed so that the intake air should reach the top of the bench. At present the air only strikes the back of the bench, and the miner working on top gets only the warmest of the air. If a screen were put up the air would sweep the top of the bench. If the benches were driven about 12 yards apart there would be less bratticing required, and, though the bratticing tends to reduce the current of air because it is congested in these narrow inlets, there is quite a lot of escape. Then we would urge the necessity for change-houses and baths for the use of the miners.

14. Have you none here?—No. Then there is the dust on the travelling-ways, which should be sprayed. They have watered travelling-ways where I have recommended, with the exception of the one between the shaft and the junction of the No. 6 and the Little dip.

15. What is the distance of the dusty way?—About 30, or 40, or 50 yards.

16. You represent the union?—Yes.

17. What is your membership?—At the end of 1910 there were 475 members on the books.

18. Have these matters which you are referring to been discussed by your union?—No, but by a committee set up by the executive.

19. And were they unanimous in regard to these matters, or was there any dissent from them?—The committee decided to place them before the Commission.

20. I want to know generally how many miners you are speaking for?—The union appointed us to make these representations.

21. *Mr. Dowgray.*] In connection with that signal from the braceman to the engine-driver, has there been any accident caused through the lack of a signal?—No, there has not been any serious accident, but I believe on one occasion at the Extended Mine the braceman pulled out the clips when men were being lowered, and he thought after he had pulled them out that the engine-man was not at his post. Then he pushed the clips back again and they caught the top of the cage, with the result that the men got a severe shock.

22. *The Chairman.*] Are these signals additional signals?—I will quote from a letter dated the 30th June, 1911, from the Inspector of Mines, on the subject: "Yours of the 14th instant to hand. The duties of banksman and onsetter are clearly defined in Special Rules 83, 84, 87 of the Coal-mines Act, 1908. Direct signalling to the engine-driver by the onsetter in all things concerning the cages in the pit-bottom is most desirable, and no other means can be allowed. The banksman should have a signal-wire from the bracehead into the engine-room with bell attached, so that he can signal as required by Rule 87, line 11. I shall request the manager to provide such means of signalling, if it is not already provided."

23. *Mr. Dowgray.*] Is it not a fact that a full box went down the shaft?—Well, the other men who will be giving evidence will be able to speak more decidedly on that point.

24. Has the signal referred to in that letter been installed now?—No.

25. *Mr. Parry.*] Have you had any experience of taking temperatures?—No.

26. You have taken no temperatures with the dry bulb?—No.

27. Have you worked in any places where the temperature was taken?—Yes, in the Kaitangata Mine.

28. What do you think of a standard temperature: is it necessary to be fixed by the Government?—Well, I consider that 80° is very much too hot. I would not be in favour of fixing a standard higher than 75° or 70°. I have had experience of a temperature of 80° in the Kaitangata Mine.

29. What was the current of air like there?—It was not a very good one.

30. That would be a dry temperature, would it not?—Yes.

31. Where do you get your drinking-water in those mines?—We carry it into them; the men take it in themselves.

32. Have they to go back to the surface in the daytime if they want more drinking-water?—No, they do without if they do not carry enough.

33. What is your opinion of the necessity for sanitary appliances?—I consider that the sanitary appliances here have been very unsatisfactory, but just recently there have been wonderful improvements effected in them, and I believe they are now going to provide disinfectants in the mine. The matter was arranged just before the Commission came here. Previously the smell was nauseating in the extreme. Then there was a complaint about the pan in the Extended Mine being close to the return airway near where the truckers were trucking. I mentioned the matter to the management, and it was removed.

34. How often are the pans emptied?—I do not know.

35. During your inspections, have you had reason to make many complaints?—No, I have made complaints only through my reports. I have only made two or three check inspections.

36. To whom have you made the complaints?—The reports are sent to the managers of the mines.

37. Is there a copy sent to the Inspector?—No, but he sees them when he visits the mines.

38. *The Chairman.*] You asked for Inspector's reports to be sent to you: would you be in favour of sending the Inspector a copy of your report?—Yes, I am in favour of that.

39. Have you drawn the attention of the owners to any matters apart from the place you referred to?—Yes, there was one place in the dip on the west side where it was impossible to get a reading with the anemometer. There was no noticeable current of air at all. The officials of the company admitted that the air was inadequate.

40. Did they do anything to remedy it?—Yes, I believe it was subsequently remedied by making a connection between the district and the intake or return.

41. Have you made any serious complaint in regard to bad air or insufficient air which has not been attended to within a reasonable time by the management, either by holing through or some mechanical system of ventilation?—Well, we made a check inspection of this particular dip and reported the matter, and on returning sixteen days afterwards we found that there was no improvement—in fact, the quantity of air had diminished.

42. And when was the improvement made?—It was made subsequent to our visit and prior to that of the Inspector of Mines.

43. What is the date of your first report?—I do not know the date.

44. In reference to the complaints regarding a place in the Extended Mine where three men were working, did you inform the Inspector?—Yes, he spoke to me on the matter when I was at work in Ralph's Mine. He asked me how many feet of air I got. I told him I got 80 ft., and he said he had got some hundreds.

45. *Mr. Parry.*] Have there been improvements made in the ventilation during the last four months?—Yes, I consider there have.

46. *The Chairman.*] In regard to the ventilation of such places as dead-ends, have you any general suggestions to make which would adequately meet these contingencies? It is apparently inevitable that defective ventilation must be found in such places during the development of a mine?—I consider that the quantity of air should be increased, that it should be conducted to these places, and that they should be ventilated first. There was quite a sufficient quantity of air not far from this particular place.

47. *Mr. Parry.*] Would you suggest that the workmen's inspector should have additional powers, in order that the standard of ventilation might be kept up?—Yes.

48. In the event of an accident taking place in the mine, are there any first-aid appliances or bandages provided there?—I believe not. I think first-aid appliances are on top, and in case of a man being injured below there is great danger of his being more seriously affected in being raised to the surface, as I understand they have no stretchers.

49. *The Chairman.*] You think that first-aid appliances should be kept near to the working-places?—Yes.

50. *Mr. Parry.*] In regard to the matter of the assistant engine-driver, do you think if an extra man were appointed it would have a tendency to make matters safer when men are being lowered and pulled?—Yes, particularly in the event of the driver having a seizure or fit.

51. *The Chairman.*] What is the depth of your shaft?—280 ft.

52. *Mr. Parry.*] Do you think there is a serious risk run by the men with only one man at the engine?—Yes, a man may have a fainting fit at any time.

53. In regard to eye accidents underground, what have you to suggest with a view to minimizing them?—I am not in favour of gauzes being used. I have worked with them, and found that after a man has worn a gauze for a day he gets blinded. I consider that eye accidents are the result of the cutting of the coal, and that should be done away with. At present we are supposed to cut the coal, but some men do not do so—some are allowed more latitude than others.

54. *Mr. Cochrane.*] With regard to the proposal that check inspectors should have greater powers to prosecute, would that not lead to divided authority in connection with the Inspector of Mines?—Not if the case was heard before a Magistrate.

55. *The Chairman.*] Would you also be in favour of the workmen's inspector being mulcted in costs if he failed?—No, I think there are too many costs against him to-day.

56. Where power is given to prosecute, as a correlative to that power there is also the power to allow costs. If a man knows that he is running no risk he may run into law more freely than he would if he were liable for costs in case of failure. If you ask for the power to prosecute you must be prepared to undertake to pay costs if you fail?—I consider that before they brought an action they would use their discretion in the matter.

57. *Mr. Cochrane.*] Then, do you not think it would lead to divided authority as between the Inspector of Mines and the check inspector?—It may.

58. Then, as to the quantity of air per man per minute, I understood you to say that you consider that should be increased, although you also said there is quite sufficient at times in the intake and return. You say that sometimes the men do not get enough. Is it not better distribution you want?—There may be the stipulated amount in the return and intake, but, as is the case in the Extended Mine, in some particular districts the required quantity is not circulated so as to reach the men.

59. Would not better distribution meet such a case?—It would materially help.

60. Then, as to the bench-bords and the improvement of the ventilation at the face, what is your proposal?—That brattice be inclined up the side of the bord, so that the air should sweep the bord.

61. Do you think that a feasible method?—Yes. Perhaps other means could be devised, but I consider that the heat on the benches to-day is too great, and when a man is up there he breathes the very worst air in the bord.

62. *Mr. Reed.*] In regard to those signals from the engine-house, are there not already signals provided for communicating with the onsetter?—Yes.

63. Will you show us in the Act where it is compulsory to put in these signals you speak of?—I am only going by what Mr. Bennie says.

64. If those signals were installed might they not lead to accidents by conflicting with others? Do you propose to have two lots of signals?—I consider that it would be possible to put in a signal with a different sound.

65. Are you aware that Mr. Bennie afterwards explained to the miners' union committee that he had no power to enforce the installation of this signal—I mean, subsequent to the writing of that letter?—No, Mr. Bennie did not say that at any time.

66. *The Chairman.*] Since you received that letter from Mr. Bennie have you had any discussion with him or has he discussed the matter with any of the officials of the union?—I do not think the matter has been discussed by them.

67. Was it discussed by the manager and Mr. Bennie when you were present, or did Mr. Bennie discuss it with the committee and state that he had no power?—I do not think Mr. Bennie has come into the union office since I received that letter.

68. Have you any recollection of such an interview?—I do not wish to deny, but I have no recollection of it.

JONATHAN VALENTINE sworn and examined. (No. 14.)

1. *The Chairman.*] What are you?—A miner.

2. With how many years' experience?—Thirty-three.

3. Which mine are you working in?—The Extended.

4. Will you give us in your own words what it is you wish to lay before the Commission?—I think, in the first place, for the safety of the men, the fireman's report should be posted up at the surface, and I also consider that the installation of a signal from the braceman to the driver is necessary in the Extended Mine. I have known times when you could not distinguish the driver in the engine-room at the Extended Mine on account of the steam: that is, when the wind blows from a certain direction. Therefore I think there should be communication between the braceman and the engine-driver. Then, the travelling-way in one place down the north side in the Extended Mine is in very bad order. It is where we cross the haulage-road there, and only a few weeks ago I nearly met with an accident by knocking my head against the timber when the skips were coming. I think it could be altered by putting a place for us to walk over. The next thing I wish to mention is that the miners should have a certain amount of discretion as to the method of working and getting the coal. We have men who dictate to us as to where we are to put our spragging, and I am sure we would meet with accidents if we followed instructions in all cases.

5. We cannot interfere with the management of the mine unless it is shown that the orders given tend to cause accident?—Well, then, this man might ask me to do a thing in a certain way, and I wish to know if I am to follow his instructions if it is not safe.

6. That is outside the scope of our Commission. We cannot dictate as to what overseers shall do. What instructions do you have to follow which you consider are dangerous?—As to putting up my sprags. If I know that I would be killed by holing in a certain way as I am instructed, must I follow those instructions?

7. From whom do you get those orders?—From the fireman.

8. Do you suggest that the firemen have not sufficient experience? Do they not pass some examination?—They have certificates, but no experience. They are men who have never got coal. The test should be as to whether a man has had experience in working coal.

9. You may make a recommendation to the Commission that the examination for firemen's certificates should include that?—Yes. I would like to do that, then.

10. Have you had any accidents through obeying these orders?—Only small ones. But I would probably have had more serious ones if I had not argued the point with them and made them give in in certain cases. I think before they get their certificates they should be required to prove they have had five years' experience in getting coal. There is another matter which I wish to bring before you, and that is that the tools should be brought to the face where the men work in skips. At the present time we have to carry perhaps half a dozen picks, powder, tea-cans, and a set of drills, and these should be brought in skips. Another thing which badly wants remedying is the cutting of the coal. We have heard here that the men are liable to lose their eyes in trimming the coal. I maintain not. They trim two different ways, and are not then liable to the same accidents. I have not lost an eye, but I think the majority of eye accidents result from the cutting. Then, I think the bratticing and the bench-bords could be improved a great deal. I have worked in places here where the brattice has been 15, 16, and 17 yards from the face, and in places like that a man does not get the benefit of it.

11. How close to the face should it be taken?—Close enough to satisfy the miner. A man gets more benefit when the brattice is the intake than if it were the uptake. As regards the bratticing and bench-bords, when a man is on the bench it is about 6 ft. high, and he is from 12 ft. to 14 ft. up. I think that the brattice should be carried so as to take effect on the bench.

12. What about the shooting?—It would not affect it any more than it does now.

13. *Mr. Parry.*] In regard to the matter of carrying your tools and water, is it not a fact that when you are so loaded with this lumber you are not in a position to see if the drive and the roof are safe as required by the Act?—No, most decidedly not.

14. *The Chairman.*] Would there be any great hardship about having a separate skip for running these things?—No, it is done elsewhere.

15. *Mr. Dowgray.*] A duplicate set of picks will be necessary?—No, it could be done without a duplicate set of picks.

HERBERT COUCH sworn and examined. (No. 15.)

1. *The Chairman.*] What are you?—A miner, and a check inspector for the union.

2. How many years' mining experience have you had?—Ten.

3. What is it you wish to lay before the Commission?—I wish to corroborate what the previous witnesses have said, with a few exceptions. I would like you to take into consideration the benching of high bords. The bratticing should be conveyed by means of a hurdle which would run the brattice across and give a good supply of air. At the present time the men on the bottom get what little air there is coming in on the bench-bords, while the men on the top do not get enough. I consider that in the working of this mine there should be a standard distance between drives, which would tend to make the supply of air adequate.

4. What distance should they be apart?—Ten yards.

5. What is the distance now?—It is nearly 20 yards. I would like to take exception to the dust in the travelling-ways. When the Commission was visiting the mine the manager requested us to stay back because the dust was not good for the Commissioners. There is another thing which I have noticed on my inspections, and which requires attention. It has reference to the truckers. In some cases the pulley-wheel is set on the chock-pin on the floor. The practice is to follow the empty truck up to the chock and cross over, and follow the full skip down.

6. What is the danger?—Under the Mining Act they are not allowed to do it.

7. Then that is already provided for?—I would suggest that it should be enforced. Then there is the matter of fingerposts. In travelling to the upcast shaft you have to go through the old workings, and there are absolutely no fingerposts to show strangers where they are going. In regard to the conveyance of tools into the working-faces, I consider there is great risk of danger to the men when carrying their tools in the travelling-ways. When a man is carrying his pick on his shoulder in a low place the points of the pick touch the roof, with the result that the picks are sometimes thrown backwards, and in falling are apt to injure a man. Our tools should be conveyed near to the working-faces. In regard to the signal to the braceman from the engine-driver, I think that also is necessary. A short time ago five men got into a cage, and when they found there were five in it one was about to get out when the cage went down with the whole five. It is about time something was done in the direction of providing signals from the bracemen to the engine-room for the lowering and hauling of men.

8. How is the signal given now? Who gives the signal to lower?—There is no signal to lower. There is a signal from the banksman to the man below, and then there is a signal given to pull up. The braceman might wave his hand as a signal for the engine-driver, but if there is a fog the engine-driver could not see it.

9. *The Chairman.*] There are no means of signalling to the engine-driver except from below?—That is so.

10. *Mr. Fletcher.*] In the gold-mines they signal instead of waving their hands?—Yes, they pull a bell. In Waihi they have signals from the brace to the engine.

11. Have you ever worked in a colliery where there was a signal from the banksman to the engine-driver?—No. I have never worked in a colliery where there were men lowered or hauled in a shaft.

CHARLES FREDERICK WATSON sworn and examined. (No. 16.)

1. *The Chairman.*] What are you?—A miner.

2. Do you hold any other office in the mine?—No.

3. How many years' mining experience have you had?—Fifteen.

4. Just give us in your own words what it is you wish to say before the Commission?—I desire only to corroborate the statements of previous witnesses, with a few exceptions.

5. Let us hear the exceptions?—I recommend the abolition of the contract and tonnage system, as there is too much hurry and scurry under them, whereas if we had only the day-wages system that would be done away with. The miners should be given more discretion in getting coal. The man at the face has the best idea of the condition of that place. If the places were driven on shift wages it would tend to minimize accidents.

6. Do they blow out the coal in places?—Yes, very frequently.

7. Is the coal better when blown out or after cutting?—I think the cutting would give the biggest coal. The trouble is the question of big dividends against life. I think the crosscuts should be driven every 12 yards in bords and headings. There is nothing in the mine in the way of ambulance stretchers. The appliances are kept in the engine-room, and a man could die before they were got down to him.

ROBERT GRUNDY sworn and examined. (No. 17.)

1. *The Chairman.*] What are you?—A miner.

2. How many years' mining experience have you had?—Over thirty.

3. Let us hear what it is you have to bring before the Commission?—I have nothing fresh, and need only corroborate what the previous witnesses have said, except that I wish to emphasize the necessity for better ventilation. The safety of the mines could be improved with a greater number of splits, so that each district could have its own split.

4. You do not believe in the system of the air travelling round the other working-places?—No. I have noticed for a long time that the accidents are more serious and also more numerous under the contract system than they are under the day-wage system, and I think that provision should be embodied in the Coal-mines Act abolishing the contract system. I think the employers would get better service, and, taking everything into consideration, it would be far better for all concerned. Apart from these matters I only wish to corroborate what the other witnesses have said.

5. Is there anything you do not wish to corroborate?—Well, as to the cutting of the coal: while I think that some discretion should be given to the miners, I would not be in favour of their having full discretionary powers. I wish to corroborate very strongly what Dr. Valentine has said about the danger in trimming the coal. Further, I detest the wearing of goggles.

6. *Mr. Fletcher.*] Do you not think that cutting is an advantage in this seam?—Well, in some cases it would be more preferable to cut than to hole, but in other circumstances the reverse would be the case. In some places the coal is very bad to cut.

7. Does not the cutting protect the pillar?—Not if it is shot properly.

8. Can you have a nice clear rib without cutting?—Yes, if you show a wise discretion.

9. *The Chairman.*] Is there not a greater danger of shattering?—Of course, it wants trimming afterwards.

10. *Mr. Fletcher.*] How near the rib would you place a shot if you did not cut?—I have seen bords which should be cut in the centre. There are others where the shot could be 3 ft. from the side and not injure the side.

11. Would not that trimming be liable to cause eye accidents, by trimming the coal back from the centre cutting?—We cut the centre with the powder.

12. But the mine-owners want as much large coal as possible?—Yes, exactly.

13. If they cannot get large coal to suit their customers the mine would be idle, and what would become of the men and their families then?—In most cases the company gets as large coal as they could with cutting.

14. *Mr. Dowgray.*] The company does not compel you to cut the coal on the side?—Yes.

15. Have you no discretionary power in the matter?—You can get permission from the deputy, and I would like to say that I do not find the officials hard in that respect.

16. So that it does not follow that you cut on the side to protect the pillar—it is for getting round coal?—I am not admitting that it is to protect the side of the pillar. Sometimes there are special circumstances, and they will allow you to do it on condition that you do not go too near the side.

17. Have you anything to say in connection with change-houses and bath-houses?—I think they would be a great boon to the miners.

18. You think the coal-miners would use the baths if they were provided?—Most of them would.

JAMES FULTON sworn and examined. (No. 18.)

1. *The Chairman.*] You are a miner?—Yes.

2. With how many years' experience?—About twenty-seven.

3. Let us hear in your own words what it is you wish to place before the Commission?—Well, I can only corroborate the evidence of my colleagues. In regard to the matter of the deputy's report, I say that it would be safer for all concerned if the report were posted up before the miners enter the mine. Under the present system we are running a risk, but if that were done there would be no risk. I think it is a proper matter to be brought before the Commission. With regard to the signal to the braceman, I myself have noticed the necessity for this. We have discussed the matter in committee, and sent word to the Inspector of Mines requesting him to attend to it. I think it ought to be put in the Act. I have never worked in a colliery where there was not a distinct signal from the braceman to the engine-driver. I say without hesitation that there is more danger of accident under our system than there would be if there were a bell installed communicating directly with the braceman. It is not necessary to have even a bell—a hammer would do, or a buffer of a truck. To minimize accidents piecework or contract should be done away with, for there is no getting away from the fact that that system is the cause of so many men coming to grief either by serious or fatal accidents. They are the result of the rush in the work. In order to gain a livelihood the men seem to be prepared to risk working under any sort of conditions, and they naturally come to grief through it. Let us have an average or minimum rate of wages, and we will not have the present bustle and confusion which are the main cause of the accidents. In saying this I am voicing the opinion of the whole of my union. In regard to the wearing of goggles, I may say that that has been tried on two occasions and we have objected to it, and if it comes up again we will not tolerate it, because there are dangers from using goggles. We would rather lose our eyes in getting the coal. We want to do away with cutting and holing as much as possible to minimize the accidents. If we had to wear glasses the possibility of accident to our eyes would be greater, because the coal would break the glass. I also agree with previous speakers that we ought to have bath-houses, and I believe the majority of the men would use them, particularly when coming off the night shift on cold winter nights, if the men could get a hot bath. I also think it is necessary that, instead of our ambulance stretchers and bandages being on the surface, we should have them in the mine ready for emergencies. Further, there should be every facility provided to get injured men to the surface. In regard to the carrying of tools, I think they should be conveyed into the mine. On one occasion a man fell down when walking on the slippery bottom, with the result that the point of the pick ran into him. It might have been serious, and there is always the possibility of an accident occurring. As regards our check inspectors, I say that they should be subsidized or paid half wages, and brought into line with the Government Inspectors.

4. Would you have them pass an examination?—Yes, if the body of miners thought it wise. An examination could be made to the satisfaction of the majority of the miners. Another point I would like to make is that the Government Inspector writes his reports, sends it to the company, and the union does not see them. The Inspector sees the check inspector's reports, but the check inspector has no way of seeing the Government Inspector's report. That is hardly fair. We should have the right to see them.

5. *Mr. Reed.*] The Inspector makes no report to the manager?—Then, as regards the air-circulation in Ralph's Mine, it is very good, but could be improved if there were one or two more splits. I might also say that since I have been in that colliery I have not been able to find an overcast or an undercast. Of course, we were told that when the working-area became bigger they would be put in. There is another point I wish to refer to which has been dealt with to a certain extent by previous witnesses—namely, in regard to the truckers following skips on jigs. What is the penalty attached to it, and can we enforce the law?

6. You consider that it should be made quite clear in the interests of human life?—Yes, the penalties are on miners and all parties who violate the law. As regards discretionary powers being given to the miner, I am in favour of that. I do not agree that a man will take so much harm in trimming loose coal as he does in cutting a vast body of coal. I have been working on planks when cutting coal, and have had to turn my face away from it. I do not think that the Act says we shall hole out coal before men begin to hole, and there is the overruling factor that we must obey the management. I do not say that that is done in all cases, but at the same time I think we should have more discretionary powers than we have at the present time. I contend that a man who is working a face of coal knows more about it than the deputy, or the manager, or any one else. As to the quantity of air, in my opinion if there were 1,000 ft. of air it would not be enough if the smoke hangs about all day, as it does in some cases.

7. *Mr. Dowgray.*] You are president of the union?—That is so.

8. You heard the question put by Mr. Reed in connection with Mr. Bennie's letter as to the installation of a new signal: do you know anything about that?—I know the secretary wrote to Mr. Bennie and received an answer, but I do not know of any private conversation which any official of the union had with Mr. Bennie subsequently on the matter.

9. You do not know that Mr. Bennie cancelled that letter?—No, nor do I know of any conversation or discussion which took place between the Inspector and any official of the union. I certainly was not present at such a discussion.

10. Does your committee meet without you and the secretary being present?—No.

11. *Mr. Parry.*] Under the present system do you see any report before you go to the working-face?—No; you see the deputy in his office in one part of the mine.

NIGHTCAPS PUBLIC HALL.—15TH SEPTEMBER, 1911.

WILLIAM BARCLAY sworn and examined. (No. 19.)

1. *The Chairman.*] You are a certificated mine-manager?—Yes.

2. In charge of the Nightcaps Coal-mine?—Yes.

3. What mining experience have you had?—About sixteen years.

4. And how long have you been in charge of this mine?—Three years.

5. Will you tell us what it is you wish to bring before the Commission?—Well, I think at the present time the existing legislation is suitable for our mine. Of course, every mine has local conditions, and one class of legislation may suit one mine and not another. I also think the administration of the rules and regulations should be left elastic with the Inspector of Mines.

6. Would you favour the Inspector of Mines having power to prosecute on his own initiative?—Yes.

7. That is to say that where he finds the conditions unfavourable he should have a summary power to prosecute without the delay which would be caused by having to send to Wellington for authority to institute proceedings?—Yes, I do. All the Inspectors of Mines I have had to deal with have been men of good mining experience, with a thorough knowledge of whether the conditions are satisfactory or not, and have been men who have been held in high esteem, with a good practical knowledge. There is another matter I would like to draw the attention of the Commission to. I think the mine leaders should urge upon the miners the necessity for strictly observing the rules and regulations in their own interest so far as safety is concerned.

8. Do you find that the men neglect the precautions already provided for their safety?—Yes. I find that the miners seem to think that all the regulations are only for the manager to observe, forgetting that the rules and regulations are made for their own safety.

9. Have you had any difficulty with the workmen's inspectors?—No; but, still, we have trouble sometimes in enforcing the rules. I believe that the mine leaders wish the men to strictly observe the rules; but it is not an easy matter to enforce them. Then, in regard to the prevention of accidents, I think that the rank of the miners should be raised. In the case of a sailor, he must serve his time before he is accepted as an A.B.; but at the present time an ordinary labourer, or a farm labourer, can pay his 5s. to the miners' union to become a member, and under the preference clause he must be accepted as a miner.

10. Do you think it would be conducive to their safety if miners were compelled to gain some experience before being considered competent?—Yes, it would raise them socially if they were required to hold certificates under the Coal-mines Act. At the present time men get into a mine, and the management does not know whether they are miners or not, though they may be on the union's books.

11. *Mr. Molineaux.*] Do you consider there should be an alteration in the regulations as to the time which must be allowed to elapse after firing before a man should return to a miss-fire: it is three hours at present?—Well, I would not recommend any alteration in the present time. We generally send a man home or find him another place. We do not like to tamper with a shot until the deputy has examined the hole. The deputy always refires the hole.

12. Do you have many miss-shots?—Yes, perhaps about 2 per cent.

13. How do you account for these miss-fires: what, in your opinion, is the most prevalent cause of them?—I think most of them are the result of bad stemming, or stones in the stemming.

14. In regard to hot places, do you consider it practicable to fix a standard temperature, on a matter of temperature alone, for a place where a man should not work eight hours?—No, but I think a maximum temperature could be fixed.

15. You do not think it practicable?—No, I do not think so.

16. For what reason?—Well, perhaps I could work in a temperature which would be uncomfortable for you to work in; and then, again, the temperatures alter very quickly.

17. It depends on the surface conditions?—That is so: you might have a high temperature both inside and outside in the early part of the day, and in the afternoon it might be quite cool.

18. With your experience in coal-mines, do you consider coal-mining a healthy occupation?—I do.

19. Have you had any reason to believe that a man working in your mine is more liable to illness than a man employed in an ordinary occupation?—No; we have men here fifty and sixty years of age who are healthy and ablebodied.

20. You spoke of the necessity for the men having experience and gaining certificates: what term would you suggest?—Possibly, two or three years' service.

21. Is it the custom at the present time for the union to accept any man as a member who is prepared to pay his subscription?—I cannot say, but I think the union takes a man's word that he is a miner.

22. Do you consider that some men apply to you for employment whom it would be unsafe to put in a bord by themselves?—Yes, a man should have confidence in himself before he is allowed to work by himself.

23. And you think a man must actually have had experience before he can look after himself in an ordinary place?—Yes, but they would get work with others in double places.

24. But there are times when you put a man by himself in a place?—Yes, in single places.

25. But if you employed a man who said he was a competent miner in a single place, he might through lack of knowledge get into serious difficulties?—Yes, in handling explosives, and through falls from the roof.

26. It is on that account that you think a man should have something to show that he has had previous experience?—Yes, on that account, and it would be a good thing, too, for those who are experienced coal-miners.

27. *The Chairman.*] You think that a mere working experience would be sufficient?—Yes, a mere working experience for, say, two years.

28. *Mr. Cochrane.*] With regard to making the men observe the rules, what would you recommend? You say the rules are satisfactory, but the men cannot be made to observe them?—I say that the union, or the miners' leaders, should urge on the men the necessity for observing the rules.

29. Would you suggest that penalties be provided?—Well, penalties, from the management's point of view, are not of much use. You see, here we are fifteen miles from a Court, and a deputy or other mine official would have to go.

30. What is the height of your highest pillar workings?—Well, at one time about a year ago we tried to work 25 ft. of pillar and head coal.

31. Are you still doing so?—No, we reduced it to 12 ft. I will quote from an entry in my diary dated the 31st August, 1910, which is as follows: "Four men brushing heading in old lay-by above the stone parting, and making preparations for working away the top seam before the bottom seam. I have discontinued working these two seams altogether. It is too high for safe working."

32. The reason was that it was too dangerous?—Yes, we had to prop up the back ground to make it safe after the coal is shot down.

33. And what do you consider a safe height?—With pillar and head coal, 12 ft.

34. In regard to miss-fires, you give the chief cause of them as bad stemming: have you any other reason to offer for them?—No.

35. Now, as to temperatures, if it became necessary to fix a standard temperature for reducing a shift from eight to six hours, what would you consider a reasonable thing?—A maximum of 75° for an eight-hour shift.

36. Saturated?—Yes, 75° saturated—that is, for an eight-hour shift to be reduced to a six-hour.

37. *Mr. Dowgray.*] In reply to Mr. Molineaux, you said you thought that the rules should be enforced: what particular rules did you refer to?—As to men going back after miss-fires before three hours had elapsed; men visiting places that have not been examined by the deputy; men riding on boxes; and men not setting timber properly when the underviewer or deputy has instructed them to do so. They set the timber, but they have to be kept up to the work.

38. In regard to permits being granted to men to manage mines without sitting for examination, what is your opinion?—I think that not more than four or five men should be working under a man with a permit. At the present time the Act allows eight men. We have a good many second-class certificated men in Otago working at the coal-face.

39. You spoke of miners being encouraged to gain a qualification by two years' experience: is there any encouragement for them under the present system of permits?—It is still open for a miner to study in order to learn as much as possible about his work.

40. But a man usually studies to better his position?—Yes.

41. So that you suggest that the number of men under a permit be reduced from eight to four?—I believe it should be reduced to four or five.

42. *Mr. Cochrane.*] As a certificated mine-manager, have you had any experience with the wet-and-dry bulb thermometers?—No, but I have studied the subject, and Mr. Green, when he has visited the mine, has instructed me in it. I have Dr. Haldane's book on the subject.

43. *The Chairman.*] You have periodical inspections of the mine made by the Inspector?—Yes.

44. And you say that the conditions are favourable and satisfactory to the men?—Yes, the men themselves say so. I do all I can to improve their conditions.

45. How many seams were there where you were working the high place?—Two.

46. Were there any partings?—Yes, from 6 in. to 2 ft.

47. Would these partings render the places more dangerous or liable to fall than if there were no partings?—No, I do not think so. It would form a stronger roof above.

48. Would you say that a place 20 ft. high without partings was unsafe, or more safe to work than with the partings, with a good roof?—I do not think a place 20 ft. high would be examined, especially by a deputy with a safety-lamp in the morning. It is very difficult for a deputy at any time to examine places with the present safety-lamp.

49. There are no means of carrying something in the nature of a hooked stick by which you could hold up the lamp when making an examination?—Yes, we use hooked sticks.

50. If he held his lamp up on a stick would he have a sufficiently commanding view of the light to detect the presence of gas?—Yes, but not to examine the cracks in the roof. He could detect gas, but not examine the roof by that light.

51. *Mr. Dowgray.*] Will you tell us how a man could examine the roof by himself reaching, say, 7 ft. and with a stick 14 ft.: how would he be able to detect the effect on the flame?—He could not detect the cap, but the gas would extinguish the light.

52. What position would he be in if his lamp was to go out: would it not affect him?—Yes.

53. *The Chairman.*] You favour a 12 ft. place?—Yes, I have been asked the question, and I do.

54. Are ladders not used for examining these high places?—Yes.

55. Are they satisfactory?—Yes, if they are always available, but they frequently get broken.

56. You would require a ladder in each place?—No, they have to bring a ladder; when they are firing shots the ladders do not last long.

57. *Mr. Molineaux.*] Do you think the examination with a safety-lamp a satisfactory method of examining a mine in the early morning?—No, I do not; but, still, I do not see how you can better it. You must examine with a safety-lamp.

58. Can he see the roof without any trouble?—No, he cannot.

59. It is only a test as to the presence of gas, and does not enable him to make a satisfactory examination of the roof?—I find that the deputy examines with the lamp, but if he is not satisfied he returns and makes another inspection of the roof with an open light.

60. Can you offer any suggestion with regard to this practice of examining first with a safety-lamp and then with an open light?—No, the necessity arises only now and then.

61. *The Chairman.*] You could not do that in a fiery mine, though?—No.

62. *Mr. Molineaux.*] But in mines where gas has been found?—I do not know—sometimes it means a double inspection.

63. Is that always carried out?—No, only if the occasion demands it.

64. But the roof may be bad at any time?—Yes.

65. And gas has never been found in your mine?—Not to my knowledge.

66. *Mr. Dowgray.*] Does the deputy not sound the roof with a stick?—Yes, but it may sound strong and still have cracks in it which he may not see.

THOMAS TODD, sworn and examined. (No. 20.)

1. *The Chairman.*] You are a miner?—Yes.

2. With how many years' experience?—Twelve.

3. Do you hold any certificates?—Yes, a second-class certificate of competency.

4. What is it you wish to place before the Commission?—I would like to say, in regard to these permits, that I think the number of men a permit-holder may be in charge of is far too many. At present it is eight.

5. What number would you suggest?—I would specify no number. It should be arranged so that a permit should only be granted, say, for eight men, but only until a manager is obtained.

6. Then what time would you allow a company in which to get a manager?—Say, not more than three or six months. The permit-holder may have to appoint a deputy or underviewer, who has to be the holder of a certificate, whereas the permit-holder has no certificate.

EDWIN RIDLEY GREEN sworn and examined. (No. 21.)

1. *The Chairman.*] You are Inspector of Mines for this district?—Yes.

2. What certificates do you hold?—A first-class colliery-manager's certificate by examination, and a first-class certificate under the Mining Act by virtue of my office.

3. How many years' mining experience have you had?—Thirty-seven.

4. How long have you been Inspector of Mines?—About twelve years.

5. The Nightcaps Coal-mine comes under your jurisdiction?—Yes.

6. You make periodical inspections of the mine?—Yes.

7. And you take readings of temperature and air-measurements?—Yes.

8. Have you a schedule of them?—No, owing to my having been called away by a recent fatality in Canterbury they are not yet ready, but I will hand them to the Commission later.

9. In what condition have you found the mine, generally speaking?—I have reported generally that this mine has been kept in good working-order and condition. There is plenty of timber available; full attention is paid to the details of working as required by the Coal-mines Act. In regard to the examination of the mine by officials fully qualified and certificated, every care appears to me to be

taken by the management. The nature of the coal formation, with its clay backs and joints, is such as to have caused me a good deal of apprehension from time to time, but the management has been careful and satisfactory. There have been serious accidents, but minor accidents are of infrequent occurrence.

10. You have had no complaints from the men?—Not for a considerable time.

11. Do you find that the deputies' examinations are regularly made and the records properly kept?—Yes; in fact, the examinations are made more frequently than the Act requires. The statute provides that if more than one shift is employed the firemen and deputies' inspection must be made at intervals of not less than twelve hours; but here the inspections are made every eight hours, and two men, in company, make the morning examinations.

12. *Mr. Cochrane.*] You have heard the manager make a statement as to the time allowed before returning after a miss-fire: what is your opinion on the matter?—In coal-mines I consider that the period provided by the Act is a safe one—that is, three hours.

13. Then as to the question of permits, what do you consider a reasonable number of men to be looked after by a man who has no certificate but only one of these permits?—I presume you are referring to underground working. There are two sets of permits, one for opencast workings and one for underground. I think that eight men underground are too many.

14. How many would you favour?—The Act at one time limited it to six. I think, six, including the permit-holder, should be the maximum.

15. *Mr. Dowgray.*] You stated that the working of these clay backs caused you considerable anxiety?—Yes, for some time.

16. But you are pleased to be able to tell us that there have been very few serious accidents: do you attribute that to the skilful working of the mine?—Yes, and to the fact that the men are accustomed to the working of this class of coal.

17. The men working in this mine are fairly skilled?—Yes.

18. When on your rounds do you ever find the workmen neglecting to set timber?—I have very rarely had to call their attention to it; perhaps now and again the roof may have required attention as the result of being struck by a shot.

19. And the men carry out the regulations?—Yes, as far as I know.

20. *The Chairman.*] Is there anything else you would like to suggest?—While we are on the subject I would like to mention that a short time ago we had a few consignments of inferior blasting-powder. This is a matter to which I would like to direct the attention of the Commission. Mr. Barclay could tell you better than I can how that powder, which could not be used, has been brought here. It was not safe to use because it would not explode properly. Some of it was taken to another mine near here, and they could not use it at all.

21. A suggestion has already been made to the Commission that the Government should undertake the manufacture of detonators: have you any recommendation to make on the subject?—Well, I would not go into the matter of detonators—I have no complaints—but in regard to the explosives, we had a conference of Inspectors at Waihi, when we recommended that all explosives imported should bear the date of manufacture, so that the user might know how old the material was. You can understand that when the powder comes to hand in large consignments, and is stored in big quantities, cases are sometimes left in the back of the magazine, and, finally, when the stuff comes from the place where it has been stored it may be damp and not fit for use: so we thought, as Inspectors, after considering the matter, that if the date of manufacture were printed on the case of powder or gelignite—not necessarily on every inside package, but on the outside—it would act as a safeguard.

22. *Mr. Cochrane.*] Would you recommend anything else in addition to the date in regard to such powder?—Of course, I do not want to interfere with the Inspector of Explosives. If I went any further I would be trenching on his ground. I do not know that I can go any further.

23. *Mr. Dowgray.*] As a man of considerable experience, can you say whether it would get over the difficulty if the State undertook the manufacture of explosives?—I do not think my opinion on that point would be of much value.

24. But the opinion of a man holding a first-class mine-manager's certificate, with thirty-seven years' mining experience and twelve years' experience as an Inspector, is worth something?—Well, we want the best explosives to be supplied.

25. Would not the Government be able to give you the best?—We have not the ingredients here.

26. But if you could get the ingredients, would not State manufacture be the better way?—I cannot say. I am not a political economist.

27. *The Chairman.*] At any rate, you would like to see the very best material used?—Yes, I would add that latterly there has been a stricter inspection of explosives by that Department.

INVERCARGILL COURTHOUSE.—16TH SEPTEMBER, 1911.

EDWIN RIDLEY GREEN—examination continued.

28. *Mr. Cochrane.*] Have you the tables in regard to the Nightcaps Mine?—They are here, but I have not yet had time to peruse them. My clerk prepared them.

29. You have some other papers to present?—They are not ready for presentation yet.

30. Have you work to attend to other than purely mining work?—Yes, I have recently been given the administration of the Stone-quarries Act of last year. Then, a short time back the Public Works Department was short-handed and I was asked to undertake the inspection of some of their roadworks, which I did; but latterly I have been relieved of that work. There are one or two other matters also which I may be asked to attend to from time to time.

31. Can you tell us how many days in the year you have been occupied on this extra work?—No, not yet: that is the information I am getting for you. I will produce it at the earliest opportunity.

32. *The Chairman.*] Does this work interfere with the efficient inspection of the mines under your care?—I would not like to admit that the mines are not efficiently inspected, but any one can see that these extra duties add to the hours of my employment.

33. *Mr. Cochrane.*] You do not neglect your inspection duties?—I do not care to say anything on that point. Of course, I have my superiors, and if they choose to instruct me to undertake this extra work I endeavour to do it.

34. You heard the evidence at Nightcaps?—Yes.

35. Have you anything to say as to fixing a standard temperature for mines?—For that mine or all mines?

36. For all mines generally?—No.

37. Have you read Dr. Haldane on mine-gases and mine-temperatures?—I have the first edition of his work on the subject, and my bookseller has had my order for a copy of the new edition for twelve months. I have Foster and Haldane's book, issued in 1906.

38. You are accustomed to the taking of wet and dry temperatures?—Latterly, yes; they have lately come into vogue.

39. Are you aware that Dr. Haldane states that men cannot carry on continuous work at 80° saturated?—Yes, I have read something of that in the report of the Royal Commission.

40. Do you agree with it?—Under certain conditions, I do.

41. What conditions?—If the air were bad with foul gases present in the atmosphere. If the air were pure I should say that a man could work in that temperature, but a good deal would depend on his physical condition and the length of time he was required to work, also on the amount of work he was expected to do.

42. You would also take into account whether the air was moving or still?—Yes.

43. And at 78°, would you contradict Dr. Haldane?—No, we are looking to him for knowledge.

44. Then, if he says 78° is the temperature beyond which it should not go, would you be in favour of the shift being reduced from eight to six hours in saturated air?—Without professing a deep knowledge of this subject, I may say that I have already given men reduced hours of working in a lower atmosphere than that in foul air.

45. *The Chairman.*] What element determined that?—The effect upon myself and the state of the men working there. This does not refer to Nightcaps. One man spoke to me, and I conferred with the manager, with the result that the man was allowed to go home before the shift was finished. The manager agreed to the shift being shortened.

46. *Mr. Cochrane.*] Do you consider the law as it stands gives you sufficient power to deal with such cases of inadequate ventilation?—Yes.

47. Have you sufficient power to enforce the law as it now stands?—Yes; that is to say, if I find a place which in my opinion is inadequately ventilated—if the ventilation provided is not an infringement of the special rules in regard to large quantities of firedamp, &c.—of course, I would ask that the men should be withdrawn; but, as a rule, I find that that is done.

48. But the question is, does the law at present give you sufficient power to compel a company to provide the men with adequate ventilation?—Yes, I have instituted proceedings against a company for not providing the prescribed quantity of air at the working-face. The manager contended that the air was put into the mine and that was sufficient; but Mr. Widdowson, S.M., held otherwise—that the men must get it at the face.

49. Would you favour reducing the present three-hour limit for returning to miss-fires?—I think they might do it in quartz-mines, but not in coal-mines. I notice in quartz that one hour has been suggested. In that matter I bow to the opinion of others.

50. What is the difference in principle?—Quartz-dust is not combustible, while coaldust is.

51. Now, have you anything to say in regard to signalling in alluvial mines?—No. I have no underground alluvial mines in my district.

52. *Mr. Fletcher.*] Do those other duties, such as the inspection of roads and bridges, prevent you from carrying out your regular duties as Inspector of Mines?—No.

53. You look after the mines first and leave the other duties to be attended to afterwards?—Yes.

54. *Mr. Dowgray.*] In reply to a question by Mr. Cochrane, you stated that you had reduced shifts from eight to six hours by request of the men?—Yes.

55. And you take into consideration the effect of the air upon yourself and the conditions under which the men are working. Do you think a man is in a better position to judge of the effects upon himself of working in such a place than you?—Yes, a man must know more about it from his own point of view than I would.

56. There is a point which has struck me but which we have not touched upon yet. We have been dealing with quartz-mines and the gases found in them. I would like your opinion as regards coal-mines—as to whether a deputy, when he discovers gas in a mine, should let it remain there until sampled by the manager to ascertain the amount and quality of gas in that particular section of the mine. Of course, the deputy in the first instance has to report his own opinion?—Well, if there were a large body of gas, I would say that the deputy should call the manager; but if it were only a small quantity he could remove it by brattice. The deputy is an experienced man and holds a certificate.

57. But they have not a great deal of experience in regard to gases?—It is a complicated matter.

58. Would this not be encouraging them to use their judgment? Both the manager and the deputy would take samples, which could be compared, and perhaps by that method they would gain more practical knowledge. Would you agree to such a provision as that being embodied in the Act?—Yes, we are advancing every day. I do that sort of thing frequently. You wish the manager to collect and keep records. Yes, it would be an extra safeguard.

59. And they would thus gain that practical experience which we all wish them to have?—Yes.
60. And that the managers should take the samples also?—Yes, if the samples were properly taken and analysed. A good deal depends on the collection of the gases in the first place, and the samples must be handled carefully. If a manager is to collect a sample of air and happens to be a little careless in not properly sealing it and so forth, some of the contents might escape and the results might read less dangerous, thereby giving a false sense of security to the management.
61. Still, they would gather experience in the taking of samples?—Yes, it would be an advantage.
62. And then your samples would be a check on them?—Yes.
63. So you would suggest that such a provision be embodied in the Act, and that the sample be taken in the return airway?—Yes, I agree with that in gaseous mines.

ALEXANDRA COURTHOUSE.—22ND SEPTEMBER, 1911.

EDWIN RIDLEY GREEN—examination continued.

64. *The Chairman.*] Have you the tables in connection with the Nightcaps Colliery?—Yes, I produce three tables, showing the fatalities at the Nightcaps Colliery from 1900 to 1911, the non-fatal accidents for the years 1906 to 1911 inclusive, and the barometrical, thermometrical measurements and analyses of air taken by me since 1908. This does not include the analysis of the last sample taken by me, the report on which has not yet been received from the Dominion Analyst. [Exhibit 15, copy of analysis of air now submitted, put in.]

KAITANGATA COURTHOUSE, 26TH SEPTEMBER, 1911.

EDWIN RIDLEY GREEN—examination continued.

65. *The Chairman.*] You have some tables relating to the Kaitangata Mine to produce, I understand?—Yes, I produce (1) list of fatalities in Kaitangata Colliery since 1900, (2) list of fatalities in the Castle Hill Colliery since 1900, and (3) barometer and thermometer readings, and measurements and analyses of air, from Kaitangata Colliery. [Exhibit No. 17, put in.]

JAMES NORTON sworn and examined. (No. 22.)

1. *The Chairman.*] What are you?—A coal-miner.
2. Do you hold any office in any union or in the mine?—I hold the position of local secretary of this branch of the Otago Coal-miners' Union.
3. Well, as secretary of the union, or as a miner, have you anything to lay before the Commission, either by way of suggestion for the improvement of the mining conditions, or as a remedy for matters requiring attention?—The only suggestion I have been asked to place before the Commission is that in the event of the Inspector requiring the manager of a mine to attend to any matters, a list of those matters should be handed to the local secretary to see that the same are attended to before his next visit.
4. Is there any other matter you wish to refer to?—No, I think that is all.
5. *Mr. Dowgray.*] Do you find that in this district it is commonly known when the Inspector is coming to visit the locality?—Well, we are always aware a few days before he comes that he is coming.
6. Can you attribute that to any particular cause?—No, it seems to be generally known in the town that Mr. Green is going his rounds—not to any particular person.
7. Do you think it would be any benefit if his visit were kept secret?—No, I do not see that it would make any difference—not, at any rate, to the work of our mine.
8. *The Chairman.*] You have no conditions to complain of?—No.
9. Then it does not matter whether he comes openly or secretly?—No.
10. *Mr. Dowgray.*] Can you tell us how you know he is coming?—Everybody in the town seems to know. We do not know the day definitely, but it is generally known that Mr. Green will visit the district shortly.
11. Is he looked upon as one of the notable persons who come into the district?—No; I could not say as to that.
12. *Mr. Cochrane.*] Are you aware that the Inspector of Mines has other duties to perform, such as roadworks and subsidies?—No.
13. Would it not be that his visits become known as the result of these local-body works?—It may be. I do not know.
14. Did you ever make any attempt to trace as to how his visits became known?—No, it has never affected us, and we have never gone to any trouble to find out.

WILLIAM CROWE sworn and examined. (No. 23.)

1. *The Chairman.*] What are you?—A miner.
2. Do you hold any office in the mine?—No.
3. Do you hold any office under the union?—No, except that I am on the executive.
4. How long have you been mining?—About twenty years.
5. Where did you get your mining experience?—Mostly in Kaitangata, also a little in Western Australia.
6. You hold no certificates?—No.

7. Upon what matters do you wish to inform the Commission?—I wish to discuss the working of pillars and tops which is adopted. I wish to see it improved in one way or another, as the present system is not consistent with safety.

8. What is the present system?—The pillars are taken out at present three or four abreast. There may be several pairs of men getting up to the stone, and perhaps a lot of the stone falls. We may be breaking back the pillars, and if one or two men are working a pillar or bord it begins to get dangerous; and another party may be filling coal further on—that is dangerous.

9. Have you any suggestions to offer for a safer method?—I would suggest that a section be left, and in time the roof and floor would get pretty well back again.

10. And then you could go back to it?—Yes, you could go back to it and it could be opened up again. They should keep driving the levels forward, and coming back again to them in, say, twelve months' time. If they are going to extract the pillars, I should say that a strip should be left in.

11. What is your opinion as to the number of accidents which occur in this mine?—Well, I have not had any accident; nor have I been near any one that has been hurt. It is not the accidents which should be considered, but the narrow escapes that take place.

12. You have to be on the alert?—Yes, and that is where the trouble comes in. There are perhaps three parties working close together and making a great noise with the shovels, and they have to keep calling out to one another. If we drove a bord and then left a strip there would not be so much danger by reason of the noise, even if a shell of only from 3 ft. to 6 ft. were left in between each pillar or bord.

13. Is that all you wish to say in regard to the height of pillars?—Well, another way would be to drive the places, and we want cover of some sort more than anything else, where we can prop the roof, which is never safe.

14. What is the average height of the pillars you are working?—The bords may be 6 ft. or 7 ft., but the pillars depend upon the thickness of the coal.

15. It was your place we were in to-day?—Yes, some of the Commissioners were there to-day.

16. What is the height of that place?—Right at the fall it is over 20 ft. The stone is all down now—it fell after the Commissioners left.

17. Is there any other matter you wish to bring before the Commission—as to ventilation, for instance?—No, the main thing is that the pillars and tops should be worked on a different system.

18. What sanitary arrangements have you?—We have none—we generally use an old air-course.

19. Have you any objection to find with that practice?—No, it is the best thing to do in the meantime. If you made a special place it would soon be lost, because we are continually shifting.

20. *Mr. Dowgray.*] In connection with the height of the top coal, do you think there should be a maximum height?—Yes.

21. Would you say what you consider a safe height?—At present there is no maximum and no minimum. I think it should be about 15 ft., or, if the stone were higher, perhaps a little higher.

22. Does the nature of the roof vary?—Yes, a great deal; but when it is good it does not last long.

23. What method do you adopt for examining the roof?—We tap it with the pick.

24. By climbing up a ladder?—Yes, sometimes; and if we are in doubt sometimes we also tap it with a long pole.

25. Does the company insist upon your going to the roof on every occasion?—Not on every occasion. Where there is a clay roof we are told to leave a foot or two to hold it, but where it is conglomerate I have never been stopped from going up to the stone.

26. *The Chairman.*] What is the highest you can timber?—In cases, about 12 ft.—that is the highest prop we ever put in.

27. *Mr. Dowgray.*] What is the highest place you have worked in in this mine?—Well, I have never measured it. In places it has been 20 ft. or 24 ft.; but it is not often like that.

28. Are you in a position to judge of that roof by reaching with a pick or a long pole?—Hardly.

29. You would not be able to examine that, then?—No.

30. Even the sound is not a satisfactory guide?—Yes, it is, mostly.

31. Which, in your opinion, is the safest method of satisfying yourself?—By tapping it.

32. You need to get close to it?—Yes, as close as you can.

33. How do you get your explosives in this mine?—Well, we have been in the habit of taking them down, and leaving them down till they are required.

34. Do you mean that you carry them down and put them by the side of the pillar?—Yes, that has been the way it has been done during the last twenty years: the custom has been to leave them there till they are required.

35. And the detonators?—They are left there too, in a tin.

36. Just laid by the side of the pillars?—Yes, in a safe place.

37. And the gelignite lying loose?—Well, it is in the regulation tins.

38. That is, the tins supplied by the makers?—No, by the company.

39. Do you think that is a safe method?—I would not care about carrying any shots up and down every day. We should keep them in small wooden boxes.

40. You think that boxes should be provided?—Yes, just enough for four men.

41. I was in your place to-day. Do you tell us that it collapsed about ten minutes after we left?—Yes.

42. It looked all right when we were there?—Yes, that may be so; but I told Mr. McAlister that there was a movement on.

43. Does it give you much warning?—No, the stone does not. There was a smooth horizontal parting, but the stone sounded all right. It came away from a smooth parting, so that even with a hammer you could not tell.

44. With your experience as a miner can you tell where the stone roof is bad when a piece of stone is 5 ft. thick?—No, though it may sound all right. In this place, I was up there this morning, but I was not placing a great deal of reliance on it. There were large blisters on it. There are places where you can rely on it, especially in No. 3 section, but most of the time you cannot.

45. When men are working in six-hour places, how do they get out when the rope is going?—Walk out.

46. Do you get permission from the manager to travel on the road?—Yes; that is, if it is a wet place. I have not worked in a wet place—a six-hour place—since that rope has been put in. We have worked in hot places.

47. Do you get a reduction of hours for hot places?—We have difficulty in doing so.

48. *The Chairman.*] What do you call a hot place—what temperature?—Well, we have no thermometer. It is not altogether the heat—sometimes the air is not very good.

49. Who decides what is a six-hour place?—I do not know. I suppose, if the men contend it is a six-hour place, they have some say in it as well as the management. There is hardly such a thing in the mine as a six-hour place unless they are wet. We do not get a reduction, as a rule, for hot places.

50. Have you had any experience of taking temperatures?—No.

51. Have you seen them taken?—No.

52. So that you do not know what the temperature would be?—No.

53. *Mr. Dowgray.*] You heard a remark made to-day while travelling in the mine—I believe, by the Inspector of Mines—that the men prefer working on pillars to the solid places?—I have been trying to get out of the pillars for fifteen years.

54. For what reason?—There is not so much strain.

55. What do you mean by "strain"?—Well, listening for small bits dropping. Sometimes I know there is something wrong.

56. *The Chairman.*] Where were you when the stone fell to-day?—A trucker was in there, and the box was not quite full. I said to him, "Give us a pull," and just as we got into safety it came down.

57. *Mr. Dowgray.*] Do you think the company would get as much coal under the system you advocate as under the present system?—I do not think there could be much difference. The coal is buried a good deal, and it really belongs to us; whereas if we had a coal roof we would get it practically all.

58. Can you tell us what is the difference between the stentons?—Generally, about 60 ft.

59. Do you think that is a satisfactory distance?—We would certainly like them closer sometimes.

60. *Mr. Fletcher.*] Could you take any top coal out and leave some up with safety?—Yes, in many places we could.

61. If 4 ft. or 5 ft. or 6 ft. of coal were left up, could you get the other with safety?—Yes, because we know when the coal is pretty good.

62. Did you say that 12 ft. props are the longest you use?—Yes; but 6 ft. and 7 ft. is the ordinary length.

63. *The Chairman.*] For taking out pillars?—We use the same size props. Then, if it does not fall we have to shoot it down.

64. *Mr. Fletcher.*] Do you consider 60 ft. is a long distance between cut-throughs?—Well, as a rule, I do not consider it too far. It depends upon the air, which is sometimes very good.

65. But it would weaken the place?—In my opinion, it would not make much difference to put them in oftener than that.

66. But if you drove a cut-through every 10 yards you would reduce the strength?—Perhaps. If they were narrow it would reduce the strength of the pillar.

67. But if they were narrow you would get the air in?—A 6 ft. stenton would be quite sufficient.

68. But the practice is to have the pillars as large as possible. I would advocate larger pillars than you have here?—And then split them?

69. It does not matter at the end—it would give more strength behind you: do you not think so?—Yes; but sometimes we have to go too far from cover.

70. But supposing you left some of the coal up, say, 5 ft. or 6 ft., would it be safe then?—It would be better if we were leaving a certain amount of coal. It would depend on the height of the stone.

71. *Mr. Cochrane.*] Do you leave unused gelignite and detonators in the mine overnight?—That has been the practice up till lately.

72. And were the management aware of your doing so?—Yes, I suppose so; it has been the practice for years.

73. Then, as to the roof, does the natural rock roof vary—have you a false roof at places?—It is very seldom; as a rule, it is coal.

74. I am not speaking of any coal that may be left. The usual roof is what?—Conglomerate.

75. Do you ever find clay underneath it?—Very seldom, though I have seen it in places. There may be 2 ft. or 3 ft. of clay, and that is the worst roof you can possibly get in the Kaitangata Mine.

76. As to the explosives, are they not served out in canisters?—Yes.

77. What sort of canisters—the ordinary canisters?—Yes, about 1 ft. long, which holds sixteen plugs of gelignite.

78. And it is in these you take the explosive in?—Yes; and we have a little tin for the caps, too.

79. *Mr. Reed.*] In regard to the fall which you say took place to-day—I was with Mr. McAlister—you said it was dangerous; how did you know?—By small pieces trickling down.

80. Had you sounded it previously?—Yes, this morning.

81. And you found it unsafe?—No, just as it was yesterday.
82. How was that?—It was supposed to be as solid as a rock.
83. So that the sounding was not efficient to-day?—It was just as good as it was yesterday.
84. And the sounding was no criterion as to its state?—No.
85. You spoke of working the pillars by leaving an alternative rib?—Yes.
86. You would leave a shell: would you expect to be paid solid rates for driving through the pillars?—It is all one rate here.
87. So that you would get the same rate?—Yes.
88. Regarding the explosive which you said was left underground, how much was served out?—I could not tell you that.
89. *The Chairman.*] Can you say for certain when you left explosives underground, and what quantity?—As many as four shots—sixteen plugs.
90. *Mr. Reed.*] Where did you leave it?—At the corner of the pillar.
91. What was it in?—Tins.
92. *The Chairman.*] How long is it since then?—There is a new practice now.
93. Who instituted this new practice?—I cannot say; I was just told by the deputy.
94. How long ago?—About a week ago.
95. *Mr. Reed.*] Are you sure that the management knew?—I should think so.
96. Are you sure—this is an impeachment of the company?—It is possible they did not know. I am not charging them with anything; but our tins were always there for any one to see.
97. Are you positive that the management was aware of this being done on any one occasion?—I do not know. I only assume it. I should think they were.
98. Is it not a fact that a shift's supply is served out at the beginning of each shift?—The men who want ammunition get it from the man in charge.
99. One shift's supply?—Yes.
100. *The Chairman.*] Could you say why the new arrangement came to be instituted?—No, we were just told to take our ammunition out.
101. *Mr. Dowgray.*] The new system only came into force about a week ago?—Yes.
102. You stated that the roof was as solid as a rock; who told you that?—I formed my own opinion of it. Mr. McAlister was in there yesterday, and thought so too—those were his words. He passed that remark to Sam Clarkson, who was working on the other side. He told me to trim down the loose coal.
103. It only goes to prove that you cannot always judge by the sound?—Yes.
104. I believe you said that the other stentons are 60 ft. apart; are you sure that is the system here?—I have never measured them, but I believe that is the distance. It may be longer sometimes.
105. *The Chairman.*] You did not draw the manager's attention to the stone when he was there to-day?—No, I could not say that it was bad.
106. Did you ask him a question about the pillar?—It was as to how to take out that pillar.
107. *Mr. Dowgray.*] When I was going round I saw a number of stoppings: are they always kept up like that?—Well, where I am working just now there have been stoppings put in this last two or three weeks.
108. The company always keeps these stoppings well up?—Yes, as well as they can.
109. How do you get your lamps lit when they go out?—We send them up by the trucker, who gives them to the horse-driver.
110. Are you not held responsible for your lamps?—We generally send them out.
111. Do you think the system could be improved?—Yes.
112. Can you suggest any improved method?—I do not know, unless we had a fire-station further in. When a man's light goes out it is out a long time.
113. You have been here a long time: have you ever had anything to do with this winding-apparatus at Castle Hill?—I was there three or four years ago when they were having a trial. The executive were asked to attend it.
114. Were they satisfied with the system?—No, we were not satisfied with it. We let it stand as it was, though we did not approve of it.
115. Have the men come up it?—One or two men went down that day.
116. Did they express any opinion?—No, but they got half-drowned with smoke and water.
117. What is the opinion of the men in regard to the escape shaft?—They do not approve of it by any means.
118. Do they ever discuss it amongst themselves?—Sometimes—if anything happens they may say a word or two.
119. Does everybody know the road to the escape shaft in your mine—the Kaitangata?—No; it would not be an easy thing to find it.
120. Do you not think you should have fingerposts?—Yes, we could do with more signposts.
121. You would suggest that fingerposts should be put up pointing the road to the return shaft?—Yes; there are one or two now, but they get neglected.

WILLIAM NICHOLAS sworn and examined. (No. 24.)

1. *The Chairman.*] What are you?—A miner.
2. Do you hold any office in the mine or in the union?—No.
3. How long have you been mining?—About twenty-five years.
4. Where?—In the Old Country, Queensland, and New Zealand.
5. How long have you been working in this mine?—About seventeen years.
6. Have you had any experience of taking temperatures?—No.

7. Have you had any experience of what they call hot places or six-hour places?—I have had experience of hot places, but have never worked six-hour shifts in them.

8. You have never had a reduction to six hours?—No, not for hot places.

9. What matters do you wish to bring before the Commission?—Well, principally the working of head coal. I do not think the present system is safe.

10. You have heard what the previous witness had to say in that matter: do you agree with him?—Yes.

11. Have you anything to add to what he has said?—No, except that a strip should be left between the places, about 3 ft. or 4 ft., to deaden the sound of the shovels.

12. *Mr. Dowgray.*] I believe you were deputy in this mine?—No, in the Castle Hill Mine.

13. I believe your mate was killed here?—Yes, my back mate, McGhee, was killed.

14. Can you describe that accident?—Well, he was filling coal that had fallen or been shot down. It looked fairly safe to me when I knocked off work at 3 o'clock.

15. You thought it a comparatively safe place?—Yes.

16. And yet a man was killed there?—Yes.

17. Was it in high pillars?—Yes, but the coal did not come down from a great height—I should say, from 7 ft. to 10 ft.

18. Was it higher on the side?—It was up from 18 ft. to 20 ft. inside.

19. It was in one of the places where they were bringing the top coal back?—Yes.

20. What have you to say with regard to a maximum height for bringing top coal back?—I should say 15 ft. is high enough.

21. When travelling in the mine to-day my attention was directed to a stopping in the main south extension which has been renewed several times: can you tell us what is behind that stopping?—It was connected with No. 3 back heading, and there was a great deal of open work there.

22. Is there any anxiety amongst the miners as to that?—I cannot say that there is. They do not know what is there, though I heard a man say a fortnight ago, "God help the men if that stopping blows out." That was just a day or two after another stopping blew out.

23. Is that where the stopping blew out a fortnight or three weeks ago?—I could not say—I was not in the mine at the time, but I heard that remark.

24. *The Chairman.*] There was a report in the papers, but you do not know of your own knowledge?—No.

25. And no one connected with the management has ever said to you that there was such a stopping blown out?—No.

26. *Mr. Dowgray.*] On looking over the report-books, I see that the deputy reports gas frequently: are the miners allowed to proceed to those places?—No, I do not think so. I have been told, "There is a little gas in the roof; keep your lamp down." If I find gas, I draw the attention of the deputy to it, and he tells me to get out of the place.

27. Did you ever work in that dip in No. 21 section?—Yes, at the beginning of last quarter I was there.

28. I noticed in that particular section that the stentons are not 60 ft. apart: is there not a difficulty in ventilating that section?—There were two or three bords inside, and they were often gassed out when I was there.

29. And you could not suggest any different method of driving these places?—No, I could not suggest any other method unless the ends or stentons were put through oftener.

30. *Mr. Cochrane.*] You say you think it a better method to leave a strip of coal between the places?—Yes.

31. Will you explain what you mean by that?—Well, what I mean is that each place should come out separately, instead of two or three pillars coming out abreast. A strip should be left on each side to deaden the sound of the shovels. If there are three places working there are six shovels going. If you hear some small pieces trickling down, you have to stop the whole of the places, whereas if there were a strip left you would not need to disturb the other men.

32. Then you say you have been told to keep your lamp down because there was a little gas in your place: who told you that?—The deputy who passes me in.

33. And was there any attempt made to clear the place of gas?—Well, as soon as they started to work the gas would probably clear itself; but if it did not the deputy would withdraw the men.

34. And you would leave your work?—Yes.

35. *Mr. Reed.*] What is your opinion of the ventilation of the Kaitangata Mine—is it good, bad, or indifferent at the present time?—Well, I believe there is a good current of air passing through most of the places, but in some places it is very hot.

36. Does the company take every precaution to remove the gas as it emanates from the face?—Yes.

37. Is the bratticing brought up to the face?—Yes.

38. Do the firemen and deputies examine for gas frequently?—Well, they examine a place when they come to pass a shift in.

39. And if gas is found are you ordered out and a notice put up?—Yes.

40. Does the company take all necessary precautions to protect the men from explosions and the effects of the gas?—Yes, I think so, and also in their own interests.

41. *Mr. Dowgray.*] When you were deputy at Castle Hill, did that furnace adequately ventilate the mine?—Yes.

42. Has there ever been any agitation to have that furnace replaced by a fan?—Well, the men have talked about it, but that is as far as it has gone.

43. *The Chairman.*] They have not made any representations to the company on the subject?—No.

44. *Mr. Dowgray.*] They thought there was danger of an explosion by reason of the air passing over the flames?—Yes, that is so.

JOHN HEARD sworn and examined. (No. 25.)

1. *The Chairman.*] What are you ?—A miner.

2. How many years' experience have you had ?—I have been working in the Kaitangata Mine eighteen years; I have been away for about a year during that time.

3. Do you hold any office in the mine ?—No.

4. Or any position in connection with the union ?—I am on the executive.

5. To what matters do you wish to direct the attention of the Commission ?—To the working of the pillars and head coal. I agree with what the other witnesses have said on the subject. I think it is worked too high at present for the safety of the men.

6. Have you any suggestions to offer ?—No, I cannot improve on their statements.

7. You agree with their views ?—Yes.

8. Is there any other matter you wish to bring before the Commission ?—Yes, I would like to see the ropeway at Castle Hill cleared of trucks for the men to go in.

9. Does their presence there make it in any way dangerous, or only inconvenient ?—It is not dangerous, but very inconvenient.

10. You have never known any accident happen through the present system ?—No.

11. Have you anything to say as to the ventilation ? Are you satisfied with it ?—Yes, I am quite satisfied with the ventilation we get in the Castle Hill Mine.

12. Have you anything to say as to that emergency escape ?—I consider it is a long way behind the times. I would not like to use it myself.

13. What are your objections ?—Well, if two men went up in that bucket they would never get to the top.

14. What do you consider the danger ?—The men are not accustomed to riding in those tubs—it is not a very safe way.

15. Is the method of hauling a safe way ?—I could not say—I have not seen it working.

16. *Mr. Dowgray.*] You think it is only fit for use as a last resource ?—Yes, I consider it a paltry affair.

17. *The Chairman.*] Is there anything underground to indicate the direction to that place underground in case of emergency ?—I think the men could find it.

18. *Mr. Dowgray.*] Could you find your way round the furnace ?—Yes, easily.

19. There are no fingerposts pointing the way ?—Well, I have not been in there for a long time.

20. Do you carry your own picks out ?—We carry them down in the morning, but they come up in the box.

21. Is there any danger in the men carrying their picks ?—There might be. It would be a great advantage to the men if their picks were always taken in the boxes.

22. You were a deputy there ?—Yes, for a short time.

23. Have you met with a serious accident ?—Yes, I had two fingers taken off.

24. How did that occur ?—When I was falling head coal.

25. Do you agree with the recommendation of the two previous witnesses as to the system of working ?—Yes.

26. Judging from your experience, do you think there is anything against adopting that system ?—No, I think it would be a good system—better than the present one.

27. Why did you discontinue working as a deputy ?—I did not care for it.

28. But it is harder working on the coal ?—But you are not tied so much when working on the coal.

29. You think the responsibility is too great ?—Well, no, I did not think that, but I preferred the coal.

30. Would you prefer working in solid places to the pillars ?—Yes, working in the solid places is safer; but I have not done anything else but pillar-work, and take no notice of it now.

31. *Mr. Cochrane.*] Have you seen the bottom of the upcast shaft ?—Yes.

32. Were there wire-rope guides on the buckets ?—That I could not tell you.

33. *Mr. Reed.*] You stated that you left the position of deputy to work at pillar-extraction ?—Yes, that was my fancy.

34. So you fancy dangerous work ?—I do not think so.

35. Nevertheless you made the change ?—Yes.

36. *The Chairman.*] What is the difference in pay ?—Sometimes you make more, and sometimes less.

37. *Mr. Reed.*] As regards the ventilation in the Kaitangata Mine, what is your opinion ?—I cannot say anything on the present ventilation. It is some time since I was in that mine. I am working in the Castle Hill Mine now.

38. Was that practice of taking the explosives down adopted ?—In the morning we took down the explosives for the day.

39. So that the manager served out only the day's allowance ?—The manager has nothing to do with it; we got it from the storeman.

40. But he represents the management ?—Yes, I suppose so.

41. You asked for a day's supply ?—Yes.

42. *The Chairman.*] What was the average quantity taken for a day ?—About two shots—that is, eight plugs—and caps, and two lengths of fuse.

43. Have you ever left gelignite or dynamite after your shift ?—Yes, we left it for our mates.

44. And they know where it is left ?—Yes.

45. Are you aware, of your own knowledge, of that practice being known to the management ?—Well, I suppose the management would know of it. There was nothing to stop them knowing it. The management never asked us.

46. What is your practice in Castle Hill now ?—We do not need many shots there—about a shot a shift is sufficient for us.

47. Do you still leave it below, or have you received any fresh instructions on the subject ?—No, I have had no fresh instructions.

48. *Mr. Reed.*] Were you aware that you were breaking the law when handing the explosives over to the following shift ?—No, I thought it was all right, as long as we had the ammunition in tins.

49. The Act states that it shall not be taken for use into the workings of the mine except in quantities actually required during the shift. Did you know that ?—Well, we generally took what was required for the shift.

50. But you really took in more and left it, so that you were breaking the law ?—Well, I suppose other men break the law as well as we.

51. *Mr. Dowgray.*] I saw some men in the mine wearing gauzes: are they safeguards ?—I do not think they are very safe.

52. Have you seen men using them ?—Yes.

53. Do they hinder your sight ?—Of course, you cannot see with them as well as you can with the naked eye.

54. So that you consider them a source of danger ?—Well, they stop the biggest pieces of coal getting into your eyes—they are a slight protection.

55. You do not use them in pillar-extraction ?—No, only when the coal is proud.

56. *Mr. Cochrane.*] You said you would like to see the rope-road clear of all the tubs for starting in the morning: do you think that is a feasible proposition ?—I do.

57. Would it not cause great delay ?—No, not that I can see.

58. *Mr. Dowgray.*] Do you not come into contact with wire when walking down there ?—Yes, sometimes.

59. There is danger in carrying your picks ?—Yes.

ROBERT NICHOLAS RIDD sworn and examined. (No. 26.)

1. *The Chairman.*] What are you ?—Secretary of the Coal-miners' Union.

2. What is the strength of your union ?—We have a total strength approximating something like five hundred members in Otago and Southland.

3. And how many in Kaitangata ?—I could not tell you exactly, but somewhere between two hundred and ten and two hundred and fifty.

4. And what proportion of the miners in Kaitangata does that represent ?—The great majority of them are members of the union.

5. Do you speak on behalf of your union or from your own personal experience ?—To a certain extent from both.

6. What mining experience have you had ?—As a miner, about seven or eight years.

7. In Kaitangata ?—No, in other districts.

8. Do your duties take you into the mines ?—Yes, fairly often.

9. In what way ?—I occupy the position of workmen's inspector, and nearly every quarter I am appointed as one of the scrutineers to draw the quarterly cavil.

10. As workmen's inspector, what do you do ?—Well, there are generally two workmen's inspectors, and their duties are occasionally to go down and examine the mine.

11. What is your personal experience of that mine ?—I am of opinion that under the existing state of affairs the workmen's inspector is only a farce.

12. When you have examined the mine what have you found ?—We usually make out a report, and forward a copy of the report to the mine-manager.

13. How often do you make these inspections ?—At no stated periods.

14. When did you make the last one ?—The last inspection was made on the occasion of the accident to the late Joseph Carson.

15. Prior to that when did you inspect ?—I cannot give you the exact date, but the one before that was made when the late John McGhee met his death.

16. How often do you make these inspections ?—Well, it is the usual thing to make an inspection if there are any complaints from the miners. There are no stated periods for the inspections. We find that under the Act the workmen's inspectors can only claim admission to a mine once a month, and if he goes down to-day and finds it in passable order there may be a pressing necessity for him to go down again inside a month. So we do not go down regularly, in case there may be a complaint from the men as to the conditions not being good.

17. Do you think it would be an improvement from a safety point of view if, in addition to the right to inspect once a month, the workmen's inspector had the right to go down in case of accident ?—We have that right already in cases of fatal accident.

18. Have you any suggestion to make on the subject ?—I should say that the workmen's inspector should have practically the same right as the Inspector of Mines to go down at any time. And, further than that, they should have increased powers. All that they can do at present is to go down and inspect the mine and make a report, a copy of which is sent to the mine-manager. If the matter is serious a copy is sent to the Inspector of Mines, but that is the last of it. I should imagine that if the inspection proves that the mine is dangerous the workmen's inspector should have the right to say work in the place should be stopped until the Government Inspector can visit it.

19. What experience ought a workmen's inspector to have in order to have the right to interfere ?—He should have a certain amount of practical experience; he should be a miner.

20. How would you suggest that his experience and ability should be tested ?—Well, it is rather a difficult matter. I have not considered it from that point of view.

21. Well, you ask for more powers as an inspector. Of course, some workmen's inspectors may have sufficient experience, but some of them may not?—That may be so, but that remark may also apply to other men who are not sufficiently experienced.

22. But you should give some guarantee against interference by inexperienced men. What test would you make them pass to prove their qualification?—Well, that is not a question I can answer exactly. I have no doubt that they should have a certain amount of experience, and that that experience should be proved before they should get these powers. I do not advocate that as seriously as I do the necessity for them to have the right to inspect the mine more frequently—even if they are not given as great powers as I suggested—so that they should be recognized a little more than they are at the present time.

23. When you speak of complaints, is not that rather vague? You might easily get a complaint made only to give you the right to go down?—I do not say that it should be necessary to have a complaint before the inspector can go down. As a matter of fact, he is not anxious to run round the mine for fun. He would need to be satisfied that there is a necessity for him to go down.

24. To what extent does the inspection interfere with the working conditions of the mine?—I am not aware of it interfering in any way, except that if the manager exercises his right to accompany the inspector. That may take him away from other work, but he does not need to go.

25. But what about using the ways when the ropes are going?—Well, the custom here has been for the workmen's inspector to go down before the rope starts in the morning, so as not to interfere with the working of the mine.

26. Have you any other matter to bring before the Commission?—Well, in addition to my previous suggestion, it is the opinion of my union that workmen's inspectors, seeing that they are carrying out an important duty, should be paid by the Government.

27. Well, now, has your union passed any resolutions in regard to matters to be placed before this Commission, or can you speak with the authority of any number of any members of your union?—Well, sir, I can only speak with the authority of the management committee of the union. The matter has been left entirely in their hands as dealing with the Kaitangata and Castle Hill Mines.

28. What matters are they?—The most of the matters have been dealt with by previous witnesses.

29. I suppose you have no experience of working pillars in the mine?—No; but I might say that there is one matter which I think should be taken into consideration, though it was not brought up since the Commission was set up. A general meeting of the union here carried a motion condemning the present system.

30. Did the witnesses we have already examined voice the general opinion of the union?—I take it, sir, that they do. They are representative witnesses and experienced miners. There is also another matter which I personally wish to bring forward, but not as secretary of the union. Personally, I object very much to anybody being allowed to travel on that travelling-road in the Kaitangata Mine while the rope is in motion, because I consider it is anything but safe. We have known many runaways on that incline. There have been no accidents, but that is by good luck, I think.

31. *Mr. Dowgray.*] In your official capacity as secretary of the union have you had occasion to discuss the dangerous methods practised with the management?—Yes; on one occasion our executive met the management and we discussed certain matters in connection with pillar-extraction, and the manager told us that if a miner considered his place unsafe they would almost have no alternative but to dismiss the men.

32. *The Chairman.*] When was that?—It was during last year. I cannot give you the exact date. Of course, when we pointed out the seriousness of his statement he toned it down, and tried to make it refer to something in the past; but he made that statement, and it can be proved by witnesses who will come before the Commission to-morrow.

33. When did the variation or toning down take place—at the same interview?—Yes, when I pointed out the seriousness of his attitude.

34. Well, what was the upshot of that: did it go any further? Was there any result?—Well, that was only a side-issue which arose at the interview.

35. *Mr. Dowgray.*] Did you discuss the methods suggested by the three previous witnesses as to pillar-extraction?—No, not at that time.

36. *The Chairman.*] What other dangerous practices were you discussing?—We were discussing the matter of taking a strip alongside the pillar when the side of the pillar was blocked by a fall of stone. We were trying to persuade the management that it was better to cut through the pillar again rather than take a strip alongside the pillar when carrying out pillar-extraction.

37. *Mr. Dowgray.*] Do you mean, like McGhee's place in Castle Hill Mine?—Yes, that could be said to be typical.

38. Are the men not allowed discretionary powers as to when the place is safe or not?—Well, I really could not say. When men say a place is unsafe they tell me they are ridiculed—they are told it is as safe as a house.

39. Have you known of a case of a man going home when they thought a place was not safe to work in, and the management thought it was safe enough?—Well, I cannot say as to that, but sometimes there is a difference of opinion between the officials of the mine and the men.

40. Have you ever known men to leave their places in such cases?—Yes.

41. What was the result?—Well, nothing happened to the mine, because before the next shift went on the place was closed.

42. You have not known of cases where the men left and the place proved to be reasonably safe?—I do not know of such cases, though there may have been such.

43. In your official capacity as check inspector, when you report a bad place is it attended to and put right? Do they take any notice of your reports?—Well, of course, I am not down in the mine to see. When we draw their attention to matters, of course they promise to fix them up. Whether they actually do so I do not know. The conditions change before we visit again.

44. Do you never make inquiries as to whether matters are remedied?—Sometimes. I may say it is a very curious thing that we do not always find that the complaints of the men are borne out. I have known occasions when complaints have been made in regard to certain sections of the mine, and when we examine them we do not find the conditions the same as those complained of. They are not found to be as bad as we were led to believe they were.

45. How long after the inspection do you make the report?—Probably the next day. What I wish to say is this: that I have known us to go round and find the conditions passable, and a couple of hours afterwards the men have had to go home.

46. *The Chairman.*] How do you account for that?—I account for it by the manipulation of the screens.

47. You might tell the Commission what you really inquire into and what you test for?—Of course, we test mostly for gas.

48. Do you take air-measurements?—We have only done so on one occasion, because we did not have an anemometer to do it with until quite recently. We certainly found sufficient air going into the mine, but it was not distributed about the faces.

49. Do you take temperatures?—No.

50. *Mr. Dowgray.*] You thought the canvas doors had been manipulated to make the place all right during your visit?—Yes, something had been manipulated.

51. *The Chairman.*] But if it were gas you were after, and the canvas was manipulated to remove it—— ?—It was not gas on this particular occasion; it was smoke which sent the men home.

52. *Mr. Dowgray.*] Smoke from what?—From fires that were in existence in the mine. And I believe this smoke finds its way into the working-places, though I have never been unfortunate enough to come across it.

53. *The Chairman.*] You have never found it?—No, care was taken about that.

54. *Mr. Dowgray.*] Do you know anything about the number of accidents prevalent in this mine?—Well, I know there are a good many minor accidents in this mine, and there have been two fatal accidents since I came to Kaitangata.

55. During the last twelve months?—Yes.

56. Do the workmen here ever discuss the question of baths being erected?—The matter was discussed, and there was a ballot taken at Kaitangata to ascertain how many men working in the mine could use the baths if they were provided, and it resulted in 121 of those who voted being willing to use them, fifty-eight unfavourable to the proposal, and there were six informal votes.

57. *The Chairman.*] Out of a total of how many men employed in the mine?—I am not exactly sure, but the manager could tell you.

58. When was that ballot taken?—On the 18th August, 1911.

59. *Mr. Dowgray.*] What is your personal opinion of men without any practical experience working in coal-faces?—Well, of course, in bord workings, though the men may not have had much experience on coal-faces, they may have had experience as truckers.

60. But as regards a man in charge of a face by himself?—I believe it would be better if a man had a certain amount of experience before he was given charge of a face on a dangerous field of coal.

61. It has been suggested in one place where we were that a man should have two years' experience along with another man before he got charge of a place by himself?—I would not be in favour of that being made compulsory generally, though I admit it is necessary in some places.

62. *Mr. Fletcher.*] Are you employed at the Kaitangata Colliery?—No.

63. Where have you had your experience?—The experience I have had has been in smaller mines at Alexandra and Coal Creek.

64. *The Chairman.*] And they are small mines?—Yes, comparatively small.

65. *Mr. Fletcher.*] Do they take pillars out in these mines?—They were doing so in one of the mines when I was there.

66. *The Chairman.*] In regard to your inspections: you cannot accumulate your inspections?—No, but you could go down after a week if you made it up.

67. *Mr. Fletcher.*] But you can go down twelve times in the year?—Yes, if there is a month between each inspection.

68. Then you have had no experience of pillar-workings in coal?—No, I do not feel inclined to express an opinion on that subject.

69. *Mr. Cochrane.*] Did I understand you to say that you would give the check inspectors power to stop a place till the Inspector of Mines sees it?—Yes, I would suggest that.

70. Would that not have a tendency to relieve the management of responsibility?—It would have the tendency to put it on the Inspector of Mines.

71. Or on the workmen's inspector?—Well, of course, he would have to express an opinion on it.

72. Supposing you made an inspection one day and the next there was a fatal accident there, might not the management say that you were round the day before and did not stop the place?—I do not consider that would relieve the management of their responsibility. I do not think the fact of the workmen's inspector not having closed it would clear the manager in any way.

73. Not to clear him, but to relieve him to some extent of responsibility?—Well, I cannot see it in that light. I have two papers here—they are the workmen's inspectors' reports on the occasions of the two fatal accidents in the Kaitangata Mine.

74. *The Chairman.*] Were they supplied to the company?—Yes.

75. Are these exact copies ?—Yes, according to the Act the workmen's inspector must supply a copy to the company within twenty-four hours of his inspection.

76. Did you supply copies of these ?—Yes; one I handed to Mr. Carson, and the other I posted to him.

77. Addressed to the manager at the registered office of the company in Kaitangata ?—I addressed it to him as manager of the Kaitangata Mine at Kaitangata. In these reports it is stated that in the opinion of the workmen's inspector the opening of the mine by wide bords is a factor which tends to make the miner's work more dangerous when he is subsequently extracting pillars, and that it was not the safest way of opening up the mine.

78. This report is signed "Edwin Rodgers." Is he a man of experience ?—Yes, I understand he holds a deputy's certificate.

WILLIAM SHALLISH sworn and examined. (No. 27.)

1. *The Chairman.*] What are you ?—A miner.

2. How many years' experience have you had ?—I have been seven or eight years in the Kaitangata Mine.

3. Prior to that ?—I had about eight years' experience prior to that.

4. Where ?—In Victoria.

5. Do you hold any office at the mine ?—No. I have been a roadsman.

6. Have you any office under the union ?—I am treasurer of the Otago Coal-miners' Union of Workers.

7. Are you a workmen's inspector ?—No.

8. Which matters do you wish to bring before the Commission ?—I would like to speak as to the system of pillar- and head-coal extraction. I also consider that the ventilation should be better attended to.

9. As to pillar- and head-coal extraction, did you hear the evidence given last night ?—No; I consider that the present method is very unsafe, and against the interests of the men, as well as against those of the management. There are absolutely no precautions taken for the safety of the men, and it is simply a matter of luck that there are not more accidents from the time the men go in till they come out. The stone in the Kaitangata Mine is invariably very bad, and in filling coal under the stone roof it is very dangerous. The stone in the Kaitangata Mine gives no warning whatever—it is more in the nature of mud, and simply drops. It may drop in large or small pieces, and even with small pieces it is dangerous if the place is high. I consider that the roof should never be bared without leaving a cover of coal.

10. Of what thickness of coal ?—I do not consider it is safe for a man to work with it above 15 ft. or 16 ft. from the road.

11. But what thickness of coal should be left under the roof ?—If the thickness of coal is known it should not be less than 6 ft. thick below the stone.

12. What height would you say could be propped with reasonable safety, so as to win as much coal as is consistent with safety ?—Well, you cannot prop with any success much above 8 ft.; but if you have perhaps 5 ft. of solid coal on each side of you the coal would be in a state to give you warning as to loosening, and you would always know the state of the roof. You should be able to reach it with a pick or stick.

13. What system would you suggest ?—That they should drive with narrow bords, and that a solid strip should be left on the outside of the pillars. The coal should not be taken out as at the present time. There are perhaps six or eight shovels working in a line, and the noise prevents you from hearing anything that is taking place. You have to ask the men to stop work, and by the time they do so the noise is over and the warning is lost. That happens perhaps a few times, and the men get more careless, with the result that they take more risk than they should; whereas, if each pair of men were kept to themselves by a strip of coal being left on the outside, it would give them more quiet, and enable them to detect signs of an impending fall.

14. Have you any other suggestion to make ?—I would also like to say that I consider that underviewers and deputies should have more responsibility than they take at the present time. They seem to be totally devoid of responsibility. The men have to examine the places for themselves. A short time ago—on the 31st August, to be exact—I was passed into a place which had been examined by a deputy, who told me that there was plenty of coal there, and all the stone had been taken out. I thought that was rather too good to be true. I went in and examined the place myself, and found that over where I was supposed to be filling there was a mass of coal and stone hanging with 18 in. or 2 ft. broken away from the roof, and under that there was 4 ft. of coal hanging. There was nothing to prevent the lot of it falling on any person working there. As a matter of fact, it fell in two hours afterwards. I sent for the deputy, and he said that he had not time to attend to it just then, but he would be back in half an hour. He also told me I was not working in my right place, that I had no right to be where I was, and that further in was my place. I told him I was willing to work further in if he would get me a trucker.

15. We cannot go into a dispute of that nature. You think that a deputy should have more experience ?—He should have more responsibility, and he should have the experience necessary to enable him to tell a man about his place. It was impossible for me to reach the place, because it was so high. The trucker said he would not go underneath it, and the deputy sent us home. It seems that his responsibility is not defined.

16. What remedy would you suggest ?—That there should be more competent men in the mine to be able to take these head-coal places under their supervision, and all work in them should be under their direction. Where there are dangerous places precautions should be taken to see that the men do not go underneath them.

17. Have you any further suggestions to make ?—No, I do not think so.

18. You said you wished to say something on the subject of ventilation ?—I cannot speak with any experience on ventilation matters, but at the present time there is a large amount of the air going into the Kaitangata Mine which goes to waste by reason of the lack of attention to the bratticing in the mine. The bratticing works loose, and the air escapes. If unused airways were blocked with board stoppings it would be better. I also think that the air that is coming from the working-places should not be allowed to mix with the pure air in the mine; it should be taken away straight to the surface. Further, I consider that stentons are not driven close enough together. There are long distances between them now. They should not be more than 60 ft. apart, and the air should be taken into the places by bratticing.

19. What injurious effects result from the present system ?—It tends to allow the gas to accumulate in the face when the stentons are so far apart, because there is no draw on the air.

20. *Mr. Dowgray.*] I think you said, in answer to the Chairman, when describing what happened on the 31st August, that the deputy told you it was not your place: who told you it was ?—The underviewer, when he passed me in, and the deputy afterwards said I had no right there. As a matter of fact, it was my place.

21. For what reason do you suggest that 5 ft. or 6 ft. of coal should be left under the roof ?—It would prevent the stone from falling; and, in addition to that, the coal would always give warning, while the stone does not.

22. Your reason, then, is that the coal gives warning ?—Yes.

23. Have you worked in the Castle Hill Mine ?—Yes.

24. What is your opinion of that second outlet ?—The second outlet at the present time is simply an outlet for air, and not an outlet for men. The men would be a considerable time before they could get there. Then, again, there is no one on the top to take any notice of signals from below. I think the means provided are rather primitive for hoisting and lowering men.

25. *The Chairman.*] Is there any telephone near the shaft to communicate with the men ?—No; I believe there was a wire hanging there, but I think it has been destroyed.

26. Is there a man constantly kept on top ?—No.

27. Supposing the men were driven there from the mine and could not get back, is there any means of communicating from the bottom of the shaft to the surface, assuming that the communication was cut off internally ?—No, unless there has been some means put up very recently. The only communication that was there was the wire that went up the shaft.

28. *Mr. Dowgray.*] Have you ever seen this apparatus working ?—I have seen it, but I have never examined it. I have seen some tanks with some water in them. I believe the water is to go into the buckets to balance the men.

29. Are you aware that there are provisions in the Act which require that that apparatus should be tested every three months in the presence of some one appointed by the workmen ?—No, and I have never known of that being done. It has certainly not been done during the last twelve months, and probably not during the last two years.

30. You do not think it has been tested in the presence of a representative of the workmen ?—No.

31. Are you aware that there is such a clause in the Coal-mines Act ?—No.

32. Is there any dissatisfaction at Castle Hill in connection with that mine being ventilated by a furnace instead of by a fan ?—Yes, I have at times heard the matter mentioned by the men, who have said that the furnace was a very unsatisfactory method of ventilating the mine.

33. *The Chairman.*] Have the men made any representations in regard to that matter ?—Not to my knowledge.

34. *Mr. Dowgray.*] What method do they adopt in this mine for relighting the lamps when they go out ?—As a rule, if your lamp goes out, I believe you are supposed to go to the lamp-room and get it relit; but that is an impossibility. You give it to the trucker to take out, but, as a rule, you do not see it again—not even the next day. It is mentioned to you that you did not bring out your lamp, and they find you another one. You must borrow one from a man who has two.

35. Are you not held responsible for your lamp ?—No, I do not think the management hold you responsible for it, though they expect you to take all care.

36. Can you suggest any improvement on the present system ?—Well, it could easily be improved if the men were not allowed to use each other's lamps, and if the lamps sent out were returned more expeditiously. I do not know why they are not returned. I cannot see why they should not be sent in again, say, in twenty minutes after being sent out. There is always communication between the lamp-cabin and the other places of the mine.

37. You suggested that a strip of coal should be left: would the company lose more coal under that system than they do at present ?—No, I think they would lose less. At the present time two-thirds of the coal is lost. At a place where I was recently working I do not think there was one-hundredth part of the coal filled away; the remainder was all buried.

38. Have you seen any places worked here where a strip of coal has been left ?—Yes, in the late Mr. Jordan's time.

39. Was that satisfactory ?—Yes, it was safer than the present method.

40. What sanitary arrangement have you in these mines ?—There are none.

41. What method do the men adopt ?—They go into the first place that is handy.

42. Does that cause an offensive smell ?—Yes; it also causes a great deal of dissatisfaction amongst the men working near the airway.

43. *The Chairman.*] Is it not a return airway which is used ?—No, sometimes they use the travelling-roads when they are deserted.

44. *Mr. Dowgray.*] They use the first convenient place they can find?—Yes. I think it would be a simple matter to have small places dug out and filled in afterwards. Of course, all the men would have to be educated up to using those places.

45. How far would the men have to travel to get into the main return?—I cannot say. I have not worked there during the last ten or twelve months.

46. Are there not men working close to the shaft?—Yes.

47. So that you could hardly go into the return airway without vitiating the air?—No, it would be impossible.

48. It passes from one section to the other?—Yes.

49. *Mr. Cochrane.*] As to the deputies having more responsibility, what duties would you add to those already specified in the Special Rules?—If the Special Rules were thoroughly carried out by conscientious men it would meet the case.

50. Then, you say the men consider the furnace unsatisfactory: is that in regard to possible ignitions of gas, or in regard to the amount of air which circulates?—I think the main thing is the possible ignition of gas. If the furnace was going well there is a large amount of air travelling at Castle Hill, but the practice is to let the fires go down at night and the men find the places dull.

51. Where there is a fan used is it kept going at night?—Yes, there are shifts working all the time.

52. *Mr. Reed.*] In reply to Mr. Dowgray you said that the men used the first convenient place they could find for the deposition of excreta, to the disadvantage of one another: is that not the men's own fault?—Yes, to a great extent; but wherever they might go the same thing obtains. They could hardly find a place in the mine where other men would not be affected.

53. Cannot you get into the return airways?—There are no return airways.

54. But I went through one in the Castle Hill Mine?—That might be.

55. Cannot you use dust as a deodorant?—Yes, but the men will not use it.

56. But is that not their own fault?—Possibly so; but I think it would be better to have small latrines.

57. It appears that the men's complaint is against one another?—Undoubtedly; it is against every one concerned.

NEIL MCKENZIE sworn and examined. (No. 28.)

1. *The Chairman.*] What are you?—A miner.

2. With how many years' experience?—About ten years and a half.

3. In Kaitangata?—Five years in Kaitangata.

4. Prior to that?—At Shag Point, and Lovell's Flat, and Mount Somers.

5. Do you hold any position in the mine?—No.

6. Or under the union?—No, not at the present time.

7. You are not a workmen's inspector?—No, but I have been.

8. What matters do you wish to bring before this Commission?—Well, the general working of the Kaitangata Mine.

9. In what respect?—Pillar- and head-coal working and ventilation.

10. You heard the last witness?—Yes.

11. Do you agree with him?—Yes, in regard to the matter of pillar- and head-coal working.

12. Have you anything to add to what he said in regard to that matter?—No, I could not very well add anything to his remarks. He said he would like to see up to 6 ft. of coal left on the stone roof. I say it depends on the quality of the coal left, because there are some places where we are working where the coal is very rotten and full of what we call "sooty backs." I do not think that 6 ft. of coal would hold them.

13. What do you suggest?—Of course, you could hardly make provision for them. My opinion is that the head coal should be worked to a certain height and no higher—to a height where the men could look after the roof. Under the present system of work we have a place up to 30 ft. When the deputy comes in with a flashlight you can see it. He comes in perhaps on one day, and not perhaps again for a week. You are provided with a long stick to sound the roof, but we cannot sound it at that height.

14. There are no means of seeing it?—No, except with an electric torch which can be flashed on the roof.

15. Have you any further suggestions on that point?—I think that if bords were driven narrower it would be better. They should drive their bords about 6 ft. or 8 ft. wide, and timber them thoroughly so as to make provision for taking out the pillar and head coal afterwards. They could get most of the coal with very little danger to the men, and without going so high as they do. I think if the company were satisfied to get a fair quantity of coal with safety to the men, and not require them to run so many risks, things would be a great deal better for both sides.

16. Is there any other matter you wish to bring before the Commission?—In regard to ventilation I agree with the previous witness, and have said that stentons should be driven more regularly than they are at present, and that the management should not rely so much on carrying the air in by brattices and letting the air come in on its own. The men would then get more air. Last quarter I was working in a place where the Commission went through yesterday. Instead of driving stentons to thoroughly ventilate it the management carried the air in with brattices, with the result that we did not get the benefit of the air, though certainly the air itself was not bad. Towards the end of the quarter it carried a little gas. We would have been working in good air if they had driven stentons and done away with the brattice.

17. Have you anything to say on the sanitary question?—As far as the Kaitangata Mine is concerned there are no sanitary appliances. I think that the management could very easily arrange places where the men could go—out-of-the-way places, say one in each section, so that it would not be a nuisance to the workmen.

18. You heard what the other witnesses had to say about the present practice: do you agree with them?—I hardly agree with the previous witness, although he may have seen more of it than I did. My experience is that the men usually try to get into a place which is finished. They do not go into a place where the men are travelling. One of the Commissioners asked a witness whether they used the return airway. Well, it is very difficult to say what is the return airway in the Kaitangata Mine. The men are working to within a few feet of the shaft, and they have to utilize the air there. I have heard of some cases, and have known of them too, where a nuisance was caused through the men going into the air-courses, but men generally try to go into other places.

19. But you think conveniences ought to be provided?—Yes.

20. *Mr. Dowgray.*] That bears out previous witnesses' contention that what may be an old bord to-day may be a working-place to-morrow?—Yes.

21. Have you had any experience on men being sent into places which were considered dangerous?—Yes. I remember one case in particular where two of us were working two or three years ago. We considered it unsafe, and we objected to work in it, and told the deputy so when he came round. He stopped the place. It was stopped three or four days, and the coal fell down.

22. *The Chairman.*] If there is a disagreement between the deputy and the men, cannot you go to the manager?—We have the right to go to the manager if the deputy considers the place safe and we think it unsafe, but the manager generally takes the deputy's opinion.

23. Is the deputy not held responsible for the safety of the working-places?—As far as I know.

24. *Mr. Cochrane.*] I think you said you would suggest a given height for the working in pillars?—I consider that they should work them a regulation height and go no higher.

25. What should that height be fixed at?—About 15 ft. or 16 ft. The men should always have the chance of sounding the roof.

26. Would that height not depend on the different classes of coal?—I should not think so.

27. You would make it the same in a strong place as in a place with soft coal?—The men would have to sound the place if it were strong as well as if it were soft. Where you cannot get up to the roof or prop it, the only thing you can rely on for safety is the sounding.

GEORGE CLARK sworn and examined. (No. 29.)

1. *The Chairman.*] What are you?—Assistant storeman at the Kaitangata Mine.

2. What is it you wish to refer to?—I wish to explain how the explosives are given out. We have different-sized tins, of which I produce samples [produced]. They hold from sixteen to twenty plugs. Each man has his shots put in these tins. They generally get through from two to four shots, or twenty plugs—that is the maximum. The caps are rolled in paper, and served out in one of these tins.

3. Do you ever question the men as to whether they have used all those shots on that particular shift or not?—No. They do not tell me how long the supply I give them will last, or whether they are going to use it all to-day or to-morrow. I keep a record of all explosives which go out.

4. *Mr. Fletcher.*] When the men come to you for explosives you expect that they will not take more than sufficient for that day?—I cannot say that. They simply say they want four or five shots. I have heard them say, "I will not come back till to-morrow."

5. *The Chairman.*] Have the men not been impressed with the fact that they must not take more than one day's supply, or do you think they do not know?—I do not know.

6. Is there any obligation on the storeman not to supply any more than a certain quantity?—Yes, 5 lb. is the maximum. I do not give them more than half. Sometimes they get 2 lb.

7. So far as you are concerned, the supply to one man never exceeds half the maximum?—That is so.

8. You do not inquire when they are going to use them?—No.

9. How do the men work: do they work with mates?—Yes, two men work together.

10. If the men on the night shift take down explosives, do the men on the next shift take some more?—Yes.

11. Are they mates with the men on the previous shift?—I cannot say.

12. You do not take a record of the supply for the different places?—No, only as to the quantity served out to the men.

13. *Mr. Reed.*] Are you aware of the law on the subject?—Yes, sir.

14. It states that more explosives than is required for one shift shall not be taken into the mine during that shift: are you aware of that?—Yes.

15. But just now you gave us an instance of the law being broken?—I understand that it is for the day's supply. I believe what the men say.

16. Is it not the storeman's duty to stop at the maximum quantity? Are you instructed by the management in the matter?—The manager showed me the Coal-mines Act, and told me of the provision.

17. Mr. Carson gave you an instruction to carry out the law?—He showed me the Act, and I took that as the instruction.

18. *Mr. Dowgray.*] Mr. Carson has never specially instructed the men not to take in more than one day's supply?—No, he only showed me the Act.

19. Is there not a very bad road to that magazine?—It is greasy.

20. Do not the men grumble about it?—Yes, I have heard them grumble, but some men will grumble at anything.

ROBERT LEE, JUN., sworn and examined. (No. 30.)

1. *The Chairman.*] What is your position?—I am engineer to the company and acting general manager at the present time.

2. What matters do you wish to refer to?—Well, if the Commission cares to hear me, I will explain our intentions in connection with this new seam we are opening up, and the proposed method of working it. We have already put in a drive connecting with the seam, and we are now putting in a large drive to act as a main drive for the new mine. This, of course, will be an intake, and the present prospecting-drive that has been put in is to act as a return airway. The company intends to ventilate this new mine by means of a Sirocco fan capable of putting through over 80,000 cubic feet of air per minute.

3. How many men will be working there?—It is hard to say at the present time. The object of this new mine is to increase our output, and we wish to try and do all the work at Kaitangata in one shift drawing coal. It is hard to say yet what will be the number of men. When this new mine is properly opened up we are in hopes of being able to connect with the present mine in the neighbourhood of No. 21 dip, and when that is done we will be able to work the coal towards the mouth of the mine and leave all the worked-out country behind us. That is an advantage in regard to safe working.

4. *Mr. Reed.*] To the new mine at Kaitangata?—To what we call the Kaitangata No. 2. I would mention that the drive we put in as a prospecting-drive will be the return airway, and we intend to make it a travelling-way as well for the men. Of course, under our present regulations no man is allowed to travel in the roadway without the permission of the management. Referring to ventilation, we are now negotiating for a new electric installation for the Kaitangata Mine to drive the fan. The object is to have an up-to-date electric plant, so as to have a margin of power for the present fan to increase the output of air.

5. *The Chairman.*] With regard to Castle Hill, have you any plans as to the ventilation of that mine?—Nothing definite has been decided in regard to that.

6. There is a suggestion that the ventilation may be a source of danger in regard to the gas?—We have not gone into that.

7. You are speaking from the engineering point of view, and not from the underground-working point of view?—Yes.

8. Are you in a position to offer any opinion as to pillar methods? You are not a mine-manager?—No, I am not the mine-manager, and I would not care to make any remarks about that, except to say that, as far as I know, during the last six years there has been only one fatal accident in connection with the working of the pillars, and none of the other accidents have been due to pillar-workings. I might also mention, in connection with this new mine, that it will ultimately be connected with the Kaitangata Mine, and this will give us a third outlet for both mines. There will be three distinct outlets.

9. As the mine is at present laid out is it sufficiently easy for the men to find their way now to the outlets if danger arose?—Yes, the mine is provided with fingerboards showing the men in which direction to go to find the airway. These are always kept so that they can be seen by men passing along.

10. Is there any other matter you wish to refer to?—I do not think so. I just wished to explain our intentions in connection with this new work.

11. *Mr. Dowgray.*] I would like to know if you are sure that there are sufficient fingerboards pointing the way to the escape-shafts?—Yes, I think there are sufficient.

12. Have you been down there lately?—I have not been down during the last month or so; but I understand the management always keeps these notices so that they may be seen. Certainly, when I was down they were there, so that in passing by you could see them.

13. Did your company not intend two years ago to replace that furnace with a fan?—Well, I cannot say. My present connection with the company is only since May of last year, and I am not prepared to say what was done before that.

14. During your time they have not discussed it?—No, there has not been anything definite discussed.

15. You have nothing to do with the internal management of the mine?—No; Mr. Carson is the manager, and he is responsible for the underground working.

ALEXANDER FERGUSON sworn and examined. (No. 31.)

1. *The Chairman.*] What are you?—A miner.

2. With what experience?—About twenty years.

3. Where?—The Kaitangata Mine for ten years.

4. Prior to that?—In Scotland for ten years.

5. What matter do you wish to bring before the Commission?—I would like to bring forward the matter of using electric torches in these high places. I think it would be a very big improvement if they were used. You would see any breaks in the roof and sides where you cannot see them with the ordinary safety-lamp. I have used one down in the mine, and I think their use in these high seams should be made compulsory. I would compare the two lights with a field-glass and the naked eye. At sea, looking at an object with the naked eye is like looking at the roof in a mine with the ordinary safety-lamp, and looking through a field-glass at sea is like looking at the roof in the mine with the aid of an electric torch.

6. If the height of the place were reduced to 15 ft., would that not meet the case?—Well, of course, if that were done, the torch would not be required; but if it is not done the torches should be used. With places 25 ft. high you are groping about in the dark.

7. You mean an electric lamp in addition to the safety-lamp?—Yes.

8. Who would provide these electric torches?—I think the company should provide them.

9. But you think they would not be needed if the pillars were reduced to 15 ft.?—Yes, that would make all the difference. If you can see the roof you would not require these electric torches.

EDWIN RIDLEY GREEN sworn and examined. (No. 32.)

1. *The Chairman.*] You are the Inspector of Mines for this district?—Yes.

2. We wish to ask you some questions generally in the method of working the Kaitangata Mine. You have heard what the witnesses have said in regard to the present system of pillar-working. Will you give the Commission your opinion of that system, and whether you think it safe or whether a safer system could be adopted?—Well, sir, to begin with, the evidence is practically new to me, and it would certainly require some consideration for me to be able to give you an opinion of any value. You ask me as to the safety of working in these high places, and I wish to point out that the accident list from these high places in this mine is an extremely small one. The accidents have come almost entirely from the low parts of the roof. Giving a superficial opinion, it depends to a large extent upon the nature of the coal in the roof as to whether it should be a low roof or a high roof for safety. It sometimes happens that in low seams the roof is worse than those in high ones. Generally speaking, the conglomerate is present in high roofs of from 25 ft. to 30 ft. and takes a long time to fall. The nature of the working in bringing down the coal from these high places is such that the coal is generally dropped in large quantities—sometimes hundreds of tons are brought down. The workmen are on top of this high coal and have the advantage of knowing this roof. They discuss the nature of the roof, too, with us, and when we get their opinion it is most valuable. In any case, where the roof is bad more care is taken. This mine has been working for over forty years. The same variations in the roof exist as have been present throughout all that period.

3. Is it the same system of working?—To a certain extent it is; the present system is better than the previous one.

4. As far as your experience goes, is it the best system that could be adopted?—It has stood the test of time so far, though it has been in vogue for only a few years. They had another method before. There is one factor which the management have to consider most carefully, and that is that this mine is so liable to spontaneous ignition, which is liable to produce uncomfortable conditions of working. There are so many surrounding features that I would like more time to express an opinion.

5. Do you exercise any control over the method of working, as to whether it shall be one system or another?—If I thought the system a bad one I should certainly exercise my influence to have it altered.

6. Do you think the Act gives you sufficient power, or would you suggest that you should be given any more specific powers?—I have not found any difficulty in enforcing anything so far.

7. But we are here to inquire into any possible defects. As an inspector, if you had more definite powers to interfere in the matter of systems of working would it be better?—Would you allow me to take that question down and give a written answer later?

8. Yes, it is a matter in which the Commission, I think, would be glad of your opinion?—Very well, I will endeavour to asist you by every means in my power.

9. You see we are prepared to accept any suggested amendment or improvement in the Act which would give you greater powers in carrying out your duties. For instance, with regard to summary power to prosecute for certain offences. Perhaps you may find certain conditions existing which you may have to report to Wellington, and by the time you are able to prosecute the conditions may have so changed that your charge may be difficult to prove; whereas if you had summary powers of prosecution it would be a big lever in your hands. We are quite prepared to receive any suggestion on such matters, though it does not follow that they will be adopted?—Well, a suggestion sounds very well, but we are a law-abiding community, and I find it very seldom necessary to take proceedings. It might be done in minor matters, but I would like to have the cases decided before a Magistrate as already provided.

10. You consider that if you had a summary power of prosecution given to you the proceedings should be taken before a Magistrate and not before a Justice of the Peace?—Yes, I would have the wording put that way.

11. Now, with regard to the furnace shaft and the apparatus there for raising men in the Castle Hill Mine, will you give us your opinion of that?—Yes, I never liked it, and do not like it now. The management has been aware of that, and also the union. We had an official trial some three of four years ago, when we were all present—the executive of the union, the management, and myself and Mr. McIntosh, late Inspector of Mines. The trial consisted of lowering and raising men. After working with the water for a time the president and secretary of the union, the mine-manager, and Mr. McIntosh went down and came up again.

12. You did not go?—No, though I was prepared to do so. They came up rather wet, as the rope stretched, as all new ropes will, but they came up all right, as the men are alive to tell the tale.

13. But that is only an emergency plant: as such, what have you to say about it?—I would rather have a steam winch.

14. You have heard what one witness had to say with regard to signalling?—Well, there is a telephone from the surface to underground and *vice versa.*

15. But could you not have a telephone from the bottom of the shaft?—Yes, that is a fair suggestion.

16. Supposing the way to that dip were cut off?—Yes, it would be an additional safeguard to have a telephone connected with the bottom of the shaft.

17. What have you to say with regard to the suggestion as to the furnace there in that return airway?—The fact is that this mine for a number of years has only been worked intermittently. It has only been worked in order to keep it in repair. It has been an adjunct to the main mine. It has never been taken seriously in regard to output either by the company or the union. The company has been put to a great expenditure. One does not like to overburden them with expense, but if they are going to employ thirty-four men down there, as they were doing the other day, I must consider it.

18. I do not mean it as a dangerous mine, but as a gassy mine ?—There was a dumb drift, but if any one can show me where a large quantity of gas is going to come from in this mine, I would say, "Stop the furnace."

19. In the course of your inspection have you come across what you consider to be a sufficient number of fingerposts, or would you recommend further fingerposts to indicate the way to those emergency outlets ?—Yes, we have had them a long time, and, as is the case underground, they do not last long. We tried calico, but it perishes; and then we tried tin, and that became clouded and it did not last long. We have had as many as two dozen. I certainly agree that if the men do not know the places more notices should be provided, and erected more frequently.

20. Supposing, instead of putting up branch indicators, you had a special indicator put up near the entrance to the mine, stating that the way to the return is indicated by this particular kind of notice—you might make it any shape you like—and then the men would know that wherever they saw that sort of sign, it was the way to the outlet ?—We have those indicators—we have chalk and fingerposts pointing which direction to take.

21. I understand that the lettering gets destroyed. Suppose you had a particular kind of indicator, you would not want lettering at all except on the general notice to say that that particular sign pointed the way to the outlet ?—Well, our tracks are blazed just as well as they are in any bush.

22. You heard the men say that explosives have been kept in the mine: has your attention ever been drawn to that practice at all ?—No, not in the way I have heard it put here. Of course, I usually see to the tins, but it is news to me that explosives are left in the mine overnight. On looking at paragraph (*c*) of subsection (2) of section 40 of the Coal-mines Act, I think this practice is not actually prohibited. It reads, "It shall not be taken for use into the workings of the mine except in quantities actually required during the shift." Well, if a man gets four shots from the storeman and only requires to use two, the Act does not say he shall take the other two shots out again.

23. You suggest that a provision to that effect should be put in ?—Yes, I think that would be a very welcome addition to this part of the Act. Of course, if a man takes in four shots he may expect to use them; circumstances may arise which might cause him not to use them.

24. You would suggest that all unused explosives should be returned by the man who took them out ?—Either that or else the men on the second shift should not be allowed to take any down. Another suggestion was that a store should be built underground to keep the explosives in. That is a good suggestion. It is awkward for the men to carry the explosives out again. A small storage magazine underground would meet the case, I think.

25. Who would have charge of that ?—There would have to be provision made to have another man in charge of it. I would, however, like to point out that we have had no accidents from the misuse of explosives during the last twelve years, which shows the care that is taken by all concerned, management and men alike.

26. *Mr. Cochrane.*] There are one or two questions I wish to ask you, as the management is not giving any evidence. What is your opinion of leaving 5 ft. or 6 ft. of head coal ?—Well, at what height from the floor do you mean ?

27. As suggested by the witnesses ?—Five feet from the floor or 20 ft.?

28. In high places ?—At what height from the floor ?

29. Assume any height ?—What sort of a question is that to ask a man ?

30. Say 15 ft. from the floor ?—Well, 15 ft. is a very high roof to prop, and I do not believe in unsupported coal. I would rather have unsupported good rock than unsupported coal.

31. Then do I understand you do not favour the suggestion of the witnesses ?—In answer to the Chairman, I thought I made it plain that I am asking to have a little time to consider this sort of question.

32. Then, as to the furnace, did you hear the witness say that the air was dull in the morning through the fire not being kept going ? Can you tell us how long before the men go in is the fire seen to ?—Not actually, but I think the furnaceman generally goes in a couple of hours earlier than the other men.

33. *Mr. Dowgray.*] In connection with the furnace, you know clauses 55 and 56 of Special Rules —How do you interpret that ?—"The furnaceman shall constantly keep clean, brisk fires"; and "The ventilating furnace or apparatus shall not be left either day or night without the order of the manager."

34. How do you interpret that ? In a mine which is ventilated by a furnace, has the furnace to be kept going all the time ?—Yes—"constantly keeping clean, brisk fires."

35. Does it not convey to you that furnaces must be kept going all the time ?—Yes, where a large number of men are employed.

36. You know that this furnace is allowed to die out ?—It is banked up.

37. At the week-ends it is rekindled ?—My attention has never been drawn to it by any person.

38. Do you think that furnace ought to be kept going all the time ?—Well, all the men must be supplied with air. When we were there there was more air going down than is required by the Act.

39. But is there not danger of an explosion in a mine giving off gases ?—Yes, but it is a magnificent furnace.

40. *The Chairman.*] Would you recommend that a provision be inserted in the Act that it be left in the hands of the Inspector to say whether any particular system of ventilation ought to be kept going ? At present under the Act you have no control over that. Do you consider you have sufficient power to compel the management to run a fan the whole twenty-four hours ?—I think a special rule to that effect would be better.

41. *Mr. Dowgray.*] When I visited that furnace I came into contact with a cloth fire-notice about 10 yards back from the furnace ?—That is a proper thing.

42. Is the fire not a naked light?—But if that notice were not there the men would walk right into the body of the workings with naked lights.

43. How does the extent of the workings during the last twelve months compare with the previous period?—I am surprised to find it going on. It is like a lame duck, as it were. It is just to save property. The main drive may be required some day.

44. But the workings have extended since two years ago?—Yes, I believe the management did not expect to get the coal which they found in No. 7 dip, but they are on pillars, which will not last very long.

45. I would like to ask you if two years ago—on the 16th October, 1909—in your annual report to the Department you stated that the furnace was inadequate and incapable of overcoming the increased drag, and that the company purposed putting in a fan?—That was the outcome of a conversation with the general manager. Mr. Lee is a very active-minded man. I could give you a hundred dates when we discussed all manner of things—for instance, there was the suggestion that the Castle Hill and Kaitangata Mines should be connected.

46. But in your report to the Department you say that the furnace was incapable of overcoming the increased drag, and that it was proposed to install a fan. Now you admit the air has increased and the drag must be greater, but still the fan has not been installed?—Yes; but it would be like putting new leather on an old boot. There are many men here who are anxious to work in that mine, and if you tried to force the company to put in a fan the mine would be stopped to-morrow.

47. Do you know that subsections (20) to (25) of section 40 are not carried out in these mines, especially those referring to special exits. Take, for instance, the furnace shaft: the Act requires that a test shall be made every three months with twice the weight of the ordinary load, and the chain is not to be a single-linked chain?—But this is not a shaft for raising persons.

48. It is a place where the men are lowered or raised—it is a place of escape?—Is the latter part of that subsection complied with, which requires a representative of the miners to be there at the tests?

49. I asked that question, and the workmen say "No"?—If you take the engineer's report-book you will find that the apparatus is examined and reported on.

50. *The Chairman.*] Have you seen it?—Yes, I see and note the entries.

51. And as to the other parts of the mine—the ordinary working-places—you see them and satisfy yourself that they are tested properly?—Yes. This mine is heavily staffed with engineers and officials, who are required to report in books regularly kept for the purpose.

52. *Mr. Dowgray.*] You say you disapproved of that apparatus. I ask you if, on the occasion of the trial to which you referred, you did not say you wanted a meeting of the men held to approve of it?—I did. I wanted their opinion; but I have not received it to this day.

53. Yet you said you disapproved it?—I said I did not like it.

54. *The Chairman.*] Would you suggest that these sections of the Act should be made applicable to emergency outlets of that kind?—Yes, for this reason: that if that were done it would be giving protection for all. The mine-owner would then know what he had to face. Under the Act as it stands, if a new shaft is about to be opened the Inspector has no say in the matter.

55. Would you consider it reasonable that, before the management of a property decided on a new scheme such as this present shaft, a plan of it should be submitted to you for approval?—I think that would be a good idea; but it should go to some one in authority—say, to the Minister, not necessarily to the Inspector.

56. *Mr. Dowgray.*] But the company knows what they have to face?—Well, that is debatable, according to the Chairman. If a man is going to construct a dam on a goldfield, the plans have to be forwarded to Wellington for approval. Similarly, it would be a great advantage if the plans of mine-shafts were also submitted.

57. And also as to proposed methods of ventilation, and so on?—Yes.

58. You said that no up-to-date mine would install a furnace?—Not in our mines.

59. There is nothing to prevent them doing so?—Not at the present time; but there are several mines where furnaces have gone out and fans have been put in.

60. Would you suggest that furnaces should be prohibited in gassy mines?—Well, that would come under what we have just been discussing—the submission of plans to the Department.

61. Can a man judge a bad roof when the stone is in a very large body? You said you preferred the stone to the coal?—Yes, a good hard stone I prefer to any coal.

62. The stone would perhaps seem hard, and yet be bad if it were in a large body?—I said that the mine has been working for so many years that the men have become skilled in the examination of the roof.

63. But you said the present method of extracting pillars has been employed for only a year or two?—Yes; but the old mine had been closed for twenty or twenty-five years, and we went in four or five years ago, and the roof was as hard as possible, though it had been standing all that time.

64. Is it not the duty of the deputy to pass the men in?—Yes.

65. And is it not the men's duty to examine the roof also?—Yes.

66. Well, how is a man going to examine the roof so high after he has filled a great deal of that coal away?—They have long rods and ladders.

67. *The Chairman.*] What is your opinion of the suggestion of the use of the electric torch?—It is a very good suggestion.

68. *Mr. Dowgray.*] Is there any great danger in a man reaching up with a pole to examine the roof?—Of course, there is danger in all walks of life.

69. Is it satisfactory?—Yes, it has proved so.

70. You heard Mr. Crow say that in less than ten minutes after we left his place yesterday the whole place collapsed?—Yes. Was that the witness who said Mr. McAlister had said it was as safe as a rock?

71. Yes?—Well, I suggest Mr. McAlister should be examined on that point. While I am here there are one or two matters I would like to mention. They may be considered trifling, but I think them important. There is a large amount of public attention drawn to this mine from time to time. Of course, this mine is liable to an accumulation of gases, the most dangerous being white damp. We have found small percentages present from time to time. With a view to examining this mine for gas, during the last two years I have cultivated white mice for testing the air, and yet I find in travelling in the mine that there are mice actually living there without having been introduced. That shows that there cannot be so much foul air there. A mouse will die in air where a man could work. That is one point in regard to the conditions in the mine. Not that we are going to relax our attention, but it shows that care is paid to the matter of ventilation, which is proved by the fact that these little animals can live there.

DUNEDIN COURTHOUSE.—29TH SEPTEMBER, 1911.

WILLIAM HOLLOWS sworn and examined. (No. 33.)

1. *The Chairman.*] What are you?—A coal-miner.

2. With how many years' experience?—Twenty-nine years.

3. Where?—In the Denniston Mine at Westport, in the Brunnerton Mine at Greymouth, and at Shag Point and Allandale in Otago.

4. Where are you working at present?—In Christie's No. 2 Mine.

5. Do you hold any position in the mine?—No.

6. Do you hold any office in the union?—I am secretary of the Green Island branch of the union.

7. What matters do you wish to bring before the Commission?—I wish to speak on ventilation and the causes of accidents.

8. What have you to say as to ventilation?—I may say at the outset that in nearly all the matters which I shall bring forward as requiring amendment in the Act I have been appointed to do so on behalf of the union, as representing the miners generally at Green Island.

9. How many miners are there in your union?—From seventy to eighty.

10. Have you discussed these matters with the members?—Yes, with the members and the executive.

11. And the points upon which you will speak have been unanimously agreed upon by the union?—Yes.

12. Then let us have your statement?—We consider, first of all, that fans should constantly be kept going whilst the men are on shift.

13. That is in cases where the ventilation is provided by a fan, or do you mean that fans should be always employed?—We advocate that fans should be always employed as against furnaces.

14. But as against natural ventilation?—The fan is the better method of ventilating mines. With them there is less danger from fire.

15. And you consider that the system of ventilation, whatever it is, should be kept constantly going?—Yes, at least while the men are working.

16. And when the men are off shift?—It would certainly be better if the fans were constantly kept going to keep the mine clear of impurities. We consider that the fan should be started from two to four hours at least before the shift goes on. That is, in the event of the fan being stopped when the day's work is done, it should be started from two to four hours before the men proceed to work again, to clear the faces. We advocate also that all airways should be at least 5 ft. or 6 ft. in width and height. We consider that the method of ventilation should be strong enough with a low velocity to prevent gob fires in mines. We are of opinion also that the air should be taken direct to the return. In one of the mines in this district they have an oil-pump, the fumes from which mix with the air going in and travel round the working-places, and we think that those fumes should be taken direct to the return. In cases of fires double stoppings should be put in where the fires are close to where the men are working. These stoppings should be built of brick, and packed in with sand and clay. The idea is to keep the fumes from mixing with the air which the men have to breathe. In some instances this has been done, but formerly they put up bags and boards, with the result that there was a certain amount of leakage. These matters are not always attended to as they should be. The next point I have to mention is a very important one: it is that we consider that the air should sweep round the faces where the men are working. The Act should be amended to state definitely that the prescribed quantity of air should be supplied to the men where they are working. At the present time the Act is very vague on the point.

17. Do you want the whole of the air to pass through the whole of the workings?—There should be sufficient air to allow the men to work comfortably. What we want is a proper volume of air.

18. But that is not my question. Do you consider that the air should travel right round the whole of the places, or that there should be splits?—Yes, certainly, there should be different splits to serve different districts. With regard to the ventilation question, we advocate surprise visits by the Inspector. I may say that the miners at Green Island are under the impression that the management knows in every instance when the Inspector is coming, though they are not prepared to prove it. We think it would be better for the health of the miners if these visits were made by surprise, and also if the check inspectors were able to make surprise visits. We think it would tend to make a manager who is lax in his duties more attentive. We consider also that copies of the check inspectors' reports should be sent to the Department and not to the manager.

19. Do you mean to the Mines Department or to the Inspector?—To the Inspector and not to the manager.

20. Why not to both ?—Our reason is that if the management is not aware of the nature of the report sent in by the check inspectors it would have a tendency to make him look after the conditions of the mine better than if he saw the report if it stated that matters were all right. He would not know what is coming. With the assistance of the Government Inspector the management knows when his mine is going to be examined. It seems that the inspection is too open at the present time. We also advocate an amendment in subsection (4) of section 40 of the Coal-mines Act, dealing with manholes on horse-roads. At the present time, unless there is an output of over 10 tons an hour along these roads, no manholes are necessary. In the Green Island district there is a very great danger on horse-roads on an incline. The horse pulls the boxes up the incline, and the boxes are let go. They sprag them in some instances. If a man were on the roadway he would be in danger. We consider that this subsection of the Act should apply to roads where less than 10 tons an hour are put out, and manholes should be put in every 20 yards.

21. Do I understand you to say that these manholes should be put in the horse-roads or in the part of the mine where the trucks are let go ?—Well, there are dangers even in the horse-roads. A man may not have any way of escape when a horse may come along full gallop. I desire also to make reference to the matter of the supply of timber to the miners. We consider that the timber—cap-pieces, and so on—should be brought within 6 ft. of where it is to be put up. At present the management contends, according to the award, that it is sufficient if the timber is delivered to the lay-by. My reason for suggesting this is that it would prevent accidents. It is impossible sometimes for the men to push the boxes with the timber on them.

22. That is a provision in the award. Is there a provision in the Act which deals with the matter ?—Yes.

23. Where ?—Special Rule 11 deals with it. It says that there shall be a sufficient quantity of timber supplied to the workmen. We have no doubt on the point, but it has been a bone of contention between the management and the men.

24. You think the Act should be amended in the direction you suggest ?—Yes, the timber should be delivered to within 6 ft. of where it is to be put up: that would make it clear. We also advocate that ambulance appliances should be provided at every mine for use in case of accident. Also that the miners should travel the escape-roads at least once a week to become acquainted with them. At the present time some miners do not know where the escape or the return is. I think there should be some way of compelling them to become aware of the escape-roads.

25. You want to make it compulsory upon the miners ?—Upon the part of the company to see that the miners do travel these escape-roads.

26. There is nothing to prevent the men from doing so now. Would that not be a provision to apply to the miners—that they should be compelled to do so ?—Well, for their own safety they should be compelled to do so.

27. But your suggestion is that there should be an obligation placed upon the management to compel the men to travel these roads. Why not make the amendment so as to compel the men themselves to do it ?—I would have no objection to that. The difficulty would be that if it was left to them they would not go. I think the obligation should be placed upon the management to say to the men one day every week, "You must travel the escape to-night." It should be the duty of the management to direct it to be done. I wish also to say a few words in regard to the accident record at Green Island. Although the percentage has been low, still the risks in pillaring are tremendous. No doubt the Commission knows the conditions of such work and the effect it has upon the nerves of the men. We think that there should be better supervision with a view to the prevention of accidents in this class of work. The tonnage-rate system is responsible for more risk being taken by the men than there should be. The miners are working at so-much per ton or per box, and they try to get out as much as possible to enable them to earn a living, with the result that the work is rushed a great deal. They do not know when there is going to be an idle day, and I think that the tonnage-rate system should be abolished.

28. That is not a matter of supervision, is it ? I understood you to mean that greater supervision should be exercised over the workmen ?—What I mean is that the miners should exercise more care in timbering. Under the present system there is a rush to get the boxes filled, with the result that they neglect timbering which is necessary. We advocate also that there should always be two men working together in pillaring. We do not consider it right that one man should be allowed to do such work by himself. There should be a system introduced to reduce the noise at present made in pillaring and head-coal work. There may be a crowd of men put on to fill the fallen coal, and with the noise that goes on when such men are working together the men cannot hear a warning. We consider that two men are ample to work in one place if it is to be done safely. Where coaldust accumulates in a mine we advocate that it should be removed. I do not know whether there is a provision in the Act to deal with this matter, but it is not attended to in the mines in the Green Island district. We are of opinion that cut-throughs should be put in at least every 60 ft. In regard to the matter of ventilation, we consider that where the miners are working in bords running from heading to heading, even 60 ft. at times is too far for the ventilation to sweep the face all the time. It is necessary to put brattice in.

29. What distance is there between stentons on your field ?—The distance varies; it is sometimes 20 yards and sometimes 10 yards.

30. But that is within the maximum you suggest ?—Yes, of course, it is in some cases; but my idea is to try to get the Act amended so that it should be made imperative.

31. You think a uniform standard distance should be specified in the Act. Supposing you had a really bad place, which required the stentons to be put through at shorter distances, would there not be a danger of the manager sticking to the standard to the detriment of the place ?—That is so; but my idea in specifying the distance is that bratticing is only a temporary method of ventilation. If they were continually carrying on bratticing there would always be a certain amount of leakage, and if that went on for a great distance the air would get worse. There should be a stipulated distance for cut-throughs.

32. Have you had any experience of the dangers arising from shot-firing ?—Yes, that is a matter I overlooked. We consider that proper appliances should be supplied to the miners, and also tamping. I do not know whether there is provision in the Act for that, but there ought to be. A miner may use tamping which is not fit for use. In pillaring it is different, because you can always get an ample supply from the fall.

33. You do not fire a great many shots in coal-mining: what is the most you fire at a time ?—Three is about the maximum, but generally only one is fired.

34. And as to misfires ?—If we have a misfire we are withdrawn, and we do not go back.

35. How long is it before you go back ?—Four hours generally.

36. What is a safe time ?—Not to go back that shift.

37. Nothing less than that ?—I should say, four hours.

38. *Mr. Dowgray.*] You stated that the fan should be kept going when the men are at work: is that not the custom in Green Island ?—The custom in the mine where I am working is for the fan to be kept going while the men are on day shift, but when night shifts are at work the fan has been stopped. I have heard of instances where the fan has not been going for half a day's work.

39. What is the present custom in regard to starting the fan in the morning: when does it start ?—A quarter or half an hour, or sometimes an hour, before the men.

40. Do you feel any bad effects as a result of the fan not being always kept going ?—Yes, sometimes.

41. You recommend that where fans are in use they should be kept going all the time ?—Yes.

42. You suggested that the airways should be at least 5 ft. by 6 ft.: what is the custom now ?—In some places they are 5 ft. by 6 ft., but in many cases they are only 2 ft. or 3 ft. square, and in those places you have to crawl.

43. You stated, in reply to the Chairman, that in your opinion the air should sweep round the working-faces: do you understand that the Act lays down a minimum of 150 cubic feet per man per minute, and more if necessary ?—Yes.

44. Are we to understand that there is not 150 ft. of air provided at the working-faces ?—I am certain of it in some instances.

45. *The Chairman.*] Have you seen any air-measurements taken ?—No.

46. *Mr. Dowgray.*] Are we to understand that the 150 ft. is not circulating round the faces, as required by the Act ?—No. I read the Act that way, but some are of opinion that so long as the required quantity of air is running through the mine it is sufficient. The Act should be amended to make it clear.

47. You also suggested that subsection (4) of section 40 should be altered so as to include manholes on horse-roads ?—Yes, they are generally, but there is less danger there, because in a drive, for instance, there is room for a box to pass.

48. It would be sufficient for the 10-tons-an-hour limit to be struck out ?—Yes, that would meet the case.

49. And "20 yards" should be substituted for "100 yards" ?—Yes.

50. You told us that the custom here is to deliver timber at the lay-by and not at the working-places ?—Yes.

51. According to my reading of Special Rule 2 it is quite clear that the timber should be delivered at the men's places ?—Yes, I think so, too. But the Mines Department does not agree; they consider that it is subject to the provision of the award. Previous to this award it was the custom for the company to do all the timbering, but we contend that the Coal-mines Act overrides all awards.

52. *The Chairman.*] What does the award say ?—That "the company shall cut all timber to the lengths required by the miners, and deliver the same to the miners." That is the reading of the award.

53. *Mr. Dowgray.*] I noticed that in one mine we visited yesterday the trucking-road is very low: is that not a source of danger to the men when retreating out of it ?—Yes, certainly, it is one of the most dangerous positions that a man can be placed in to have the boxes in behind him, and no way to retreat either at the side or over the top. He is depending upon his strength to be able to push the boxes out of the way. I contend that the road should be wide enough to enable a man to get past a box. They are practically blocked in.

54. Would you suggest a height for trucking-roads ?—Yes, 5 ft. or 6 ft.

55. You stated that there was a feeling abroad amongst the miners that the management always knows when the Inspector is going to visit the mine. Can you give us any reason why you think that ?—I cannot give you any proof, but that is the common talk.

56. *The Chairman.*] Do you know personally when he is coming ?—No, but we can surmise. As far as the miners at Green Island are concerned, the Inspector of Mines is the last person with whom they would lodge a complaint. They are under the impression that they cannot rely upon the secrecy of correspondence with him. That is why I advocate surprise visits. We want more visits, and if it is too much for the Inspector to do more Inspectors should be appointed, and they should have greater powers.

57. You consider that the Inspectors should have increased powers ?—Yes.

58. In which direction ?—They should have the power to enter a mine at any time, and the check inspectors should have that power also. At present they can only go into the mine once a month, and we consider they should be allowed to go down whenever they think there is any laxity on the part of the management or any danger. This applies to the check inspectors and the Government Inspectors.

59. *Mr. Dowgray.*] But the Government Inspector has the power to enter a mine at any time, has he not ?—No, not in my opinion.

60. You are in favour of the workmen's inspectors having more access to the mines ?—Yes, to prevent accident, and to see to the ventilation.

61. Do you suggest that a monthly inspection is not enough ?—Yes.

62. When the Inspectors go to visit these mines, is there a lot of preparation made for them ?—That is the assumption of the men. They talk amongst themselves and say to one another, "The Inspector will be here to-day."

63. Then, even though his arrival is expected, it has the effect of improving the conditions ?—Yes. But there would be more satisfaction if the visits were surprise visits; it would be better for both manager and the men.

64. What is your opinion on the subject of men being required to have a certain amount of experience in coal-mines before being placed in charge of a face ?—I consider that they should undergo an apprenticeship, that they should have two years' experience underground, and serve some time at the face.

65. Do you think that would help to reduce the number of accidents ?—I am sure of it.

66. *Mr. Cochrane.*] You said that manholes should be provided every 20 yards ?—Yes.

67. Do I understand that to refer to incline places, where the horses draw up the empties and the full ones run down ?—More so there, but also on level roads, because a horse running at full gallop would be a danger.

68. Then, as to the guiding of the air round the faces, is your suggestion that the whole of the air-current coming into the mine should be taken round, or would you specify that the air from one split should supply one section ?—Yes, there should be splits. What I meant was that the whole of the air travelling in the vicinity should circulate in the places.

69. Without undue leakage ?—Yes, certainly, the air should sweep those faces and not pass them.

70. *Mr. Reed.*] As regards your statement that the fans do not run at night, will you tell us how many men work on a night shift in the mine ?—Two or three.

71. So that you only want sufficient air for two or three men on the night shift ?—Certainly.

72. Is the natural ventilation not good enough for that ?—No, not in all cases.

73. But it only requires 300 ft. per minute for two men: is it not good enough for that ?—Not in some mines, because, with the gases given off from pillaring and the firedamp arising from falls, the natural ventilation is not sufficient.

74. Tell me which mine has not 300 ft. of air by natural ventilation ?—I am not going to argue that point; but the air is mixed with the gases, and the miners are inhaling a certain proportion of those gases.

75. Then you would compel the company to run the fan all night for two men ?—Certainly, for two men or twenty.

76. And you do not regard natural ventilation of any value whatever ?—It may be where there are no gases given off.

77. In which mines are these gases given off in these large proportions ?—In all the mines I have been working in.

78. You advocate that double stoppings should be built with brick: do you mean that to apply to temporary stopping ?—To all stoppings where there are fires.

79. You refer only to fire-stopping ?—Yes.

80. As regards manholes, you made a recommendation that the Act should be amended to require these being cut every 20 yards on horse-roads: do you mean that to be done regardless of the width of the horse-road ? Supposing the horse-road is 12 ft. wide, would you have a manhole there ?—No, only where there is not sufficient room on each side for a man to get out of the way. If you have sufficient width you do not need them.

81. As regards ambulance appliances, are they not provided in these mines ?—I have never seen any.

82. Not in the office ?—I have never seen any.

83. You recommended that the miners should travel the escape every week. In whose time ?—In their own time if they are pieceworkers, but, if they are not, in the company's time.

84. You advocated the removal of coaldust: would it not be a great expense to shovel this dust up always ?—Not necessarily to shovel the dust up. I think it would be sufficient to flood it with water from a tank on roads where men are travelling. It might be done once a week.

85. Would that wet ground not be a matter for complaint ?—It would not be very wet if just sufficient water were used to lay the dust.

86. Is it not the safer precaution to keep your pillars large in the first operation ?—Yes.

87. You have advocated that they should be cut up by stentons every 10 yards: that is spoiling them, is it not ?—That is so. When I said 10 yards I may have underestimated it a little; but usually they are more than 10 yards, and there is not the ventilation. There is also always a certain amount of leakage.

88. *The Chairman.*] In the north it has been recommended to the Commission that the pillars should be made larger, but you are proposing the opposite: is that not dangerous ?—Not necessarily. The pillar one way could be kept a fair size.

89. *Mr. Reed.*] What regulates the dimensions of the pillar: is it not the superincumbent pressure of rock upon them ?—Certainly, you must keep them strong enough; but if you have stentons every 10 yards there would be quite sufficient support, providing your pillars the other way were 8 yards instead of 4 yards as at present.

90. At the Green Island Mine, you say, you cannot get adequate ventilation with brattice longer than 10 yards ?—I did not say that; but the stentons should go through to prevent any leakage in the brattice.

91. You say you read this section 40 of the regulations to mean that 150 ft. of air should circulate round the faces. How do you arrive at that theory: the Act does not say that ?—There should be sufficient air to allow the men to work in comfort, and not permit them to be choked.

92. But in a non-inflammable mine would you regard 150 ft. of air as necessary to keep a man comfortable when working?—I am not going to assume anything of the kind.

93. Just so; but why do you think 150 ft. should be there?—I am only saying that the Act requires it.

94. The Act states that as a minimum, and says further that, "Provided that where the Inspector is satisfied that such rate is insufficient to provide adequate ventilation, he may from time to time require the rate to be increased"?—That is so.

95. Then the law provides that to protect you. The Inspector can make the management give you more air under that section?—Yes, that is so.

96. Now, as regards Special Rule 11 and delivery of timber, does not that read such "working-place," and not "working-face"?—Yes.

97. Now, do you contract to deliver their coal at the lay-by?—Yes; but we do not contract to put timber up in the lay-by. That is in a working-place.

98. You contract to work 4 chains?—Yes.

99. Your working-place is 4 chains long?—You say so; but I contend that the working-place is at the face, where you get your coal.

100. Do you truck for distances of 4 chains?—We truck in distances.

101. Is your contract for 4 chains?—Yes.

102. Is one end of your contract the lay-by: you contract to truck from the lay-by to the face?—You have to put the coal there.

103. You are working from the lay-by to the face, and the regulation states that the timber shall be delivered to the working-places. It is delivered at the lay-by, is it not?—Yes, that is so.

104. Consequently the lay-by must be part of your working-place?—No. Assuming that a man is trucking his coal 4 chains on a heavy grade, it takes him all his time to push his truck. How is it possible, then, for him to wheel that timber into the face? The Act should be made clear to show that the timber must be delivered at the face.

105. Do you suggest that the inspection is lax in not insisting upon this timber being delivered to the face?—Yes. If that is not done, and the men are required to take in their timber, they will simply neglect to bother with it, and that would lead to accident. That is the reason why we bring the matter up.

106. Does the management assist with the timber?—Yes, in some cases; but the miner is usually left to struggle with it, or he has to get some one to assist him.

107. Has this question been brought before the Arbitration Court?—Yes; and the whole of the recommendations made by the employers before the Court were accepted by the Judge.

108. *The Chairman.*] You say that this word "working-place" should be more definitely defined?—Yes.

109. Because it is injurious to the men to truck up heavy roads?—Yes.

110. *Mr. Dowgray.*] Were you speaking of No. 2 Christie's Mine when you said that two men were working on the night shift? Is there a fan there?—No.

111. Are there not fires in that mine?—Yes.

112. When the fan is stopped, how does it affect the smoke in the mine?—It would almost chase you out of the mine. You are able to walk in; but it is a difficult matter to work in that atmosphere. The ventilation is certainly not sufficient for men to work arduously there.

113. *The Chairman.*] What work do the two men on the night shift have to do?—Sometimes pillaring and sometimes repairing.

114. So that they may have to travel the whole of the mine in the night?—Yes.

115. *Mr. Dowgray.*] Have you any sanitary arrangements in the mine?—No.

116. What do the men do?—They just go into the return or into the waste part of the mine.

117. *Mr. Molineaux.*] Can you tell me how long it is since the night shift has worked in the Christie's No. 2 Mine?—It is some time.

118. This year?—I cannot exactly tell you; but it is some time back.

119. So that really there is not much hardship if the fan is stopped at night—it is only on odd occasions that it is required?—When the night shift is working the fan should be going. I am not alluding to any particular mine. As a matter of fact, all the mines in the district at times have worked at night without the fan working.

ALEXANDER LOVE sworn and examined. (No. 34.)

1. *The Chairman.*] What are you?—A coal-miner.

2. With how many years' experience?—I have had betwixt thirty-eight and thirty-nine years' experience—principally in the Green Island district.

3. Have you any position in the mine?—No, not at the present time.

4. Have you ever held any office?—Yes, at different times.

5. What office?—Deputy. I have also had mines of my own at times.

6. Do you hold any office in the union?—I am president of the Green Island Branch of the union.

7. And do you speak with the concurrence of the union?—Yes. I think Mr. Hollows has given you a good idea of the matters the union wished to have laid before the Commission.

8. In the first place, do you corroborate generally what he has had to say?—Yes. I wish also to say that in driving bords in solid work they should not be higher than 7 ft. or 8 ft.; and for safety in the extraction of pillars no head coal should be taken down until pillars are extracted. My reason for that is that several of the mines in our district have changed hands, and the companies which held the properties first robbed the mines by taking down the head coal up to 17 ft. or 18 ft., and it is

impossible to timber those bords. Therefore there is great risk in working these pillars, and we advocate that in the solid the work should be carried on by that method—with lower bords, say 7 ft. or 8 ft. high. Then, as to brushing, we find some complaint as to the width of the places; for instance, there are some places where the men are extracting pillars which are only 5 ft. or 6 ft. wide. If an inrush of debris happened they have to rush and push the box away as quickly as they can. I would advocate that the brushing in all working-places and also in trucking-roads should be brushed up to a height of say 6 ft. or 7 ft. I must also say we would like to see higher props; at present they are only about 8 ft. There should be longer temporary props supplied and kept in the workings. Then there is the matter of the drawing of the props. There was an accident which happened in connection with that class of work. The shift before had advised the man to draw a prop and set it up behind; whether he did so or not we have no evidence to prove, but we contend there should be a deputy with these men on the night shift. There were none up till the time this accident occurred. Then, in regard to check inspectors. We can only make an inspection once a month, and we cannot go down to inquire into complaints when they are received. Supposing there is something complained of in regard to pillar-working: a pillar might only last a few days, and if we can only go down once a month our chance of seeing the conditions complained of is gone. Then I would advocate that inquiries into accidents should be held before a Magistrate, a mine-manager, and a representative of the union.

9. That is so now?—But I think it says it is to be before a J.P. Then, with regard to bigger pillars, I do not think they would be suitable in our district, for under our award we work bords 12 ft. wide, and a pillar 8 or 10 yards would be too great to carry. We have only a bit of fireclay and stone, and there is no substance in that. I think that pillars anything from 4 to 6 yards is quite sufficient in our district. Then we have trouble about the delivery of the props. The provision is misconstrued to mean that the miner has to take his own prop from the lay-by. For myself I think, according to the Act, it should be the miner's working-place, because if there were twenty or thirty miners going into a lay-by the question arises as to whose place it is. I might also state that it is very difficult for the men to unload such timber as 10 ft. blue-gum props, with two empty boxes in the lay-by and meeting the full boxes coming down. In our mine the deputy usually helps the men to unload, but when he is not there it is very hard on the miner to do it himself.

10. Do you say that the present custom is responsible for the miners neglecting timbering?—Yes, that is the case in our mine.

11. *Mr. Dowgray.*] Have you ever had any difficulty in connection with the run of the strata in these pillars?—Yes.

12. Have there been any accidents in the mine as the result of that?—Yes, some slight accidents; and I think we escape many more serious ones simply by good luck. I think the brushing I have suggested would improve matters. I think Mr. Christie made the statement yesterday that the coal was 30 ft. thick in one place. Fancy a mine like that having only one outlet! The air is naturally very stagnant.

13. As regards sanitary arrangements, are there no pans or anything provided?—No, there is nothing that I know of, except that lately a place has been erected outside our colliery.

14. *Mr. Reed.*] You recommend that pillars should be from 4 to 6 yards: under what pressure would you have these—at what depth from the surface would you have pillars with these dimensions?—From 20 ft. up to 100 ft. We are working practically in outcrops. If you go beyond 100 ft. you would want your pillars a foot or two extra.

15. Would you have that applied generally, or are you speaking only of your mine?—I am speaking of the mines in our district.

16. How many accidents have there been in pillar-work at Green Island during the last forty years—ever since pillar-work was started in the district?—Well, I think that is a big question to answer. I cannot say. There was one man buried in Christie's No. 2 Mine; he was got out alive, but he has not recovered his health: it is the result of the dangerous work. There are a number of small accidents where men have been off work two or three months, but I think to get a full list you would have to go to the insurance company.

17. How long have you been mining?—I started at eleven and I am nearly fifty now, so that makes it nearly thirty-nine years.

18. And you can remember only one fatal accident as the result of pillar-extraction?—Well, it is only during the last few years that pillar-extraction has come into force.

19. Is that not a good record?—I have not said there was only one accident. I have not been here all the time—I have been at Kaitangata and up the country.

20. If there has been only one recorded in that time, is it not a good record?—It is sheer luck that there are not more. I think the management and men are very lucky to escape the accidents.

21. With regard to the delivery of timber, is it not a fact that the present management has been settled by the Arbitration Court, and that under it the company pays for the removal of the timber from the lay-by?—Not that I am aware.

22. Was not the tonnage rate raised to cover it?—No; the only thing we have to go by is our award.

23. Was not the tonnage rate raised by the Arbitration Court to cover this?—No; I say not. The miners applied to the Arbitration Court for a rise in wages on account of the increased cost of living, and they were granted a rise of 1d. per box on round coal. The timbering was done by the company before that, and it has since been placed on us.

24. Would you be surprised to hear that such an arrangement exists?—Yes, I would be surprised to hear that. The reason for bringing this matter forward is because some of the men have been cautioned.

RICHARD GREEN sworn and examined. (No. 35.)

1. *The Chairman.*] What are you?—General manager of Freeman's Coal Company.

2. Do you hold any certificate?—Yes, an underviewer's certificate. I am also part-owner of the mine.

3. How many years' mining experience have you had?—About thirty-two.

4. Where?—In our own mine here.

5. What matters do you wish to bring before the Commission?—Well, I wish to contradict some of the evidence that has been given, and to explain other matters. It has been stated that fans should be kept going continuously. That might be all right in gaseous mines, but I do not think it at all necessary in our mine. It was also stated that the oil-engine was at work and that the smoke from it went round the working-faces. That is not so—the exhaust from that engine goes direct into the return.

6. Assuming that to be so on general principles, do you think it ought to go into the return airway?—Yes, that is the proper place for it. Then there is the matter of the double stoppings. If the management cannot tell what is required, I ask, how do the men know? There are the local conditions to be taken into consideration, and no one knows better than the management what is required, and he makes his plans accordingly. He has the safety of the men and mine to look after, and he can be trusted to do the best, I think. It was also stated by one witness that the visit of the Inspector of Mines was a prearranged affair.

7. He did not say that: he said it was known, he thought?—I wish to deny that. It is not known to me, as part-owner of our mine, when the Inspector is about to visit our mine. As to the check inspectors, they want more powers and various other things. They want their powers increased so as to be able to inspect the mine at any time. That is intended to make trouble in the matter of rates: it is not for the safety of the men at all that they want this power. It is well known what they are after. The safety of the men is well looked after by men much more competent than they are. They also wish the check inspectors' reports to go to the Department and not to the manager. Why not to the manager? If there is anything wrong about the mine there is no man who wants to know it quicker than the manager.

8. The suggestion was that it should go to both—so that the Department as well as the mine-manager should see it?—Well, that would be better than going to the Department direct, be ause the manager wants to know, and to hide it from him is ridiculous. Then there is the matter of timber, which is a sore question with the miners at the present time, for this reason: that at the last sitting of the Arbitration Court, held about three years ago, it was pointed out by the owners why it was reasonable to ask the men to take in the timber. That matter was thoroughly threshed out then, and the rates were increased to cover it. As regards ambulance-kits, we have them kept at our mine. Then they want the tonnage-rate system abolished. Of course, I might be going outside the scope of the Commission in doing so, but I want to say that there is an agitation on foot to do away with the contract system and introduce a weekly-wage system, and this is an attempt to bring it along.

9. But we have had the suggestion made to us elsewhere that the contract system makes the men rush their work more?—But that suggestion is only a means to an end.

10. But we are considering whether we will take it into account in connection with the matter of accidents?—Very well. Then, one witness wanted the noise reduced in the mine. How are you going to fill coal without making a certain amount of noise?

11. He only said there should not be half a dozen men working in one place?—That would mean that you would get out only one-twentieth of the coal you get at the present time.

12. Supposing you had a fall and there were half a dozen men there working?—If there were any danger the manager would be there, you may take that from me. One witness wanted the coaldust removed. That is an utter impossibility—that is, if men are going to travel in and out. To remove the coaldust simply means that the mine would have to be shut down. Then, as to pillars being from 8 ft. to 10 ft., I would point out that if you are in ground that has heavy clay on top, the smaller your pillars the greater the crush. The manager regulates the size of the pillars. He must find out the most suitable size for the ground he is in. As regards the timber, I may mention that there is no timber at all being pushed uphill in our mine, and if it is heavy work the men are always helped. I think these are the main points I wish to deal with.

13. *Mr. Reed.*] As regards running the fan, how many men work on the night shift?—Never more than two.

14. Is there any natural ventilation in your mine?—Yes.

15. Have you measured it?—Yes; there was 18,000 cubic feet prior to the erection of the fan.

16. That would be about 9,000 ft. per man per minute?—Yes.

17. Does that natural ventilation go round the faces?—Yes, right round.

18. Would you regard a complaint that the air is inadequate as reasonable?—There might be one or two places in the mine where there might be reason for complaint—supposing, for instance, you were extracting pillars and there was a fire smouldering not far away. There would then be grounds for complaint, but under ordinary circumstances there is absolutely none.

19. Have you ambulance appliances at your mine?—Yes.

20. Where do you keep them?—In the office.

21. What do they consist of?—An ambulance-kit and the necessary bandages, splints, and stretcher.

22. How long have you had them there?—For twenty or thirty years. The present kit has been there four or five years.

23. Do the men know they are there?—Yes, I should think so.

24. Have they ever been used?—Only on one occasion, as far as I can remember.

25. On how many occasions has it been necessary to use them ?—They have been used on every occasion when they have been required.

26. You have not had many accidents to require to use them ?—No, not sufficiently serious to require them.

27. Is the coaldust in your mine explosive.—No.

28. Is there any firedamp in your mine ?—No.

29. Do you know the reason why the coaldust is removed from mines in other countries ?—Because it is inflammable.

30. Those conditions do not occur with you ?—No.

31. Now, as regards the noise in pillar-extraction, do you understand anything about the longwall system of working ?—I understand the system, but I have never had experience with it.

32. With it there may be fifty men working where you have only one ?—Yes.

33. What sort of noise would that number of men make ?—It would be very great.

34. Under your system how many men are working in close proximity to one another ?—Well, at most, perhaps four.

35. What is the difference in danger between the longwall and pillar systems ? Are you aware that most of the collieries in Great Britain are worked on the longwall principle ?—Yes.

36. There are a great number of men there working in sight of one another ?—Yes, hundreds.

37. Are you aware that the death-rate from accident there is very low indeed ?—I am not acquainted with what it is.

38. As regards brattice and stentons, one witness said he would like to see stentons put through every 10 yards : would you regard 20 yards too long for brattice ?—I would say it is not too long.

39. If the brattice is well erected would you be afraid of it leaking ?—It depends upon the nature of the brattice, of course ; some would leak more than others, but there should be little or no leakage if it is proper brattice.

40. Given proper brattice it would be all right to hav it 20 yards ?—Yes.

41. Have you had any difficulty in interpreting the Coal-mines Act in regard to adequate ventilation ?—Well, that would come more under the notice of the manager. I have not been in charge of the mine underground. It would probably be that he would discuss the question with the Inspector.

42. Is the inspection pretty regular in your district ?—Yes, fairly regular.

43. Does the Inspector notify you of any defects ?—Yes.

44. Frequently ?—Well, we think it is frequently enough, at any rate.

45. You consider the inspection adequate in the interests of human life ?—Yes.

46. As is proved by the absence of fatalities ?—Yes.

47. *Mr. Dowgray.*] Is your certificate one of competency or service ?—Service.

48. And you have a first-class certificated mine-manager in charge of your mine ?—Yes.

49. You stated that prior to the erection of the fan there was 18,000 ft. of air passing into the mine by natural ventilation ?—Yes.

50. Is your fan shaft not your second outlet or return ?—Yes.

51. When the fan stands is that return airway not blocked up ?—No, we open the damper.

52. You open the door ?—No, the damper in the shaft—a big iron plate, 6 by 4.

53. Does that give a direct opening to the surface ?—Yes ; the chimneys are 12 ft. above the fan altogether.

54. You stated that you have ambulance appliances in the office : are they used ?—Yes.

55. Can you give us any idea as to the number of accidents which have occurred in your mine during the last twelve months—cases in which you have had to pay compensation ?—There might have been one or two—and they were only minor accidents.

56. You said your principal objection to the check inspectors visiting the mine at any time was that it would create strife amongst the workers ?—Yes.

57. And yet you appreciate their reports so much that you want them sent to you ?—If there is any report made we want a copy of it.

58. So that it serves a useful purpose ?—It may serve some useful union purpose, but not in the nature of reducing accidents.

59. You accompany the check inspectors in their inspections ?—Yes ; but I have something else to do—I cannot go round every day.

60. Are there stretchers provided in your mine ?—Yes.

61. How about the dust ?—Where that dust is there is no water, and there is no way to get water in.

62. Could not water be brought in ?—I dare say it could be brought in, but it would be a question as to whether it would not be as cheap to put the shutters up and keep the men out as to bring water in.

ROBERT HILL sworn and examined. (No. 36.)

1. *The Chairman.*] You are a mine-manager ?—Yes, of Christie's No. 2 Mine.

2. What certificate do you hold ?—First-class competency certificate.

3. What experience have you had ?—Forty-five years.

4. You have heard Mr. Green's evidence : do you agree with it ?—Yes, I agree with all he has said.

5. Have you anything to add to his statement ?—Yes, a little. I would like to say, first of all, that there is absolutely no truth in the innuendo thrown out that managers are aware when the Inspector is going to make his inspection. There has been a great deal said as regards the danger of extracting pillars. Personally, I cannot see where that danger comes in. In my experience I have

had more accidents to men working in bords than in the extraction of pillars. I have been engaged extracting pillars since 1890, and during all those years I do not think a miner has been injured when extracting pillars—not by the smallest accident. I would also like to say that there is a great difference between the views of the miners on this matter a few years ago and the evidence given here by them to-day. When we were withdrawing our men from a previous mine to go to our present one they did not want to leave their pillar-work, simply because, I think, they could make more money pillaring, and it was just as safe as other work. In my opinion, the pillar-work is no more dangerous than—in fact, not so dangerous as—working in bords. Then, the secretary of the union spoke of work on the night shift. Well, we have had no night-shift work for nearly two years. We did not keep the men working with only the natural ventilation—we lit the furnace every day at 3.30 o'clock p.m. The furnace was capable of producing 10,000 ft. of air, and was kept going by the deputy.

6. You have closed your furnace now ?—Yes, at present it is closed ; but we sometimes use it. I may say, sir, I did not come here with the intention of giving evidence, but I thought I would like to say that I disagree with the idea of the check inspectors being able to go down and make an inspection every day.

7. *Mr. Dowgray.*] Do you know anything about the longwall system of extracting pillars ?—Yes ; it was all worked in the longwall system where I come from in the Old Country.

8. Do you agree with me that with the longwall system the working-places are about 20 or 30 yards apart ?—It is about 20 yards, I think.

9. *Mr. Reed.*] As regards the noise, is it not very much greater under the longwall system than that made in pillar-extraction here ?—Yes.

10. Have you mined at Home ?—Yes.

11. Did you ever hear the miners complain there about the noise under the longwall system ?—No. I might say that when I began extracting pillars in the present mine we had three men at least working together ; then they said there should be only one man ; and now they say there should be not less than two men.

12. *Mr. Fletcher.*] What was the height of seam where you were working in the longwall system ?—From 20 in. to 3 ft. 6 in.

13. What height is the seam here ?—About 20 ft.

14. *Mr. Dowgray.*] In what part of the Old Country did you work in the longwall system ?—In Airdrie.

15. How far were the working-places apart ?—As I said, about 20 yards.

16. How many men worked in a place ?—Two.

GRANITY (MARTIN'S HALL).—9TH OCTOBER, 1911.

JAMES NEWTON examined. (No. 37.)

1. *The Chairman.*] You are Inspector of Mines for this district ?—Yes.

2. You have some statistics to submit to the Commission regarding these mines ?—Yes, a list of fatal and serious accidents in the West Coast Inspection District from 1905 to 1907 ; a list of fatal and serious accidents in the same district from 1908 to September, 1911 ; air-measurements at the Westport-Stockton Mine and Millerton Mine ; and analyses of mine-air samples taken by me in these mines. [Exhibit 18.]

VICTOR TOMASI sworn and examined. (No. 38.)

1. *The Chairman.*] What are you ?—A coal-miner.

2. How many years' experience have you had ?—Thirteen.

3. Where ?—Denniston and Stockton.

4. Which mine are you working in now ?—Stockton.

5. Do you hold any office in the mine ?—No.

6. Do you hold any position in the union ?—Yes, I am secretary to the Stockton Miners' Union.

7. What is your membership ?—One hundred and fifty.

8. And does that comprise all the miners on the field, or what proportion of the miners are members of your union ?—It comprises all the miners on the field.

9. Have you been appointed by the union to lay these matters before the Commission ?—Yes.

10. And in regard to these matters your members are unanimous ?—Yes.

11. Now, what subjects do you wish to bring to the attention of the Commission ?—As to ventilation, attendants at fans, firemen's reports, sanitation, baths, accidents, and check inspectors.

12. What have you to say as regards ventilation ?—Well, I would like to recommend that 150 cubic feet of air be brought round to each individual in the working-face.

13. Circulated in the working-faces ?—Yes, or where the men are working, and also that the air be split into different sections in the mine.

14. Instead of the whole of the air circulating through the whole of the faces, that it be circulated in splits ?—Yes.

15. What is the practice in the Stockton Mine : is the air circulated through the whole of the faces ?—Yes.

16. What have you to say in regard to the attendance at the fans ?—I would like to recommend that some one should be in constant attendance at the fan. At the present time when the fan stops it is some time before they can get the air going through the mine again.

17. Have you known the fan to stop ?—I have, in different mines—occasionally in this mine.

18. Supposing the fan were to stop, how long would it be before it would be noticeable ?—It may be some time. The deputy has other duties to attend to, and it may be half an hour.

19. Would it be noticeable in the working-faces ? Would the miners themselves notice it ?—Yes, after a while.

20. How long would it be before it was discovered ?—It may be half an hour or so ; a miner notices it when he fires a shot and finds that things are not so good.

21. As far as your experience goes, what is the general condition of the ventilation in the Stockton Mine ?—It is very fair just now. We cannot complain at the present time, but at times it has not been so good.

22. What have you to say in regard to the firemen's reports ?—I would like to recommend that a board be placed at the mine-mouth, and when the fireman enters the mine he should turn it with the blank side showing, and no man should be allowed to enter the mine with the board so showing. Then when he has examined the mine he should turn the board, and write his report on it.

23. Is there a board there at the present time ?—Yes, but it is not what I am recommending now.

24. Where is it placed ?—At the mine-mouth.

25. You want a board with the report written on one side ?—Yes.

26. What is your recommendation as to baths ?—I would like to recommend that baths be provided at mine-mouths.

27. How far have the miners to walk to their homes after leaving the mine ?—Some have four miles to go—it varies from one mile to four.

28. Have you any idea of how many miners would use the baths if they were provided ?—I should certainly say they would use them, provided there were sufficient baths.

29. What would you consider a sufficient number of baths—how many men to a bath ?—About four men to a bath.

30. How many men are employed in the mine ?—One hundred and fifty at present.

31. Is that the total number, or the greatest number on one shift ?—The total number ; but they are not all in the mine—there are about a hundred working in the mine.

32. On one shift ?—Yes.

33. How many baths would you suggest should be erected for the convenience of the men who would use them, with a working-roll of a hundred men ?—I would recommend one bath for each four men.

34. Have you any suggestion to offer as to how they should be erected ?—Yes, they should be erected in stalls.

35. Have you plenty of water in this part of the country ?—Yes.

36. And handy to the mine-mouth ?—Yes.

37. What have you to say in regard to accidents ?—I would like to recommend, in the first place, that there should be no places driven more than 12 ft. wide and 10 ft. high.

38. That is in straight driving ?—Yes, in straight driving.

39. What are your average widths and heights now ?—From 18 ft. wide and 16 ft. high.

40. And what is the thickness of the seam ?—That is the thickness at the present time—16 ft. ; it varies from 8 ft. to 16 ft.

41. What thickness of coal would you suggest should be left overhead ?—Coal should be left overhead where it could be done according to the thickness of the seam. If you are working it 14 ft., 15 ft., or 16 ft., you could leave 3 ft. or 4 ft. of coal ; but when the coal is only 10 ft. thick you could not leave much.

42. Supposing your seam were 12 ft. thick ?—If it were hard coal you could leave 2 ft. ; but it would be better to go right to the roof in that case.

43. You want a 10 ft. place ; but you say that if there is 12 ft. of coal it is not safe to leave the 2 ft. ?—I would recommend that the place be driven 9 ft., and that 3 ft. be left on. You would not need to go so high.

44. And what about pillars ?—I would suggest that all pillars be split, the splits not to be more than 12 ft. wide.

45. And as to check inspectors ?—I would like to recommend that in cases where they find anything unsafe or an insufficiency of air, if their report is neglected and the matter not put right, they should be allowed to stop the place and prosecute the manager.

46. What experience, as a rule, have check inspectors in determining bad conditions ? You ask that they should have power to stop a place and prosecute ?—Well, experienced miners are appointed for the purpose.

47. Are you not asking for a great deal of power in making this recommendation ?—If during their examinations they find only, say, 50 ft. or 100 ft. of air, and they ask for 150 ft. to be put in, and it is not done, the inspectors should be able to prosecute.

48. Do you not think that a check inspector should pass some examination to prove his qualifications for determining such matters ?—Well, he has the instrument with him.

49. But there is no guarantee that he would understand the reading of the instrument. Are you not asking for an extended power ? Should it not be necessary for him to submit to examination on the subject of mine-gases, ventilation, and generally so as to prove his qualifications ?—I would recommend that no man should be allowed to be a check inspector unless he was a practical man and had been in the mine for a number of years, but without the examination. Further, that they should be paid by the Government.

50. In the event of a check inspector, under your suggestion, taking proceedings and failing, would you make him liable for costs ? Supposing he stopped a mine and could not establish his case—if, for instance, upon investigation it was found that the air was adequate—who is to bear the loss ?—I should certainly say that I would not blame him, because if he is an experienced man surely there must be something the matter.

51. If you ask for such drastic powers, the check inspectors should satisfy somebody that they are duly qualified—say, the Inspector of Mines—or be required to pass an examination ?—Well, at the present time they could call in the Inspector of Mines before prosecuting.

52. Yes, but you are asking for greater powers for the check inspectors than even the Inspectors of Mines have ?—Yes; but we want these conditions altered.

53. Have you anything to suggest as to enlarging the powers of the Inspectors of Mines on these lines ?—I do not think so.

54. Would it not be better, if the check inspector finds that his report is not attended to, to bring the matter before the Inspector of Mines, and for the Inspector of Mines to have the power to prosecute ?—Well, that would cover it.

55. There is a recommendation before the Commission that in certain cases power be given to the Inspector of Mines to prosecute on his own initiative: would not that meet your case ?—Yes, that would cover it.

56. If the check inspector called in the Inspector of Mines to go with him, and for the Inspector of Mines to have power to prosecute if he found the check inspector's report correct ?—Yes. I also want to recommend that blocks be placed on jig-heads, and bells on knockers, and that an anchor-chain be provided.

57. And what have you to say about the sanitary arrangements in mines ?—Yes, I would like to recommend that there should be a truck placed in each section of the mine, together with cinders or coal-slack, and when the men go there they should put it into the truck before leaving the place, and the truck should be taken out at certain times.

58. *Mr. Dowgray.*] What objection have you to the men using the ordinary sanitary pans ?—In these mines we have a floating population, and you do not know who is working in the mine with you, and I do not think it is advisable to use the pan after everybody else has been using it.

59. In the event of the companies being compelled to adopt a system such as you have just outlined, would you be in favour of the men being prosecuted if they did not use it ?—Certainly.

60. Could you suggest a fine ?—Yes, I certainly would fine them not less than 10s.

61. Would that be sufficient ?—I think so.

62. In regard to workmen's inspectors, what is your opinion as to their being tied down to visiting the mine only once a month, as the law stands at present ?—I would like to say that they should be allowed to go round at any time, if there were any complaints.

63. In reply to the Chairman, did I understand you to say that you were in favour of workmen's inspectors having the power to prosecute, or simply to stop the place until it was seen by the Government Inspector ?—To stop the place in the meantime.

64. You are aware that the present Coal-mines Act says that 150 ft. of air is to be supplied to each man ?—Well, I could not say that to my own knowledge it says so clearly—I was of the opinion that it means in the intake.

65. That is the minimum, to be increased by the Inspector of Mines at any time ?—Yes.

66. Do you think the Act should be made clearer, so that that amount shall be distributed to each man at the face ?—Yes.

67. Is it not the custom in your mine to have bells on these jigs ?—At the present time there are bells and knockers on some, but not on all. It should be made compulsory that there should be stop-blocks and bells or knockers.

68. When speaking of the anchor-chain you referred to the face-jig ?—Yes.

ARTHUR HARRIS sworn and examined. (No. 39.)

1. *The Chairman.*] What are you ?—A miner.
2. With how many years' experience ?—Twenty.
3. Where ?—At Denniston, Kaitangata, Blackball, and Huntly.
4. What mine are you working in now ?—The Stockton.
5. How long have you been there ?—Three years.
6. Do you hold any position in the mine ?—No.
7. Have you any position in any union ?—Yes, I am a check inspector.
8. Are you a member of the executive of the union ?—No, simply a member, and check inspector.
9. You have heard the evidence of the previous witness ?—Yes.
10. Can you corroborate his evidence on the matters he has brought forward ?—Yes.
11. Have you anything further to add ?—No.
12. You say you are a check inspector: what have you to say with regard to the experience which should be required of check inspectors—assuming that you are asking for further powers ?—Well, I think the check inspectors should have the power, perhaps not to prosecute, but if he thinks the place bad, to stop it.
13. But what experience do you consider check inspectors should have before getting those powers ?—They should have four or five years' experience at a working-face.
14. Would four or five years' experience at a working-face give a man sufficient experience of gases, the taking of temperatures, the detection of gases, and general conditions, to justify him in stopping a place ?—Of course, a man would know well enough if he had four or five years' experience in a mine.
15. You think four or five years in a working-face would enable him to determine the presence of injurious gases ?—I think so.
16. Have you anything further to add to the recommendations of the previous witness ?—No.

17. *Mr. Dowgray.*] There is a considerable amount of unskilled labour in the mines : what is your opinion in connection with such men having charge of a working-place ?—I think a man should have two years in and about a working-face, and three months with an experienced man, before he takes charge of a face.

18. Have you known these fans to stop and give any inconvenience to the miners ?—Not here.

19. Do you think the system outlined by the previous witness as to sanitation is the best system ?—Yes.

20. *Mr. Parry.*] In regard to the qualification of a check inspector, do you not think it would be sufficient evidence of his qualifications if he were selected by a body of experienced men ?—Yes.

21. *Mr. Reed.*] Are you in favour of deputies and underviewers holding certificates ?—Yes.

22. Have deputies and underviewers the power to stop any place without consulting the manager ?—I could not say whether they have or not.

23. Then why would you recommend that check inspectors should have greater powers than underviewers, without having passed an examination ?—I do not think the deputy would stop the place, because he is the company's man : it is the men who should have the right to stop it if it is bad.

24. You would grant greater powers to uncertificated men than to certificated men ?—Certainly, because the deputies are the company's men.

25. *The Chairman.*] Would you favour check inspectors passing the same examination as deputies before being appointed, even after they are nominated by the miners ?—Yes, I would.

JAMES NEWMAN sworn and examined. (No. 40.)

1. *The Chairman.*] What are you ?—A miner.

2. With how many years' experience ?—Thirty.

3. Where ?—As a boy in the Old Country, at various mines in New South Wales, and here in the Westport-Stockton Company's mine.

4. Do you hold any position in the mine ?—No.

5. Or in the union ?—I am vice-president of the Granity Union.

6. How many members have you in your union ?—480 to 500, I think.

7. Does that represent the whole of the miners engaged in the neighbourhood ?—I think so.

8. Have you discussed with your members or the union officials the matters you wish to bring before the Commission ?—Certainly.

9. Are you unanimous upon them ?—Certainly.

10. What matters do you wish to bring forward ?—In regard to ventilation I would like to say that we have been under a misapprehension. I was under the impression that if the company provided the air in the intake that was sufficient. I contend that 150 ft. should be travelling through the working-places.

11. Would you suggest that the Act should be made clearer, so that 150 ft. should be kept circulating in the working-places where the men are working ?—Yes.

12. Is there anything further you wish to say ?—In connection with ventilation I should like to mention the matter of the fan. I think in the interests of every one concerned the fans should have an attendant. I know that I feel alarmed to think there is no attendant there. They are liable to go wrong, and they have stopped.

13. How far are they away from the working-face ? Who is the nearest person to the fans ?—The deputy. Of course, there may be a place nearer to the fan. The deputy may be round the section.

14. How often would he be there ?—About a couple of times.

15. Where are the fans worked from ?—From the compressors.

16. At any rate, you recommend that a man should be in attendance at the fan ?—Somebody should be in attendance there, so that the alarm could be given immediately if it stopped. There is another matter in connection with the ventilation : at the mouth of the tunnel where we go in there should be a board placed.

17. What is considered to be the mouth of the tunnel in the Millerton Mine ?—Where we go in.

18. You heard what the secretary to the Stockton Union had to say on that point—that a reversible board with "Report" on one side and blank on the other should be fixed, and that while the blank side is turned out no man should be allowed to go in ?—Well, in the mines I have worked in there is a board placed there. In the mines in New South Wales the deputy is there at the mouth and sees the men go in.

19. You recommend that there should be a regulation with regard to that report-board ?—I would like to say that we have thirty minutes' walking to do in this mine before we get to that board.

20. Are you going through a danger zone ?—We are going through a part of the mine.

21. Your recommendation is that it be placed at the mouth of the mine ?—Yes.

22. And that a regulation dealing with it be inserted in the Coal-mines Act ?—Yes. I would like to make it clear that we have ample air in the intake, and it would be all right if the Government compelled them to bring the air into the working-face.

23. What is your next recommendation ?—In regard to sanitation, I think that the present arrangement is disgraceful, and there should be a truck of some sort in a blind end. I do not recommend a seat ; but if a truck were provided I would compel every man to go in there, and if he did not I would provide a fine. I think also a good deal could be done in the direction of preventing accidents. The best way is to split the pillars. As I said before, I have been working a great many years in the pillars, and I think we are overcrowded, and the system wants improving. I think if these pillars were split, and not so many men put in, there would be greater safety. Where there are so many men it is impossible to hear what is being done.

24. You cannot hear the warnings?—No. Before taking pillars out bords should not be driven too wide—say, 12 ft. to 14 ft.

25. And what height?—I would not recommend more than 10 ft.

26. And what thickness of coal would it be safe to leave overhead—supposing you have a seam a little over 10 ft.?—That has never struck me. I think 10 ft. is sufficient to work with any safety. There is another matter I should like to mention, and that has reference to the check inspectors. I think they should have more power.

27. Do you agree that they should be required to pass a deputy's examination?—No. I can tell from my own experience whether a place is safe or not.

28. That may be so, but can all check inspectors do that?—Well, a competent man is usually chosen as a check inspector.

29. If a man is competent should he not be able to pass a deputy's examination?—No. The fact that he is appointed by a body of miners shows that they have confidence in him.

30. But you are asking for very extended powers for the check inspectors?—Well, I do not think they are extended powers. I do not ask for power to prosecute—only to stop the place.

31. You do not agree with the previous witness as to examinations?—No. There is another matter I want to touch on: I think these blocks and anchor-chains should be compulsorily provided—the company should be compelled to put them there. The anchor-chains only apply to the face-jig.

32. The anchor-chain would be a double precaution?—Yes.

33. *Mr. Dowgray.*] If you had only 12 ft. of coal, would you be in favour of working it 10 ft.?—I think it would be quite safe then.

34. Do you think pillar coal should be limited to 10 ft.?—Well, not 10 ft. on the lift-up.

35. What height do you consider would be safe to bring back from a split?—12 ft. or 13 ft.

36. Do you mean by a pillar being split for the whole of the pillars being run out?—Certainly.

37. You stated that the fans in the Millerton Mine had stopped: did it cause any inconvenience to the men?—I understand the men had to be brought back from the faces. There is also another matter I was going to mention. I think working double shifts in pillars is altogether against the safety of the men. If only one shift is worked a man knows the condition of his place, and how the timber is set. In pillars, particularly, I think it would be better to have only one shift.

38. You consider it a source of danger for men to follow other men in timbering?—Yes, certainly; if only one shift is worked a man knows whether it is secure or not.

39. Have you had any experience of drawing timber?—Well, I was acting as deputy for a short time, but I did not draw a great number of props.

40. What is your opinion of the method of drawing timber in this district?—Well, I do not approve of it—it is inclined to be a bit dangerous.

41. What is the method?—You take a hammer and try to knock them out.

42. You do not use a chain and lever?—No, but I think that is the safest method. I have seen it used in the Old Country.

43. Would you be in favour of timber being drawn by chain and lever?—Yes, certainly; I consider that is the best style of drawing timber.

44. *Mr. Cochrane.*] Would you make it clear what you mean as to the distribution of the air round the faces?—Well, I would like to see that amount of air in every working-face.

45. Which amount of air—the whole volume of the split?—150 cubic feet.

46. Then, if there were six men working there, would you want 900 ft.?—I would not go to extremes like that.

47. So long as they get 150 ft.?—Yes, at each working-place.

48. *The Chairman.*] Take one particular split for a district: do you suggest that the whole of that air should circulate round each face, or that separate air should be taken into each separate place?—I believe that the air should be split.

49. *Mr. Cochrane.*] Supposing it is split into three splits?—There should be 150 ft. for each man.

50. And for it to pass on and do for another section of the mine?—Yes, if the section is not too big. You can understand the impurities that the air would gather up.

51. *Mr. Reed.*] You stated that you would be satisfied if there were 150 ft. going into one working-face: you really want 150 ft. in one face, so that it does not matter if there is one man or two men?—Yes.

52. Supposing there were two men working there one day and three men the next, would you alter the quantity?—I want 150 ft. for each man.

53. So that if there were two men there would be 300 ft.?—No, I do not mean that.

54. Supposing on one day that working-place had two men in it, would you want 150 ft. or 300 ft. of air in it?—What I want is 150 ft. per man in the working-face.

55. The quantity of air you want would depend on the number of men: supposing there were ten men, would you require ten times as much air as for one man?—Well, I am not here to advocate anything like that. I simply want the law carried out.

56. Are you satisfied with the existing law?—No, I am not.

57. What you want is for the standard quantity of air to circulate to the men where they are?—Yes, that is my meaning. Then, in regard to baths, one witness has said that four men to one bath would be sufficient. I think that would be too much. I should say there ought to be one bath to every two or three men. A man does not want to wait too long.

58. *The Chairman.*] In regard to baths for metal-mines, we have had a suggestion that there should be one bath to six men, and that stalls should be provided?—That is too much of a crowd; a man would have to wait till the fifth man got a bath.

59. You think there should be one bath to every two or three men?—I said three at the most.

60. *Mr. Dowgray.*] What is your opinion as to men starting on the coal?—I think they should have a certain amount of experience.

61. Would you suggest that a man should have a number of years before getting charge of a working-place?—The previous witness said two years, and I think that is long enough.

62. He said three months along with an experienced miner?—I would give them six months.

63. Do you think that would prevent a number of accidents?—I am certain it would.

64. *The Chairman.*] You have shot-firers in these mines?—Yes.

65. How does the system work?—Fairly well.

66. You have had experience of men firing their own shots?—Yes.

67. How do the systems compare—which do you prefer?—Well, I believe it is in the interests of every one concerned to have shot-firers, providing they are experienced men. Of course, I am speaking of coal-mines only.

68. You do not fire a number of shots at once?—No.

69. But just one hole at a time?—Yes.

70. There is nothing to necessitate electrical shot-firers in your mines?—No.

71. *Mr. Parry.*] Do you think it is safer for the handling of explosives to be left in the hands of one man instead of being distributed amongst a number of men?—Yes.

72. You think it would minimize accidents?—Yes, certainly.

73. *The Chairman.*] Does the deputy look after the firing?—The deputy superintends the amount of powder put it.

74. *Mr. Dowgray.*] And the system is fairly satisfactory?—Yes.

THOMAS WILLIAMS sworn and examined. (No. 41.)

1. *The Chairman.*] What are you?—A coal-miner.

2. With how many years' experience?—Fifteen.

3. Where?—Ten years here, and also in Victoria.

4. In which mine are you working now?—Millerton.

5. How long have you been working there?—Ten years.

6. Do you hold any office in the mine?—No.

7. Or any position in the union?—No.

8. What matters do you wish to bring before the Commission?—The ventilation of the mine, sanitation, accidents, and more powers for check inspectors.

9. You have heard the evidence given by previous witnesses: do you wish to corroborate or qualify it in any way?—I would qualify the statement of the last witness as to examinations for check inspectors: I do not think they are necessary.

10. Have you anything further to add either from your own observations or after having heard what has been said?—In connection with pillar-extraction, I believe that the present system is the cause of many accidents. The contract system for taking out pillars is detrimental to the safe working of the mine, on account of the rushing of the work—a man tries to do much more work than he would under the wage system.

11. Is that the result of the system or the price?—I think it is the result of the system.

12. Supposing they got a better price?—They would rush the work just the same: it is only human nature.

13. Have you any further suggestions to make?—I recommend that single shifts be worked in pillars. I think the double shift is not safe, because when a man follows another man he does not know the timbering so well as he would if there were only single shifts.

14. How many shifts do you work at present?—Two.

15. What effect would your suggestion have upon the output of the coal? Could it be worked in any way so that the men could be employed?—It is done in other mines—only one shift.

16. *Mr. Dowgray.*] What is your opinion in connection with the height of these places where pillars are being worked?—I reckon that the splits should be no higher than 10 ft. In bringing back the lifts you could work them up to 12 ft. I think 12 ft. is high enough.

17. Do you think that if pillars were worked on single shifts it would minimize the number of accidents?—Yes, on the ground that the men would know exactly what they were doing.

18. You suggested that the wage system be substituted for the contract system: did you mean that to apply to pillars only?—No, in all the mine. I want to say also that in pillar-working to make a place safe you should be allowed to shoot out the timber, and let it fall if you think it is unsafe.

19. After driving the pillars is it necessary to take out the timber?—Yes.

20. It is much safer when it is down?—Yes.

21. *The Chairman.*] What have you to say in regard to extracting the timber props?—It is not too safe.

22. Have you seen the lever-and-chain system?—Yes; it is the safest way.

23. *Mr. Parry.*] Have you had any experience of shot-firers in other parts of the country?—I have in Australia.

24. In quartz-mines as well as in coal-mines?—Yes, in quartz-mines.

25. Do you approve of that system—to minimize accidents?—I approve of one man having to look after the explosives.

26. *Mr. Reed.*] In connection with the maximum height for pillaring, is it 10 ft. or 12 ft. you suggest?—12 ft.

27. Do you mean that anything above 12 ft. should be left behind?—If you can shoot it down so that it will come into your split you could take it out.

28. If the stuff did not come down would you leave it in the mine?—Yes.

29. What about the spontaneous combustion of the coal ?—Well, it is impossible to get that coal.

30. By your system would there not be a great deal more left than is left at the present time ?—No.

31. What is the maximum height you work now ?—You generally take a lift now.

32. So that they are doing it as you suggest ?—No, they are not splitting the pillars.

33. Will you show me where you would put the split in this sketch ? [Sketch submitted to witness, and explained.]

34. Do you favour leaving ribs on pillar-work ?—You do not need them.

35. You would specially have to fall up your coal ?—Yes, but you would in any case.

JOHN HENDRY sworn and examined. (No. 42.)

1. *The Chairman.*] What are you ?—A coal-miner.

2. With how many years' experience ?—Thirty-one.

3. Where ?—Mostly in Scotland, but nine years in New Zealand—in the Westport Coal Company's employ.

4. Where ?—At Millerton.

5. How long ?—Nine years.

6. Do you hold any position in the mine or in any union ?—Not in the mine, but I am treasurer of the Granity Miners' Union.

7. You hold a deputy's certificate ?—Yes.

8. Have you acted as deputy here ?—I have been out for a day now and then, but only occasionally, when they have been a man short.

9. What matters do you wish to bring before the Commission ?—Ventilation, sanitation, and the prevention of accidents.

10. You have heard the evidence of previous witnesses: have you anything further to say, or do you merely corroborate it ?—Well, there could be a lot said on each side, but I contend that the ventilation should be carried through splits. If there are four or five sections in a mine and so-many men in these splits, the air should be taken in at the intake and passed through each of these splits into the separate sections, sweeping round about the faces. You will always find that any coal-mine which has these splits for, say, three or four sections is better ventilated than one which has not.

11. Then you agree generally with what has been said by previous witnesses ?—As to the fan business, I agree that there should be a man stationed at the fan. At times I have been called out because of the fan stopping. That proves that there should be a man as convenient to the fan as possible.

12. Now as to accidents ?—Well, in connection with the prevention of accidents I would recommend, in regard to the fireman's duties, that he should report at the mine-mouth. A cabin should be erected there, and there should be a board marked "Mine not examined," so that the men could see it. When the fireman returns to the entrance he should turn the board to the other side showing "Mine examined," with the date and his name. I contend that is a safe way, and would prove a great preventive of accidents, because working in our own mine here we have thirty minutes to walk from the entrance to the mine to the deputy's report, and we never see the deputy. If you were early enough you would, but you would require to be half an hour earlier than usual. I contend it would be a great preventive to have this board and to have the deputy there, and be able to speak to him and see if your place was safe. That is the usual method in the Old Country, and it is in the Act here too. I also consider that it would be well to have knockers and stop-blocks on all jigs. The present system of shouting "Right" is not a good one—men have lost their lives by it.

13. What do you suggest ?—I would suggest that all face-jigs should have stop-blocks and knockers. In regard to pillar-work, the system here is very bad. There are generally five or six pairs of men in these pillars, and they open up both ways, which leaves a big space of ground. We contend that this is a very dangerous system. A safer method would be to open out on one side only. A still safer method would be to split the pillar and bring back everything. Then you would have the closed ground to fall back on. The place should be 9 ft. or 10 ft. at the most, and 8 ft. high. You would have a good safe retreat then. Further, I want to say, in regard to pillar-workings, in a place like New Zealand, where there are a great many men travelling, and where every Tom, Dick, and Harry can be a coal-miner, every precaution should be taken. You might have a soft bottom, and you are trusting these men, with the result that perhaps it comes down on top of you. I would suggest that, in connection with prop-drawing, the safest method would be the Sylvester or chain-and-lever system for drawing props. They are drawn now with an axe and pick, which is not a safe method. A man simply walks in and draws the props, and does not know anything about it. They are pretty well decayed, with the result that it all comes down on top of them. As to sanitation, I think the time has arrived when steps ought to be taken to provide sanitation systems for mines. The present state is disgraceful.

14. Can you suggest a remedy ? You have heard the idea of the truck suggested by a previous witness ?—Yes, I approve of that.

15. As to these check inspectors, what is your opinion as to these increased powers which are asked for ?—I quite agree that the check inspectors should have more power.

16. What about their qualifications ?—Well, as far as the matter of qualifications is concerned, you may take any trade: when a man has served his time you reckon him as qualified to take charge of any branch of that particular trade. I consider that when a man has been working in a mine two years, and a certain part of the time with a practical miner, he is quite qualified.

17. Do you not think he should have studied ?—Yes, it behoves every man to advance himself, but I say that a man who has the practical experience is just as good as those who hold tickets.

18. Do you not think that if he is qualified he should be able to pass the deputies' examination ? He ought to be able to.

19. Then do you not think he should do so ?—No. You will understand that the management going round every day know when a man is a practical man.

20. But they have nothing to do with the appointment of the check inspectors ?—Certainly not; but the union always appoints the most practical men. They do not appoint a man who has just arrived in the country.

21. *Mr. Dowgray.*] As to the length of time a man should serve before he takes charge of a working-place ?—I consider that a man should have two years inside a coal-mine, and not less than six months with a practical miner, before he takes charge of a place himself.

22. You have read the duties and powers of firemen under the Coal-mines Act ?—Yes.

23. What you ask is simply that the law should be carried out ?—Yes.

24. You heard what the previous witness said about anchor-chains: would they prove a safe-guard on a face-jig ?—Yes. I consider that for the safety of all concerned, in a mine where there are so many outlets, there should be gates with locks and keys to prevent men wandering in them. Take the previous fire in this mine as an instance: it is said to have been caused by drunken men passing through the mine.

25. You recommend that no man should be allowed to travel the mine except on his ordinary duties ?—Yes; when a fireman closes the mine by turning the board no man should be allowed to go in.

26. Is your recommendation as to air-splits intended to prevent the vitiated air from one section of the mine going into another ?—No; each section should be ventilated on its own, but not that one fan should be required for each place.

27. *Mr. Reed.*] Do you approve of deputies holding certificates ?—Yes.

28. Why ?—Because I believe in the most experienced men holding firemen's tickets—men that have been used to gas.

29. Consequently you would require a certificate that he is competent ?—Yes.

30. Why then should not a man who is to have the power to shut the mine also give some proof of his qualifications ?—You do not understand me. I do not want any man to close down the mine, but the check inspector should have the power to say that a section should be closed down until the Inspector of Mines arrives.

31. Should the check inspector be given that authority without any proof that he is competent ?—Well, if he had two years' experience and is a practical man.

32. At the Kaitangata Mine the check inspector told us that he had no experience at pillar-work: in such cases as that do you not see the great advantage of a certificate ?—It is not always the most practical man who holds a mine-manager's or any other sort of certificate.

33. Is it not some proof ?—It is a little proof.

34. Why should we dispense with that in the case of a check inspector to whom you want to give such powers ?—I say that it is no proof that he is not as qualified as if he held a certificate.

35. *The Chairman.*] Do you consider that a check inspector ought to be as well qualified to examine the conditions of a mine as a deputy ?—Certainly.

36. You admit that the deputy ought to have a certificate ?—Yes.

37. If one should have that qualification, then why not the other ?—I consider that a man who has not a ticket is sometimes more practical than a man who has one. I know a man who sat five times for a mine-manager's certificate and did not get it, and yet he is a practical man.

38. It seems to me that if you are asking for extended powers it would only be reasonable to satisfy, say, the Inspector of Mines or the Inspecting Engineer that you are qualified to exercise those powers with the same degree of knowledge ?—Well, I consider that a man who has put the time in in a coal-mine has that degree of knowledge although not having a ticket.

39. You consider that a check inspector is quite capable of discharging the duties of a deputy without having a deputy's ticket ?—No.

40. *Mr. Dowgray.*] In the event of an accident taking place—take, for instance, the case of a man getting his leg broken at the Millerton Mine—the check inspectors are called in to visit the place, and if they express themselves dissatisfied with the conditions, what takes place ?—There is nothing further done.

41. Does it remain standing until the Inspector comes ?—In the case of a fatal accident it has to stand; but, if they are not satisfied, they want the power to stop the place in other cases than fatal accidents.

42. In the event of a fatal accident taking place, whose report is taken ?—The check inspector's.

FRANCIS ALBERT SMITH sworn and examined. (No. 43.)

1. *The Chairman.*] What are you ?—An engine-driver.

2. With what qualifications ?—A first-class certificate.

3. How long have you held it ?—Ten years.

4. What mine do you work in ?—The Westport Coal Company's Millerton Mine.

5. How long have you been there ?—Nine years.

6. What matters do you wish to bring before the Commission ?—Well, that where large plants are working one man should not be left in charge by himself.

7. Why ?—Because it is not safe to be in charge of it, and the responsibility is too great on one man's nervous system. The strain is too great for him to be always by himself.

8. To what kind of plant does that apply—to shafts or an incline ?—Where there is a large plant similar to what we have here. There are four large boilers, two compressors, and four fans.

9. You do not raise or lower men?—No; but we have the ventilation of the mine to attend to in that the fans are driven from the plant.

10. Have you ever known of any accident to happen through having only the one man in charge of the plant?—Yes, I met with an accident some four years ago.

11. How?—I fell off a ladder.

12. But the presence of another man would not have prevented that?—No, but it might have had more serious consequences.

13. *Mr. Dowgray.*] It is the compressors you work at?—Yes.

14. Is it not necessary to have two men there?—Yes, there are two on the day shift, but only one on the night shift.

15. What would have been the result if an accident such as you describe had happened on the night shift?—It might block the place. If one man were on and he met with an accident he would not be capable of controlling the machinery.

16. Has any accident occurred at night through one man being left in charge?—Only the one I referred to. Another accident happened on a Sunday.

17. Did you not at one time have a fireman on the night shift?—Yes, when there was less work.

18. When you are firing the boilers can you see the fan going?—No.

19. You have heard previous witnesses speak of the fans: if they were to stop could you tell?—No—that is, the fan for inside the mine.

20. With the fan at Mine Creek and Mangatini you could not tell?—No.

21. Have you had any experience of the testing of these boilers by hydraulic pressure?—Well, my experience is very limited; but we test them.

22. Do you not feel more confident after they have been tested by the hydraulic test than otherwise?—Yes, in a sense, though if it is tested with hydraulic it would probably strain it more; but it would be hard to say what would be the consequences afterwards.

23. What pressure do you usually put on with the hydraulic power?—From 150 to 200.

24. What is the working pressure?—100.

25. Do you not think that if the boilers are going to burst at all it would be better if they did so under the test than otherwise?—I do not know.

26. The boilers are tested here by the hydraulic test?—Yes.

27. *Mr. Parry.*] Is there any one working in close proximity to where you are working?—No, the plant is by itself.

28. *The Chairman.*] During the night shift there is no one else within call?—Well, the telephone is within call.

29. *Mr. Parry.*] What is your opinion of the responsibility on one driver, when lowering and winding men, where a great number of men are working?—I have never had much experience of that myself, because my certificate is only a stationary-engine driver's certificate.

30. Do you think there is any great risk?—My opinion is that it would be a great nervous strain on a man, but I do not know how long they work.

31. *Mr. Cochrane.*] You stated that if the fans were stopped there would be no indication at the compressors: can you suggest any apparatus that would give an indication?—No.

32. *Mr. Dowgray.*] You say there are two men on the day shift, but only one on the night shift: what is the difference? The fans are working just the same. Have you the same pressure to keep up on the night shift as on the day shift?—Yes.

33. Can you give us any explanation of it?—There is a bit of winding which requires one extra compressor for the day shift.

34. *Mr. Molineaux.*] Where do you consider the actual danger to the driver comes in?—The actual danger comes in in case of accident.

35. What sort of accident?—There are many kinds. A man might get scalded, or burnt, or get hurt in one way or another; in going down the steps he might fall.

36. Do these compressors require your constant attention?—They do, in a sense. You must look round now and again, because several things might happen.

37. What have you to do at the compressors while you are on shift?—Oil up and look round the bolts.

38. How often?—Once or twice a shift.

39. And that machinery is well guarded with guard-rails and shields over any exposed places?—Yes.

40. So that if you only go round once or twice you have ample time to go round the boilers? Are you using the whole four boilers at night?—Yes.

41. You complain more of the amount of work that there is to do on the night shift rather than the liability to accident?—No, it is the liability to accident. A man is not safe there. Many things might happen.

SEDDONVILLE (EMPIRE HOTEL).—10TH OCTOBER, 1911.

JAMES NEWTON examined. (No. 44.)

1. *The Chairman.*] You have some documents to put in regarding this mine?—Yes, a list of fatal and serious accidents, 1908 to 1911, and air-measurements taken in the mine on the 15th May, 1911. [Exhibit 19 put in.]

JOHN MACKIE sworn and examined. (No. 45.)

1. *The Chairman.*] What are you?—A miner.
2. With how many years' experience?—Thirty.
3. Where?—In Scotland.
4. How long have you been working in New Zealand?—Two years.
5. Where?—All the time in the Seddonville Mine.
6. Do you hold any office in the mine?—No.
7. Or in the union?—I am a check inspector and an executive member.
8. What is the membership of your union?—About ninety-four.
9. Does that represent all the miners in the field?—Yes, and the workmen about the mine.
10. Have you discussed with the members and the executive the matters which you wish to bring before the Commission?—Yes.
11. And they are unanimous?—Yes.
12. What are these matters?—The first one is ventilation. We think it would be advisable to have 150 ft. of air for each man passing into the working-face, and where sections are large we would recommend the system of splits. The next thing is as to sanitary arrangements. We propose to put a truck in the different sections, and that disinfectants should be kept there.
13. Have you anything further to suggest?—Yes, a separate bath should be provided for each miner.
14. We have had various suggestions on that point: in some places they say one bath for every six miners, and in others one bath for every three; now you say one for each. Do you want hot or cold baths?—Hot and cold.
15. Plunge or shower?—You should be able to use them either way. I mean compulsory baths, of course.
16. You would make it compulsory upon the men to use them?—Yes; if they are provided they should be used by every man. Then we want the wage system adopted instead of the competitive system, for the safety of the miners.
17. In what way would that affect the safety of the men?—It would keep them from rushing and grasping after money.
18. Have you anything further to suggest for the safety of the miners and the prevention of accidents?—Yes, that the pillars should be split as a preventive of accidents.
19. What size are the pillars?—A chain each way.
20. You recommend that they be split?—Yes.
21. In all cases, independent of what the roof is like?—It would be safe in any case, because the bords are wide. If you have a narrow split you would have a better retreat.
22. You draw your timber by explosive: you do not use either the hammer or the chain and lever?—We prefer the explosive because it is not so dangerous.
23. But in cases where you want to save as much timber as possible, what would be the best method?—You cannot save much timber in pillar-working.
24. Do you not save timber when you draw it with the chain?—There is not much timber saved here, at any rate.
25. Have you any further suggestion to offer?—We would recommend the single shift in mines, to give the place time to rest before the miners come back, especially in pillar-work.
26. What advantage is that?—It gives the roof time to settle and time to break off the pillar. When it is always going on it breaks over the pillar and is always on the move.
27. Anything further?—That check inspectors should have the power to prosecute if their demands are not complied with within a reasonable time.
28. For what offences?—Anything that is covered by the Mining Regulations.
29. Would you be in favour of check inspectors submitting to examinations before getting such powers?—It depends upon the nature of the examination.
30. Something in the nature of the deputy's examination. You see, supposing you find a place dangerous from gas and you want to give the inspector power to prosecute, he ought to be in a position to speak with some knowledge on the subject?—Of course, that has not been discussed by us. I can only give an expression of my own opinion.
31. You think that it would not be unreasonable to ask them to submit to an examination, at any rate, as high as a deputy's?—Well, they should have a certain amount of a general knowledge of the working of a mine.
32. Have you any other suggestions?—That no bord should be broken away more than 12 ft. Of course, I admit there are none in our mine that are broken away more than that. Further, we think that each man should have a report from the examiner of the mine before passing in, as they do at Home; a cabin should be erected for the purpose.
33. So that the deputy should be in attendance at the mine-mouth?—Yes; that is for the general safety of the men. These are all the matters upon which I am authorized to speak.
34. *Mr. Dowgray.*] In regard to your request that the check inspectors should have the power to prosecute, are you aware that you are asking for greater powers than the Inspector of Mines has at present?—I do not know the powers of the Inspector of Mines.
35. In some other places they have suggested that the check inspector should have the power to stop a place until the Inspector of Mines has seen it, and for the Inspector of Mines to have the power to prosecute?—That almost amounts to the same thing.
36. *The Chairman.*] No, the difference is that the Inspector of Mines is a duly qualified and certificated mine-manager, and that is why I suggested the examination. If you are going to ask for powers to prosecute, the person who is to prosecute should be an independent person and have some qualification?—Yes, of course, he must have qualification.
37. You think it would meet the case if the check inspector had the power to temporarily stop the place and call upon the Inspector of Mines and ask for a prosecution?—I think that would meet the case.

38. If the Inspector of Mines had the power to prosecute summarily?—If he had that power I think it would amount to the same thing.

39. *Mr. Dowgray.*] Have you ever studied the question of new men starting on the coal? You are familiar with the amount of unskilled labour in this country. Have you considered the question of men having to put in a certain time in a mine before taking charge of a place?—I think it is desirable that a man should have a knowledge of a mine first.

40. Some have suggested two years in a mine, and three or six months with an experienced miner?—I think the men would be none the worse for having to have two years' experience in the mine. There would then be not so much danger to other people.

41. So you would recommend that a clause be inserted in the Coal-mines Act that they should have two years' experience in the mine?—Yes, two years' experience in the mine—that is, if they have had no previous experience.

42. Should they have a certificate to that effect?—Of course, they could get that from a union, or an employer, or a manager.

43. What is your opinion about the bells and stop-blocks being put on these jigs?—I think they should be on all jigs.

44. In this district they are usually used, although it is not in the Coal-mines Act?—I think it should be embodied in the Act, because a man might be passing along the bottom of the jig and cry "Right" about something else, and so cause disaster.

45. Have you ever worked in any place in the Old Country where they used anchor chains on the face-jigs?—I have used a prop, but I do not think it was an anchor.

46. You know those anchor chains?—If there was a hood that would prevent the truck running away before it was ready for the jig it would be a good thing.

47. *Mr. Cochrane.*] You said that for sanitary purposes you would recommend a truck: would you have it fitted as a closet, or how would it be used?—I suppose there would be a truck with disinfectants provided, and it would be loaded on to the truck.

48. Do you mean a square wooden truck?—An iron truck.

49. And how would it be used?—The truck is there, and there is a place marked off and disinfectants provided, and it shovelled into the truck, which is emptied regularly.

50. Then, as to baths, you said that separate baths should be provided for each miner: do not you think that that might be overloading the thing, and you might not get what you want, as you possibly would if you asked for less?—There would only be the initial outlay. One man could look after them.

51. Would it not mean four times the outlay if there were four times as many baths?—There would only be a partition between the baths.

52. You would be satisfied with shower-baths?—Yes, bath and showers.

53. In regard to the examination of the mine and the different men being told the result of that examination, is that not done at present?—No, it is not a question of the men knowing the result of the examination. Each man passing the cabin should ask "Is it right?" and the man in the cabin should answer.

54. Is that done at present?—No, not here.

55. But is there not a board?—Yes; but that board might be turned, and the man might not be there at all.

56. What you want is verbal communication between the examiner and the men?—Yes.

57. *Mr. Reed.*] You are recommending the wage system because of accidents: have there been any accidents in the pillars here?—I do not think so.

58. So that you propose this for imaginary accidents?—No, it is not for imaginary accidents. We know quite well that there is more rush with the men working under the competitive system.

59. The last report of Mr. James, the mine-manager, stated that the hewers here earned on an average 17s. per shift: do you not think that if the miners had a daily wage they would earn less?—That might be, but they would be safer. There will be more pillars worked now.

60. Is not this mine rapidly approaching total exhaustion?—There is a good bit of coal in it if it is worked rightly.

61. Would the miners be satisfied to lose the wages on that account?—I do not know, but they have agreed to this recommendation, at any rate. It is not for me to say.

62. What is the current rate of wages for miners working here?—The award fixes it at 12s.

63. So that you would be losing 5s. a day?—It looks like that, but you would not be losing so much in the end.

64. About the miners coming to New Zealand and having to serve a certain period before being allowed to take charge of a place, do you not think that such a regulation would be harsh on them if they were experienced miners? They would not know of this regulation, and would not bring certificates?—But it could be published.

65. But the miners at Home do not know where New Zealand is even?—They are quite well acquainted with it in a certain line.

66. It would be almost impossible for a man to write to his boss at Home for whom he worked?—Of course, we could rectify that by getting a letter from the union at Home.

67. But a man would lose three months by that method?—But the existence of such a provision would soon be spread over all the unions in the world.

68. Then, would you differentiate between the lignite-pits and the other mines? Would miners experienced with gases and in fiery mines have equal privileges?—They should all have the same powers.

69. You would let a man go into a fiery mine who had had no experience of them?—There are some men who have been in fiery mines who have never seen fire in them.

70. Then they could not be very fiery?—But they might not be in places where the fire was.

71. *Mr. Dowgray.*] Is it not the custom for miners to ask for references in this country?—Yes, they have a line from each union, as a rule.

72. And also from the managers?—Yes.

THOMAS QUINN sworn and examined. (No. 46.)

1. *The Chairman.*] What are you?—A miner.

2. With how many years' experience?—About twenty-five years.

3. Where did you get your experience?—At Denniston, Millerton, Cardiff Mine, Mokihinui Mine, and the State mine.

4. Do you hold any office?—I am a check inspector under the union.

5. What matters do you wish to bring before the Commission?—As to ventilation.

6. The same subjects as have been discussed by the last witness?—Yes.

7. Do you corroborate his evidence?—Yes.

8. Have you anything to add?—In regard to sanitation, I wish to see it made compulsory for the men to use the sanitary arrangements, for the reason that, in our mine here, although it is only perhaps 30 or 40 yards for the men to go outside, they simply step into a corner, and I think they should be compelled to protect themselves.

9. As to baths, have you anything to say?—I wish to see a system of baths in vogue, and that also should be made compulsory upon the men.

10. And you agree that there should be one bath for each man?—Yes.

11. Would that not be a heavy tax?—I do not think so.

12. Have you anything to suggest with regard to pillar-working?—I must say that I have worked on pillars in other mines as well as here, and I must honestly say that in the Seddonville Mine we have had no serious accidents in pillar-workings; but, of course, we have not had the X rays on the matter to show what is going to happen in the future.

13. Do you split your pillars?—Yes. I think the wage system would be far better than the competitive system, because I believe that the men rush into many places to fill the trucks where they would put up props if they were working on the wage system. They would then make safety their first consideration, and they do not do that now. I would like to add that in the splitting of the pillars they should not be more than 12 ft. wide.

14. What width have you here?—At odd times they run to the full bord width—that is, 18 ft.—and I do not think that is conducive to the safety of the mine. The crush is too great on top.

15. What size are the pillars?—The block of coal is about 17 yards. They are very irregular. They are never more than 22 yards from centre to centre. In breaking away bords I would say that they should never be more than 12 ft. wide. We know that, in regard to pillar-extraction here, a while ago they were broken away 16 ft. to 18 ft., and that has caused a great deal of trouble and also a great loss of coal, which is a loss to the country. The other system would provide greater safety for the men. With regard to the single shift, my opinion is that with a single shift a man would come back to his pillar in the morning and know more about it than if another man had been working it and probably left a hanging shot which would be dangerous. We recommend the single shift for that reason.

16. How would that affect the output of the mine?—Well, in a field of any extent it would not affect it at all, because they would put on more haulage gear.

17. *Mr. Dowgray.*] What is your opinion about the check inspectors being able to examine the mine only once a month?—I think they should be able to examine it as often as they think fit, if anything crops up to require an inspection.

18. Are you of the same opinion as the previous witness that check inspectors should have the power to prosecute?—Yes, if matters complained of are not seen to within a reasonable time.

19. Well, you are asking for more power than the Inspector of Mines has?—Then, more shame to the Government for not giving the Inspector that power!

20. Would it not meet the case if the check inspector had the power to stop the place until it was seen by the Inspector of Mines?—Yes, that would help the matter.

21. What is your opinion in regard to new hands coming and starting on coal?—Well, I am of opinion that if a man had two years' experience in these mines he would be fit to take any place I have seen, and I have worked in Millerton Mine when it was very gaseous. I do not think I was more than four or five hours there before I was competent to carry a lamp and look after my own safety. Of course, I had worked for fifteen years in coal-mines at that time.

22. As regards the idea that a man should have two years' experience, do you think any man is qualified to be a miner?—No, there are any amount of men who would never be qualified to be miners.

23. Are you in favour of any time being fixed?—Yes, two years.

24. *Mr. Cochrane.*] What do you mean by your suggestion that bords should be broken away 12 ft.?—Simply that they should be broken away that distance, and then they could be widened afterwards.

25. *Mr. Reed.*] As regards the certificate which you say a miner should bring to New Zealand, who should grant it, the manager or the union at the place where he left?—I suppose that would be a matter for the man himself. It could be accepted from either the manager or the union, so long as he can show something in writing.

26. Any satisfactory evidence?—Yes.

27. To whom should the evidence be satisfactory—to the Inspector of Mines?—Yes, or the manager.

28. You are a check inspector?—Yes.

29. How long have you been a check inspector?—Two years.

30. Have you any idea how many inspections you have made in those two years?—I think about four.

31. And the law permitted you to make twenty-four?—Yes.

32. So that you have not taken advantage of the law?—No.

33. And yet you are asking for more powers?—Yes.

34. Do you think that once a month is ample for inspections?—No; I know there are plenty of mines where that is not sufficient, but for this mine it is quite enough.

35. Now, on the four inspections you have made, how did you find things?—We might have found slight discrepancies, such as timbering, but on the whole it has been very fair.

JAMES CUMMING sworn and examined. (No. 46A.)

1. *The Chairman.*] What are you?—A miner, and president of the miners' union.

2. What is the strength of your union?—Well, it fluctuates a little, but we have on the books about ninety-four or ninety-six.

3. What matters do you wish to bring before the Commission?—In the main I corroborate the evidence given by the check inspectors.

4. You are working in the mine now?—Yes.

5. What experience have you had in mining?—Probably twenty years.

6. Where—all in this district?—No, in Victoria, Tasmania, and in the Millerton, Blackball, State, and Old Cardiff Mines.

7. Have you anything to add to the evidence of the previous witnesses?—Not as far as ventilation is concerned. I would like, however, to touch upon the subject of pillar-working and the wage system. I would like to contradict the statement of Mr. Reed that the average earnings of the miners here is 17s. per day. The figure quoted by him from the mine-manager's report is the gross earnings of the men. There is nothing deducted from that for ammunition, explosives, oil, tools, and so on, and it is incorrect to say that their average earnings are 17s. a day. I take exception to that quotation from the mine-manager's report.

8. You say that 17s. does not take into account the offtakes?—No, for explosives, tools, and other incidental expenses.

9. What would they have clear after those deductions were made?—It would bring it down considerably. I cannot say what it would amount to for each pair of men. Some men would use more explosives than others. From the different sources it would probably be reduced by 1s. 3d. or 1s. 6d. per day.

10. Even that would be better than 12s. day wages?—That would be very foolish for me to say.

11. Of course, it is an element for us to consider in making a recommendation on the subject. If it appears to the Commission to be advisable to recommend the abolition of the competitive system, then we would have to consider the matter both from the point of wage earnings and the output of the mine?—Yes. But the output of the mine has nothing to do with us; we have to look after our own safety.

12. But perhaps it would be crippling the industry?—We have ourselves to consider, and human safety is the first thing to be taken into account.

13. You cannot give us any idea as to how either the wage earnings or the mine-output would be affected by the change?—No, I am not prepared to go into that. I would like to reply to a question put by Mr. Reed to one of our witnesses with regard to the safety of the pillars, and the fact that there have been no accidents. The manager here has a privilege which the manager of no other mine has—that is, to pick his men for these places. He can pick his men and see that they are all competent to go into the pillars, and only those men go into the cavilling ballot. There are only certain men who go into the ballot for those dangerous places. I only wish to say that as a reason why there has been no accidents in this mine. I would like also to reply to another question as to the men having qualifications. We have in our agreement a provision whereby if we do not know any man he can be looked after. He may be a quartz-miner, but not a coal-miner. I think any manager can tell at a glance, on seeing a man working, whether he is a practical miner or not.

14. Well, it could be arranged this way: either that he should have to produce testimonials of service or to satisfy some one that he is competent?—Well, that is just the same as a miner bringing a clearance to the union. He could bring the same recommendation on his union clearance.

15. But, supposing he came out from Home without anything in writing, he might simply go into the mine and show that he understands his business?—Yes, that is quite right. I would also just like to elaborate as to baths; I think they should be brought into force. With the other witnesses, I advocate that there should be a bath for every person. I consider that if anybody is entitled to a bath it is the working-man. The cost is not a matter for us—it is for the cleanliness of the men. You will find that miners' homes are generally small, and there are children about, and his mining clothes should be washed somewhere else. We could do quite well without that in our homes. I am out against the present system, and would like to see this new idea put into force. Then, in regard to the wage matter, when a man goes into a mine he has a perfect right to know what he is going to get.

16. *Mr. Dowgray.*] In connection with the abolition of piecework, or the contract system, the men have discussed this?—Yes.

17. And they know that your agreement is for 12s. a day?—Yes.

18. And they would prefer 12s. a day for the matter of safety?—Yes, provided there is work for them.

19. *Mr. Parry.*] Do you think the workmen's inspectors should be allowed to go into the mine at any time?—Yes.

20. What is your opinion with regard to the extension of the powers of workmen's inspectors?—I consider that if the check inspectors thought it was necessary for them to inspect the mine, and they found something which after their report was not rectified, they should have the power to sue the management for it. As one of the witnesses has stated, they have only made four inspections here during the last two years, but you never know when anything is going to crop up, and I think they should have the power to inspect the mine whenever they think fit.

21. As regards the stopping of a place, which has been advocated at different places, you think that where the workmen's inspector finds anything that is likely to prove dangerous, and if it is not rectified, he should be allowed to stop the place until the Mining Inspector is called in?—Yes, I do.

22. You think that power is very essential?—Yes; and I would add that, if such a thing had to be done to wait till the Inspector came, those men should be paid by the company for the time lost by them.

23. That would be practically substituted in place of prosecuting?—Yes.

24. *Mr. Reed.*] In regard to the matter of baths, in the Waihi and Grand Junction Mines at Waihi they are putting up hot showers: would you approve of that in preference to bath-tubs? It does not entail so much capital expenditure, and it would not mean such an extreme cost?—Of course, where it is a case of a coal-miner *versus* a gold-miner, there is no comparison between the dirt on the gold-miner and that on a coal-miner. There is a great deal of difference.

25. In Germany and France showers are used, with a concrete floor?—Well, they have baths instituted in the State mine in Victoria.

26. Showers or tubs?—Bath-tubs, so I am informed. You go to work in your workaday clothes and come home in them. I prefer the bath.

27. In a large mine employing a hundred and fifty men on a shift, or two hundred men, that would mean two hundred tubs?—It would, I admit.

28. And who would provide the towels?—Probably the men would provide them. They could carry them as they do their crib.

29. As regards the clothes being left behind, what you suggest is the practice in gold-mines. In regard to washing and keeping the clothes clean, who should do that?—It should be done by a scientific process by the company.

30. And the company to pay for washing the men's clothes?—It is a big matter to go into the bed-rock of the subject. Of course, the men are willing to meet the employers, but it is no use to go into the matter until the main point is established. As far as I am concerned, I would not mind paying for them to be washed, as long as they were done away from my place. I would pay my share. The miners could contribute a certain amount towards the cost of washing the clothes. This thing emanated from the gold-mining. The companies wanted the men to change at the mine, so that they could not take away anything that did not belong to them.

31. Partly, perhaps—but in mines where there is no specimen stone. The law compels it. You know that?—Yes.

DENNISTON (ODD FELLOWS' HALL).—10TH OCTOBER, 1911.

JAMES NEWTON examined. (No. 47.)

1. *The Chairman.*] You have some tables to put in in connection with the mines here, have you not?—Yes, I have prepared three tables showing (1) air-measurements taken on 21st and 22nd September, 1908; (2) fatal and serious accidents from 1905 to 1907; and (3) fatal and serious accidents from 1908 to September, 1911. [Exhibit 20 put in.]

JOHN CHAPELHOW sworn and examined. (No. 48.)

1. *The Chairman.*] You are a miner?—Yes, and secretary of the Denniston Coal-miners' Union.

2. How many years' experience have you had as a miner?—About twenty-four or twenty-five.

3. Where?—In Cumberland, England, and at Denniston.

4. Do you hold any office at the mines?—I am check inspector for both mines, Ironbridge and Coalbrookdale.

5. What matters do you wish to bring before the Commission?—I wish to deal with all the matters in connection with which you are inquiring, and also one or two others.

6. What have you to say in regard to ventilation?—I think that every miner should be supplied with 150 cubic feet of air at his working-face.

7. Have you anything to suggest as to a system of ventilation?—Nothing, except that each section should get its own fresh air and have its own return.

8. So that the air should not pass through another section?—Yes.

9. Now, as to sanitation?—I consider that it is absolutely essential that the truck system should be provided.

10. Do you think the truck system is the best?—Yes, by far.

11. As to bath-houses and change-houses?—I think each mine should be provided with bath-houses.

12. And each man with a separate bath?—Yes, a stall closed off. I do not see why a miner should bath before a crowd; they do not allow it in any other place.

13. Then, have you any suggestions to make in regard to the prevention of accidents?—I would suggest that the whole of the men be on the day-wage system.

14. How would that minimize accidents?—They would not have to rush their work to make a living.

15. You blame the contract system for the rush, and consequently for the accidents: is that to be attributed to the system or the price? Supposing they got a higher price?—There would be the same incentive for the men to rush.

16. Well, how do you think the change to the wage system would affect the earning-capacity of the workmen or the output of the mine?—The output might be a little less for a while until they got properly into the working of the system. They may get more coal out of the mine in a given time under the present system, but it probably ruins the section; whereas if they had the day-wage system it might take longer, but they would get more coal out of the same section.

17. They would get more coal out, though it would be spread over a longer period?—Yes, probably.

18. Then do you think the average daily output under the wage system would be equal to that under the contract system?—No, the rush would not be there.

19. Of course, we are not dealing with the industrial aspect of the matter?—No.

20. We have to inquire into the effect that any change might have, and the industrial effect is only an incidental one. We are here to investigate the causes of accidents. Now, have you any other suggestion to offer in regard to the sources of danger in connection with methods of working?—Yes, in regard to pillar-work. I think no place should be wider than 12 ft., and not higher than 8 ft. We have a practical illustration of that, which I had intended to show the Commissioners this morning had they visited the mine.

21. What is the average size of the pillars now?—About 15 or 16 yards.

22. And the average height?—Between 9 ft. and 10 ft. In some places it is less where it is heavily timbered.

23. Well, in some places we have had a recommendation that a layer of coal be left overhead, and in others that it should be taken down to the stone?—If the coal was of such a height to allow this being done it would be much better to leave coal as a roof.

24. What would be a safe quantity of coal to be left up?—It would depend upon the seam. The coal will give better warning than any stone. There is no doubt it would be better to leave the coal up if the height of the seam would allow that to be done.

25. Have you any suggestions to make as to explosives?—No.

26. You have a satisfactory system of dealing with the explosives in this mine?—Yes.

27. Is there anything further you wish to deal with?—There is one thing which should be looked into, and that is the robbing of a section back to its main haulage-road. If you have a section of coal further in I reckon no section should be robbed within two pillars' length of its main haulage-road.

28. What is the danger?—If you rob a place back and a fire starts you have only one road into the section. It is much safer to keep two roads. I also think the communication between two headings should not be more than one and a half pillar-lengths apart. There should be a cut-through every one and a half pillar-lengths not only for ventilation purposes, but for communication between the two headings.

29. *Mr. Dowgray.*] What is your opinion of the law as it relates to check inspectors?—Well, they seem to have no standing whatever.

30. Have you any suggestions to make in regard to check inspectors?—I should say that they should have more power. I think the Inspector of Mines should have the power to prosecute on the recommendation of a check inspector, or where there was a dispute.

31. What powers do you think the check inspectors should have?—They should have the power to call in the Inspector of Mines, and they should also have the power to go into the mine at any time.

32. It has been suggested at other places that they should have the power to stop places?—Yes, I agree with that—where they consider the places unsafe.

33. Has the matter of attendance at fans cropped up here?—No, we have never heard of a fan stopping.

34. It has never caused any inconvenience?—Not that I am aware of.

35. You do not think a fan left without an attendant is a source of danger?—It might be. The engine could be going without the fan going. I think there should be an attendant at them, because the whole of the mine depends upon the fans.

36. In regard to the firemen's reports: when the men are proceeding to their work in the morning, what intimation do they get that their places are safe?—Well, they see the fireman come out, and he signs the board when he comes out, and if there were danger in any man's place he would stop it.

37. How would he tell him?—He would tell the man and put a board across the place. I think that every man should ask the fireman before he goes in whether his place is safe or not.

38. A suggestion has been made to us in other places about bells on jigs: have you bells on all jigs?—We have bells on a lot of them—on the majority, in fact. I do not think there are bells on the short jigs.

39. Do you think it would be an improvement on the present system?—Yes, except for the face-jigs, and perhaps even then it would be better.

40. In connection with face-jigs it has been suggested that an anchor chain should be added?—Yes, that should be done.

41. From your experience in New Zealand, what is your opinion of men starting on the coal without having any previous experience?—I think that a man should have two years' experience in a mine before starting on the coal at all, and before he gets a place to himself he should have, say, six months with an experienced miner.

42. *Mr. Parry.*] Have you had any experience of taking temperatures in a mine?—No, not personally. I have worked in a place where the temperature was taken.

43. Have the temperatures been taken in these mines by the check inspectors?—No, not by us.

44. In which part of the mine do you consider most accidents take place—driving headings or extracting pillars?—It would be hard to say from memory.

45. It has been suggested that pillar-extraction be done on the day-wage system: do you contend that the whole of the mine should be worked on that system, with a view to minimizing accidents?—Yes.

46. *The Chairman.*] With regard to the extended powers for check inspectors, would you be in favour of their submitting themselves to examination?—No. I think, if they have a good general knowledge and plenty of practical experience, that should serve the purpose.

47. But you ask for the power to stop a place, and in stopping that place you take on yourself the responsibility of deciding that it is dangerous. Do you not think that if you want that power that it is only fair that you should show by passing an examination that you are qualified to decide the matter?—I think the check inspector would show that he is qualified by being appointed.

48. How?—Well, they would not appoint a man who did not have the qualification.

49. Well, a deputy or fireman has to undergo an examination. What you want, practically, is to put the check inspector against the fireman. Do you not think he should pass some examination, and be on the same level from a technical point of view as the man against whom he is pitted?—Not necessarily. Because the fireman or deputy has a certificate it is not to say that he is the cleverest. There is no time specified that he shall have served before he applies for a ticket, and the other man might have a good general knowledge in any work about the mine.

50. But may not the deputy have the same practical knowledge as the other man, but not have the certificate as well to show that he is competent?—Well, I would not exchange views with a lot of them.

51. But you are one of the check inspectors, and if that power is given to all check inspectors what is going to show that they have any technical knowledge?—I think it should be left to the men; they would not appoint check inspectors who are not competent.

52. If a man is competent he should not have any difficulty in passing the examination?—But there are lots of things in a deputy's examination which he does not bother about—such as first aid, for instance.

53. You do not recommend the examination?—No. I omitted to state that I consider we should have back travelling-roads independent of the main haulage-road. Also, in regard to the ropes, I think the ropes are run rather too fast at times. There should be a speed-limit for haulage-ropes. With the present rate of running a lad might lose his hand or fingers.

54. *Mr. Dowgray.*] What limit would you suggest?—About two miles and a half an hour.

55. Have you any idea of the speed they go now?—No, unfortunately, I have not; but it appears that they go too fast for a boy.

56. Is that the cause of accidents?—Well, it might prevent an accident if the speed was limited and uniform.

57. *The Chairman.*] Can you ascertain the present average speed? Can you ascertain what would be considered an excessive speed for a rope to travel at?—Later I could do so and send it on to the Commission.

JAMES FISHER sworn and examined. (No. 49.)

1. *The Chairman.*] What are you?—A miner, and president of the Denniston Coal-miners' Union.

2. How many years' experience have you had as a miner?—Twenty years.

3. Where?—Mostly here.

4. Are you a check inspector?—No.

5. Do you occupy any office in the mine?—No.

6. What matters do you wish to bring before the Commission?—I would like to go into the whole of the matters generally.

7. You have heard the evidence of the last witness: do you corroborate it generally?—Yes.

8. Do you want to add anything to what he has said?—In regard to the check inspectors, I consider that they should be paid by the Government, and they should have the power to stop a place if they considered it necessary to do so.

9. What do you think of the examination question?—I would not listen to it at all.

10. If you want them to be paid by the Government, and be practically Government servants in the pay of the State, why should they not qualify themselves by examination?—I do not go much on a ticket myself. There are some who have tickets whom I would be very sorry to make check inspectors.

11. But the miners would still have the right to appoint their check inspectors. Supposing it was arranged so that, before the Government paid the check inspectors, they must pass an examination equivalent, say, to the deputy's examination?—No, I would not have that at all.

12. Have you anything further to advance?—We have had to stop a place before. We had no power to do so, but we did, because it was unsafe.

13. Have you anything to say in regard to ventilation further than was said by the last witness?—No.

14. *Mr. Dowgray.*] You said that you have had occasion to stop a place. For what reason?—Because it was dangerous.

15. The roof was dangerous?—Yes.

16. Did the company have any objection to your stopping it?—No. It closed shortly after we stopped it.

17. So that your views were accepted on that occasion?—Yes.

18. *Mr. Fletcher.*] Did you report that dangerous place to the manager?—Yes, the check inspectors did so on two or three occasions.

19. *The Chairman.*] Have you anything to say on prevention of accidents?—I think the whole mine should be on shift work.

20. *Mr. Dowgray.*] Have you any idea of the number of minor accidents that occur in this colliery?—I could not tell you offhand, but the Mines Department has the reports on them. If you compare the accidents now with those of fourteen or fifteen years ago, you will find there are a great many more nowadays. I am judging from the payments out of the medical fund. It used to be £4 or £5 a fortnight, and now it goes up to £40 or £50 a fortnight.

21. *The Chairman.*] You are taking the accidents which put the men on the books of the benefit society?—Yes.

22. *Mr. Dowgray.*] How does the number of men employed compare?—It is about the same.

23. To what do you attribute the increase in accidents?—The men had more experience then.

24. You think it is the unskilled labour which is the cause?—It is partly the cause, though our fatal accidents happen mostly to skilled men. That is the result of the rush in the work.

25. Is it customary for the miners to endeavour to make a certain amount each day?—Yes, they have to make a living, and with the pillars it has to be a bit dangerous before they can make anything out of it.

26. So that under the present system the hard safe working does not pay?—No.

27. *Mr. Fletcher.*] Were you working here when the Compensation Act was passed?—Yes.

28. Have you any idea how much money was paid out for accidents prior to that?—No, I could not say. Of course, it was a great deal less than it is now. We do not attribute the accidents to the Compensation Act.

29. Do you know how much was paid out of the Accident Fund then?—No, but it was smaller fourteen or fifteen years ago. I could not give you the exact figures.

30. At Millerton it was about £40 a year ten years ago, and as soon as the Compensation Act came into force it rose to £40 a month?—Do you think they get hurt on purpose?

31. *Mr. Parry.*] Do you think the conditions have improved this last six months?—No, they are about the same. They have improved this last week or two, though.

32. *Mr. Dowgray.*] Then the Commission has accomplished something?—Yes.

ROBERT LEONARD KNIGHT sworn and examined. (No. 50.)

1. *The Chairman.*] What are you?—A miner, and check inspector for the Cascade Mine.

2. How many years' experience have you had as a miner?—Fifteen.

3. Where did you gain your experience?—In Western Australia, Victoria, and New Zealand.

4. Upon what matters do you wish to speak?—The whole of the matters covered by the Commission.

5. You have heard the evidence of the previous witnesses: have you anything to add to it?—No; I corroborate everything that has been brought forward. I would like to say a word or two in regard to the general safety of the men. No bords should be broken away more than 12 ft. wide. I say that no pillar should be split more than 12 ft. wide and 8 ft. high; you could contend with the roof then. I would also recommend a single shift throughout the mine, except in headings. I do not wish to interfere with the development of the mine at all, but every other place should be worked with one shift.

6. *Mr. Dowgray.*] Do you think the double shift on pillars is a source of danger?—Yes.

7. Would you explain to the Commission your reasons for saying so?—In double shifts in pillars, when a man leaves his pillar in the afternoon it might be all working, and if another man has to follow him in the same pillar he is running his head into danger; but if a pillar is left it will quieten down. And then, if it is worked on a single shift, the man would know how he set his timber.

8. What is the system of breaking away bords just now?—Some of them are broken away 12 ft. wide and then widened out, and some are broken away 18 ft. wide. According to the agreement the management can decide that.

9. It is not customary to break them away 12 ft.?—No.

10. You suggest that it should be made compulsory?—Yes.

11. How does the system of work here compare with that in Western Australia?—I cannot say. I did not work in coal-mines in Western Australia.

12. *Mr. Parry.*] What is your opinion of men who depend upon the amount of material got being allowed to use or handle dynamite?—I am of opinion that if a man has to depend upon the tonnage he ought to be allowed to use the dynamite himself. He has had enough experience, and ought to be allowed to fire the shots.

13. Do you think it would tend to minimize accidents if the handling and using of dynamite were confined to one man alone?—No.

14. Have you had any experience of mining in any other parts of the country?—Yes.

15. You have worked in Western Australia in the gold-mines?—Yes, and in Victoria. I have fired thirty holes myself in one round.

16. With fuse?—Yes.

17. How did you spit them?—With a piece of dynamite, with fuse of different lengths.

18. And you fired thirty holes with safety?—Yes.

19. What do you think is a fair number of holes to fire with safety?—For absolute safety I would not go above six.

20. What is your opinion of a man having a certain amount of experience before taking charge of a face?—He should have two years' experience.

21. You think that is essential to minimize accidents?—Yes.

22. What is your opinion as to the experience a man should have before being allowed to handle dynamite?—You do not want much experience for that. A man very soon gets into the use of it.

23. *Mr. Reed.*] As regards experience, did you come straight from Western Australia here?—No, from Victoria.

24. Where did you work in a colliery first?—Here. I started here trucking.
25. How long were you trucking?—About six weeks.
26. How long were you before you went into a face?—About five or six months.
27. Did any accidents happen to you?—No, I have not met with an accident.
28. And did you find it difficult or dangerous?—No.
29. And yet you propose that a miner should have two years' experience?—I think it would be better if they had the experience. I did not say altogether in a coal-mine. If a man has had experience in a quartz-mine it would be enough.
30. You mean that two years in any mine would do?—Yes, certainly.
31. You found no difficulty in working even after only four months?—No.
32. In what mines were you working in Western Australia?—Hillend, Golden Arrow, in Broadarrowtown.
33. What was the ventilation like there?—Pretty good. And I was also six years in the Jubilee Mine in Victoria, and about two years in the Port Arthur Mine as underground shift boss.
34. How do you find the ventilation in this mine where you are working?—Just middling.
35. Is it not pretty good?—It is fair.

JAMES SCOTT sworn and examined. (No. 51.)

1. *The Chairman.*] What are you?—A coal-miner.
2. With how many years' experience?—Fourteen.
3. Where?—In British Columbia, South Africa, Newcastle, and New Zealand.
4. Do you hold any office in the mine?—I am check inspector for the Ironbridge Mine.
5. What matters do you wish to bring before the Commission?—The whole of those which have already been mentioned.
6. You have heard the evidence of the previous witnesses: do you corroborate it?—Yes.
7. What do you wish to say in particular?—I consider that every miner should have 150 cubic feet of air provided at the face, and also, when the sections are large, the air should be split, so that the men would not be inhaling the same air. I also think that communication should be made no more than 7 yards from the face, and both stentons and bords should be blinded so as to make the air full. To-day it is a case of each stenton running level, and half the air escaping, while half the colliers are suffocated. Regarding the extraction of pillars and prevention of accidents, I think that under the present system of grab there is no wonder so many accidents occur. When you are taking out a pillar with 22 yards centre you are perhaps ordered to drive through the pillar, which leaves a very small stump on either side. The consequence is that the collier holds his life in his hands. Pillars should not be split more than 12 ft., and all bords and stentons should be broken away 12 ft. wide, which would give the pillar a good hold at the corner. If the day-wage system were introduced, as we advocate, it would stop the rush and tendency to grab, and the colliers would take time to put in props and thus secure their own safety.
8. Is that a matter of the system or the price?—It is the system—not the price at all. The same thing would be carried on if you were getting 10s. or 5s. a ton. Regarding jigs, I consider there ought to be blocks and bells on all jigs. On some jigs you will find blocks and anchors, but none on others.
9. *Mr. Dowgray.*] What is your opinion about men starting coal without having any previous experience?—When I started I had to have two years' experience in Newcastle before I dared to ask for work on the coal.
10. How does the system of pillar-extraction here compare with that in other places?—It is very different.
11. Do you consider the pillars far too small?—Yes, though under the tonnage-rate system they have to be small. The management fixes that.

HENRY JOHN FOX sworn and examined. (No. 52.)

1. *The Chairman.*] What are you?—Deputy in the Coalbrookdale Mine.
2. How many years' experience have you had in mining?—Twenty-five.
3. Where?—Great Britain, New South Wales, and New Zealand.
4. What matters do you wish to bring before the Commission?—I have been appointed to appear on behalf of the deputies, and speak on the matter of the prevention of accidents. We, as representing the company, contend that the Act does not sufficiently define what are the duties of a deputy. Our duties should be more definite as regards the prevention of accidents. We act for the manager of the colliery, and take the responsibility of the manager. At the present time we are called upon to do other work, such as timbering, road-laying, and so on, and while we are doing that we contend that we are unable to attend to our proper duties—that is, the proper supervision of the workmen. Therefore we ask for the Act to be amended so as to bring it into line with the English Act on this subject. I will read the clauses that we have drafted from the English Act which has recently been brought down by a standing committee of the House of Commons, and which we ask should be added to the New Zealand Act: "Firemen, examiners, or deputies: (1.) For every mine there shall be appointed by the manager one or more competent persons (herein referred to as firemen, examiners, or deputies) to make such inspection, and carry out such duties as to the presence of gas, ventilation, state of roof and sides, and fire shots, and seeing men out at the end of shift, and general safety, as required by the Coal-mines Act. (2.) A fireman, examiner, or deputy shall be required to devote the whole of his time to such duties as aforesaid (herein referred to as his statutory duties). (3.) The district of any mine assigned to a fireman, examiner, or deputy shall not be of such a size as would prevent him from carrying out in a thorough manner all such duties as aforesaid." And, further, Mr. Chairman, we consider that

the examination of deputies should be held once in each year at the same time as the manager's examination, and be advertised in the same manner, and all candidates should be of the age of twenty-five and must have had at least five years' experience in a coal-mine, of which three years should be at the coal-face. We consider that a deputy is not capable of supervising every man unless he has had three years at the coal-face.

5. You have heard the suggestions made on behalf of the miners as to the powers of check inspectors: from your experience of check inspectors, have you anything to say as to the qualification of a check inspector to stop a place?—If I made any statement on that point it would not be made on behalf of my union, but a personal one, and I prefer not to make any such statement.

6. Can you express an opinion as to the suggestion that the check inspectors should pass an examination?—Well, I have heard the statement made here that all the check inspectors are the most competent men that can be found in a mine. I say that is not so. I have been a check inspector myself, and I have known check inspectors who have not been capable of taking a reading of the air. They were really duffers.

7. What do you think about the examination: do you think it would be a reasonable thing to ask?—Well, I think so, because if you are going to give a check inspector the power to stop a place he should qualify himself in some way. There are many in this mine who are very erratic; they would stop anything.

8. *Mr. Reed.*] About those deputy's examinations, did you get a service certificate or a certificate of competency?—A certificate of competency.

9. You passed the examination?—Yes.

10. Who examined you?—Mr. Marshall.

11. Do you think that examination is difficult enough?—No, it is too easy.

12. It was the first examination you passed?—Yes, one of the first. I say right here it is a farce.

13. Deputies were wanted at that time—it was illegal to work without certificated men?—I wish to say that there are a lot of men who want to sit for the examination, but no advertisement has appeared, and there is no one to apply to.

14. Have you written to the Secretary of the Board?—No.

15. As to the check inspectors, do they take air-measurements?—Yes, I did when I was a check inspector at Blackball.

16. Do the check inspectors here use the anemometer?—Yes, they carry them.

17. Have you seen them use one?—No.

18. *Mr. Dowgray.*] How long have you been a deputy here?—Nine months.

19. In Blackball how long had you the anemometer?—It was the property of the union. I do not know how long they had it.

20. They had it while you were check inspector?—Yes.

21. You say you are in favour of the standard of the examination being raised and the age-limit fixed?—Yes, at twenty-five, and the men to have three years at the coal-face.

22. Where were you a check inspector before at Blackball?—Nowhere.

23. And you said that some check inspectors were mere freaks?—Yes.

24. *Mr. Parry.*] Did you say that you think check inspectors should pass a certain examination before being allowed to take up their duties?—Yes.

25. Do you know anything about taking temperatures?—No, I have never taken them, except a few in Blackball with the ordinary thermometer.

26. Do you know the difference between the two bulbs?—I have seen them, but I do not care to go into that question.

27. You said that some of these check inspectors were so erratic that they would stop any place?—Yes.

28. Did you ever see a place stopped by them in this mine?—They have not the power to stop a place. I judge from hearing their views.

29. So that you do not know whether they would have stopped it at all?—That is my opinion.

FREDERICK ERNEST FOOT sworn and examined. (No. 53.)

1. *The Chairman.*] What are you?—A deputy.

2. How many years' mining experience have you had?—Twelve years in coal-mines, and thirteen years in alluvial mines.

3. How long have you held a certificate?—I have a service certificate, and have been four years a deputy.

4. What matters do you wish to bring before the Commission: do you corroborate what has been said by the last witness?—Yes.

5. Have you anything to add?—I think the deputies should have their duties confined to looking after the men. At times there is a great deal of other work to be done, and you have to do that between times.

6. *Mr. Fletcher.*] Which mine are you deputy in?—The Ironbridge.

7. How many deputies are there there?—I cannot tell you. About a dozen, I think.

8. Which section are you in?—No. 2 section at present.

9. How many men are there in that section—hewers?—About ten singles on day shift, and ten on the night shift.

10. Are you the only deputy?—There is also a deputy for the night shift.

11. Is there any assistance?—No.

12. Do you know how many men the deputies follow in the other sections of the mine?—One man would follow about five pairs and a half.

13. How many men are under your charge in a shift?—Ten colliers and the truckers.

14. What is the average number of men they follow?—I do not know. Some have as high as twelve pairs, but they have assistance.

15. Do you know how many coal-hewers there are in that section?—Between sixty and seventy pairs of men.

16. Are there as many on the day shift as on the night shift?—There is only the one section double-shifted, the Ironbridge.

17. There are twelve deputies?—Yes.

18. *Mr. Dowgray.*] I believe you got your certificate for service?—Yes.

19. Did the getting of that ticket make you a better man than you were before?—No.

20. In your opinion, with the examination for deputies, are you getting a better class of men as deputies?—Well, the result is not to be seen yet. We have still the old hands on.

21. Do you not know the result in other collieries?—It would be very hard to say.

22. Your colleague suggested that they should not be granted a ticket under twenty-five: are you aware that there are men getting tickets under twenty-five?—The idea is to prevent them from getting tickets before they are twenty-five.

23. Under the present law as to the examination, are you getting the best men?—The examination is easy now.

24. If the examination were made stiffer, would you be in favour of men at present holding service certificates passing the examination?—Yes, I think it helps a man to go up for an examination, though there is often a practical man who lacks the educational ability to qualify for a ticket.

25. Your colleague said he was going by the latest Coal-mines Act in the Old Country: are you sure that that Act is passed yet?—I do not know; it was before the House.

26. *Mr. Reed.*] In connection with this examination for underviewers and deputies, do you not think, if the examination were made harder, it might exclude some good practical men who have not much education?—Well, everything is changing nowadays. The old conditions are passing away, and the newer conditions with education are coming to the front. With education it is necessary for everybody to keep up with the times.

27. Supposing we had had a stiff examination at the start, and it had resulted in many men failing, what would the companies have done for deputies?—It would have been very difficult for them.

28. Do the deputies realize that that was the reason for making the examination easy?—Yes, I think so; it was known.

29. To permit the mines to continue working?—Yes.

30. Are you aware that that section of the Act came into operation when none of the deputies had certificates?—I am not sure on that point. I thought the time was extended so that the men might have time to get certificates.

31. Would you be in favour of the examination being made harder now?—Well, I look at it from this point of view: if you are going to require the men to sit for a ticket it is no use making it a farce.

32. Would you be in favour of the men being tested in the presence of gas?—Yes, I think that is a necessary qualification—that the men should have the knowledge.

33. How do you think it ought to be arranged in places where there are no gaseous mines?—They could practice with artificial gas.

34. Would the deputies' association approve of the standard of the examination being raised?—I think so, on the whole. I do not know as to the question of these service men having to pass the examination. I do not think they would be able to study to go in for the examination. I am afraid it would be asking rather much of them.

35. *Mr. Dowgray.*] Did your union discuss this matter from the point of view of raising the status of the deputies or making it a monopoly?—To raise the status.

36. There would not be anything in the way of all the others being required to qualify to pass the examination?—Except from the educational standpoint.

37. If the standard of the examination were raised, say, this year, would there not be a danger of the managers taking only those men who had the better tickets to your detriment?—I do not know.

EDMUND POWER sworn and examined. (No. 54.)

1. *The Chairman.*] What are you?—An engine-driver.

2. With how many years' experience?—About twenty-four, engine-driving and firing.

3. What matters do you wish to bring before the Commission?—The matter of alterations in the boiler-sheds. We have boilers about 12 ft. high on the top and somewhere about 8 ft. apart, and we have only a 6 in. plank to go across. Also, on the front of the boilers it is about 12 ft. high, and if you have any repairs to make you have to stand on a ladder. It is very awkward, and we think it unsafe. There should be platforms from boiler to boiler, and a grating so as to meet in the centre and capable of being turned back when you do not want to use it. And at the fan in the Cascade section you have to climb up a ladder 5 ft. or 6 ft. high. It is very easy to slip, because everything is greasy. I think there should be a staging there.

4. *Mr. Reed.*] As regards the boilers, you say they are dangerous: what is the Inspector of boilers doing to allow that?—Well, the Inspector crosses those 6 in. planks and climbs the ladders annually, and nothing has been done.

5. Has the Inspector of boilers certified everything correct?—Well, he examines the boilers.

6. How long does he spend inspecting your boilers here?—About an hour or an hour and a half.

7. Do you carry out the hydraulic test?—Yes, under the supervision of our engineer.

8. At what pressure?—Our working-pressure is 120 lb., and they are tested up to 240 lb.—double the working-pressure.

9. Do you think that a good test?—Yes.

10. Have you worked in connection with boilers in any other country?—I have only worked here.

11. And they carry out the hydraulic test here?—Yes, of late years.

12. You think it is an adequate and necessary test?—Yes. I cannot say I approve of it, all the same.

13. What would you prefer to it?—If you have a boiler working to 120 lb., and you double that to 240 lb., it is quite possible that that boiler will stand the test, but it might be strained and you would not know anything about it.

14. Do you consider it an adequate test?—Yes.

15. *Mr. Dowgray.*] It is the compressors you are working with?—Yes.

16. Do you work by yourself?—Yes.

17. The question has been raised as to a man being allowed to work by himself on the night shift?—I have worked on the night shift, but I am not doing so at present.

18. Do you think there is danger with a man being left by himself?—Most certainly. You have a fan a certain distance from your plant, and anything might happen to the man—he might have a fall, for instance—and he would have to lay there till some one came along. I think it is absurd to ask any man to go on night shift without somebody with him.

RUNANGA (PUBLIC LIBRARY).—27TH OCTOBER, 1911.

JAMES NEWTON examined. (No. 55.)

1. *The Chairman.*] You are Inspector of Mines for this district?—Yes.

2. You have some documents referring to the Point Elizabeth State Colliery to hand to the Commission, I understand?—Yes: list of accidents, air-measurements, and number of employees in the Point Elizabeth State Colliery. [Exhibit No. 24 put in.]

JOHN ARBUCKLE sworn and examined. (No. 56.)

1. *The Chairman.*] What are you?—A miner.

2. Do you hold any office in the union?—I am secretary of the Accident Fund at the present time. Until recently I have been a check inspector, and I was a member of the executive of the State Miners' Union.

3. What matters do you wish to bring before the Commission?—I produce a statement showing the whole of the fatal accidents which have occurred in the mine, and also a list of all accidents which have happened since 1909. There were fifteen accidents, however, which have not been printed. These lists are copied from my books. [Exhibit No. 25 put in.]

4. All the men referred to in these lists have received relief from the fund?—Yes.

5. Have you given the time during which they were on the fund?—No.

6. You swear these are correct extracts from your books?—I do.

7. Do you know the amount of relief paid during that period?—No.

8. Did you come into personal contact with these men?—Yes, since the beginning of 1911.

9. Have you anything further to add?—I would like to say that the sanitation in the State coal-mine, in my opinion, is really disgraceful.

10. What sanitary arrangements have you there?—I consider that a pan should be placed in every incline or small section containing men, and that it should be emptied every night where there is only one shift working.

11. We have had a suggestion made to us that a truck should be used, because there are objections to the use of the pan system. The idea is that a truck, with some ashes or dust and a shovel kept handy, should be used, and that the excreta should be thrown into the truck, which could be run out and emptied?—Well, my opinion is that a pan with a patent cover would be much better.

12. It has been stated that the men stand on the seats and refuse to use them properly where there is a mixed crowd?—I should much prefer the pan system myself. I do not think there would be any objection if they were emptied every day.

13. Are there any sanitary arrangements in this mine?—None whatever. The men simply go and use an old bord where it has been worked out. On one occasion when I was check inspecting I visited a place where two men were just starting a pillar. Within 3 ft. there was a place which had been used for that purpose for five or six months. It was like a well that had been sunk and then filled in. I drew the manager's attention to it, and he said it was a pity the men did not cover it up.

14. Do you wish to refer to any other matters?—In regard to timbering, I consider that one-half the timber going into the State mine is unequal to the use it is put to. The props are very inferior, and not worth putting up for holding any body of material.

15. What is your objection to them?—They are too small, and split. Then, again, some of the bars are three-cornered, but in lots of cases they are not; also they are not of first-class quality. They do not fit as they should do, and instead of taking the weight when it is put on they swing and push out. I hold that every prop should be collared when used for bars, and then there would be no swinging of timber.

16. How would you remedy that? Would you fix a size of prop or bar to be used?—The bar is immaterial, because sometimes you have to cut it. I consider they ought all to be 8 in. through, and the props about the same.

17. Round timber or split?—Round timber preferably. But all the bars used should be round. At present one-half the bars that are put up are split, and when the weight comes on they break in halves. Then, in regard to the air in the mine, I think there is insufficient air travelling in the mine under the present system—the splits are too big. I consider there should be a split for every fair-sized section. At present one of these large splits supplies practically one side of the mine. When the shot-firers are going round they start firing at the bottom or the top, as the case may be, and when they are at one end the last pair of men are getting the whole of the smoke. They receive all the smoke from the other sets of men in the section. There is also another matter I wish to refer to while I am on the subject of air. The air may come up in sufficient quantities, but when it is turned into a bord it is turned in with brattice, and while portion of the air may go straight through the majority leaks off the brattice, and consequently the full force of the air is lost before it gets into the working-face; and when a man fires a shot the smoke has a tendency to remain there for a good while—it is not cleared away as it should be. I consider that in from two to three minutes the place should be clear of smoke.

18. You advocate separate splits for the separate sections?—Yes.

19. *Mr. Dowgray.*] Is there not one of the mines here ventilated by separate splits?—Yes. No. 1 has more splits than No. 2. I have worked in both sections.

20. How long have you been a miner?—I have had twenty years' experience all over the colonies. I went in as a lad at fourteen years, and have been practically ever since connected with mining.

21. What other mines have you worked in?—In New Zealand I have not worked in any except this one, but in New South Wales I worked in the Hartley Vale Mine, and also in most of the Newcastle mines; in Victoria I worked in the Coal Creek Mine; and in Tasmania I worked in a small mine.

22. How does the pillar-extraction here compare with that in the other mines you have worked in?—Very unfavourably.

23. In what respect?—In the first place, in other mines, as a rule, they never use the old bords. Here the road is laid through the old bord, where the roof has had time to bag, and the whole of the bord is likely to collapse at any minute. In other places they do away with the old bords, and take splits right up the side of the pillar. That is called "siding over." By the time you get to the bord you have the open ground on one side and nothing on the other. Since there have been so many accidents here they have put in chocks. In other places, where the roof is not as dangerous as it is here, they come in with a narrow split and get a good support on each side. Here you are not into safety until you are out to the flat sheet. I consider the bords have been driven too wide.

24. *The Chairman.*] Do you advocate splitting pillars?—Yes.

25. *Mr. Dowgray.*] Is there anything to prevent these pillars from being split?—No, not as far as I know.

26. Is there any difficulty in regard to the angle at which the coal lies?—No. It has to be jigged down in the majority of places, and if they drove a split up it would just be the same.

27. *The Chairman.*] What is the size of the pillars here?—Sometimes they are 4 or 5 yards, and sometimes 9. A bord may be set off to be driven 8 yards wide, but before it has gone far it may be 10 yards wide—they may have encroached upon the pillar. Consequently the pillar is only half the thickness it should be.

28. Who makes that encroachment?—The miners make it, but the management is there to see that it is not done. Even in the event of the miner doing it the blame must lie on the management for allowing him to do it.

29. Do you know what is the rule of the management in regard to the width of bords?—The recognized width is 6 yards, but I consider that too wide.

30. *Mr. Dowgray.*] What do you consider a safe width?—Nothing more than 4 yards at the outside.

31. *The Chairman.*] Supposing the bords were driven the regulation width, what would be the size of the pillars?—According to the plans they would be something like 8 yards.

32. *Mr. Dowgray.*] In driving a narrow split through a pillar, has the management to pay solid rates?—Yes.

33. *Mr. Parry.*] As regards timbering, how does this mine compare with the other mines you have worked in?—Not well.

34. Have you ever worked in a mine with a similar roof?—Yes, just as dangerous, if not more so.

35. What was the mode of timbering there?—More chocks or pigstyes were used. In the Hartley Vale it was all broken roof. Nearly all the props were collared, and there were chocks all along. During a period of twelve years there were only two fatal accidents in that mine, and very few minor accidents.

36. Do you think it is possible for the timber standing as it does in this mine to take the weight without being stayed?—In many cases, no. A man has to be a thoroughly practical man to set his timber so as to take the weight.

37. The use of pigstyes or chocks would get over that difficulty?—Certainly. You have a fair illustration of that in the place where White was killed some time ago. I have worked in that section of the mine, but have never seen a chock, when used, fail to stay a fall or cut it off.

38. Had you seen split timber used for bars before?—No, not where there was any body of ground to hold.

39. Do you think it is a dangerous practice?—Yes, certainly.

40. *Mr. Fletcher.*] You say that the bords are supposed to be driven 6 yards wide?—That is the widest. In cases where there has been a very bad roof it has been reduced to 4 yards.

41. How is it that in some places the bords are 10 yards wide? Whose fault is that?—I take it that it is the manager's fault.

42. Do you not think the men should help the management in the matter?—Well, only one-half the men are practical, and if the others are allowed to break the rule it is the fault of the management for permitting them to do so.

43. Supposing the manager discharged a man for robbing a pillar?—I think that any sensible body of men would uphold such an action on the part of the manager.

44. *Mr. Cochrane.*] You stated that you worked in a mine with as bad a roof as this one, and that there were only two fatalities in twelve years. Which mine was that?—The Hartley Vale Mine.

45. How many men were working there?—As high as two hundred.

46. *Mr. Dowgray.*] You referred to men not being practical. In a mine such as this do you think that men should get on the coal before they have shown that they are capable miners?—I think that no man should have charge of a place until he has from two to five years' experience.

47. It has been suggested that a man should have two years' experience before he has charge of a place by himself, and three months with an experienced miner?—I do not think he would be capable in less time than that.

JOHN GLOVER sworn and examined. (No. 57.)

1. *The Chairman.*] What are you?—A miner, and workmen's inspector.

2. Do you hold any office in the union?—I am treasurer of the union, and secretary of the New Zealand Federation of Labour.

3. How many years' experience have you had as a miner?—Thirty years in and about mines—fifteen years as a miner. I have had experience in Staffordshire, Lancashire, and at the State mine here.

4. Has your union discussed the matters which you wish to bring before the Commission?—Yes.

5. Are you prepared to speak on these subjects on behalf of the union?—Yes.

6. What is your membership?—About four hundred and fifty.

7. Are you unanimous on the points you wish to lay before us?—The union left it to the executive.

8. And who are the executive?—The president (Mr. P. C. Webb), vice-president (Mr. H. Coppersmith), secretary (Mr. G. H. Hunter), treasurer (myself), and three other members, who will give evidence later.

9. Now, what is it you wish to lay before the Commission?—In the matter of ventilation, we contend that the mine should be divided into sections, as is the case in No. 1 mine. No. 2 mine is not divided: the system of ventilation is altogether different. If the air in No. 2 mine were distributed similarly to that in No. 1, the conditions would be better than they are. Then, when you get down on to the second level, you would notice that the coal is heating and giving off gases. You yourself, Mr. Chairman, asked the Inspector of Mines what caused the smell, and he said it was sulphuretted hydrogen. If the air were split it would be taken into the return, and not mixed with the air the men have to breathe, because we think the air is sufficiently vitiated with the explosive smoke without having it mixed with sulphuretted hydrogen, which could easily be conducted into the return if the mine were split into sections. The present system is causing the men to suffer from ill health unnecessarily. I happen to be working in a district of the mine which gets the air after the other places, and am satisfied that we do not get sufficient air.

10. How many places does the air go into after that sulphuretted hydrogen joins it?—I should say thirty-five to forty places. In the No. 2 mine there are about fifty-seven places working, and in No. 1, which is split into sections, there are only about thirty places working. Then, we contend that a sufficient quantity of air should sweep round the faces to keep them clear of all gases and explosive smoke. We know that the minimum is 150 cubic feet per man per minute, and 600 cubic feet per horse. That may be quite sufficient where there is no blasting going on, but where there is blasting a larger quantity of air should be circulating round the faces to keep them clear or to make them clear in a reasonable time.

11. How long does it take the face to become reasonably clear now after firing?—Ten minutes or a quarter of an hour at the least, even in a place which gets the full sweep of all the air that is going. In connection with sanitation, my executive is of opinion that the pan system should be introduced. Up to the present time there has been no system of sanitation at all in the mines here. As was said by the last witness, the sanitation is very bad. I think the members of the Commission had only to use their senses when inspecting the mine yesterday to appreciate how bad it is. The pan system should be introduced, and the pans cleaned out every twenty-four hours.

12. Have you anything to say as to the truck system?—Personally, I think it might be a good idea if the truck system were introduced, for I know that many men have an objection to using pans after other men. We also contend that the provision of bath-houses and change-houses at every mine should be made compulsory. At the present time a great many workmen live some distance from the mine, and even for those who live handy it would be a great deal better for them to have a bath when they come out of the mine. They are hot when they finish, and if they could get a bath then it would be conducive to an improvement in their health. Hot and cold water should be provided.

13. How many men to a bath would you recommend?—Well, that is a question: not more than four, I should think, because you do not want to keep the men waiting about a long time. And we also think that, in addition to the bath, there should be a shower.

14. Then, in your original recommendation you meant plunge-baths?—Yes.

15. In some places shower-baths have been advocated in preference to plunge-baths, because it is said it has been found that the men do not pull the plugs out after bathing. The suggestion has been made that hot and cold showers would be sufficient and satisfactory?—I think you want something in addition to that. Large hand-basins are what you want.

16. And not less than one bath to four men—that is, plunge-baths?—I contended for extra-large basins. They would not require the same number of plunge-baths as they would hand-basins.

17. What proportion of the men, do you think, would use the baths?—That is difficult to say. Not more than 50 per cent. would use the plunge-baths, but a much higher percentage would use the showers and basins.

18. How would you determine whether the baths should be erected or not?—You could take a ballot on the matter.

19. And on what proportion of men willing to use the baths would it be reasonable to ask the management to install them—50 or 75 per cent., do you think?—I consider that the baths should be made compulsory, and every man should be made to wash in them if they were installed. It would be absolutely useless to have the baths erected if the men do not use them.

20. But how are you going to compel the men to use them?—I do not think there would be any difficulty in the matter—in fact, the percentage who would refuse to use them would be infinitesimal. Miners, on the whole, are not an uncleanly lot of men, although they are looked upon as such.

21. Do you think it would be fair, after the baths are installed, to make a charge for their upkeep?—No.

22. In this particular mine, what facilities would be available for laying on water?—Good facilities.

23. Is the water handy?—Yes. The next subject I wish to refer to is the prevention of accidents. As has been said by the secretary to the Accident Fund, this mine has gained a notoriety as regards fatal and other accidents. I think the statement which he placed before you shows that there have been over two hundred accidents in two years, while the men employed number four hundred. A very large number of accidents have occurred during the six or seven years during which the mine has been working, and we have suggestions to make which we think will prevent them. There is no doubt that a great many accidents happen in connection with the extraction of pillars, and we consider that more chocks should be used; also, that not more than one pair of men should be engaged extracting a pillar. At the present time there are two and three pairs of men at work on one pillar, and we consider that practice dangerous. If many men are working at a pillar which is 16 or 25 yards wide, the men cannot be at sufficient distance from one another to hear when the ground is moving.

24. What size are the pillars?—All sizes. The bords have been driven any way—in fact, there have been cases where bords have been driven into one another. That shows that the management has not had any knowledge of the quantity of coal between the bords. I think that is the result of bords not being driven by sights. We contend that all bords should be driven not more than 9 ft. or 12 ft. wide, and that the pillars should be left bigger or smaller than they are at the present time. The majority of the pillars will perhaps be 10 or 12 yards. If the pillars were left a little larger a greater percentage of coal could be won easier.

25. Cannot the miners themselves stop the robbing?—But it is not altogether their fault that these bords have been driven so wide. The rule laid down by the management is that a bord shall be broken away 12 ft. wide for the first 3 yards, and then opened out to 18 ft. wide. The management can bring that down to 16 ft. wide. The coal is of a friable nature, and when it falls there is a great temptation to the miner to fill it. The average height is from 10 ft. to 14 ft., and we contend that if the bords were driven about 8 ft. high, and from 9 ft. to 12 ft. wide, the air would not have the same action upon the coal as it has at present, causing it to frit away. We also contend that when a pillar is being taken out chocks should be set, even if the old bord is good; new timber should be put in, and chocks set all along.

26. What do you call an "old bord": how long should it have been driven?—I think any bord six months old should be retimbered.

27. You agree with the last witness as to the class of timber—that it ought to be heavier and of better quality?—Yes.

28. And as to the sort of wood?—Yes. It should be pine and birch, I think. The timber used does not appear to be of the best quality; it is too full of sap.

29. If you got a good large tree—I do not mean just a sapling—which you could split into a number of props, would not that make good props, as long as you did not split them too small?—It would be all right for props, but not for bars.

30. You prefer the round bar?—The miners find it much easier to get the round bar or cap to sit after it has been bevelled at the ends. Then, we contend that the timbering in all these places should be done in a systematic manner. We think the props should be not more than 4 ft. apart. You will see by the list that a great number of accidents have resulted from falls of stone, and yet in those places the roof has been considered safe. We consider that timbering should be done whether the roof is considered safe or not.

31. Who does the timbering, the miners?—Yes.

32. Who supervises the timbering?—The deputy.

33. The man in charge of the pillar or face does the timbering himself?—Yes.

34. What have you to say as to the experience necessary for a man to become competent to do timbering?—I think, if a man is required to have two years' experience prior to having charge of a coal-face, he should have two years' experience in setting timber.

35. But he might have worked in a mine which was fairly safe?—Still, if systematic timbering is insisted on he would have done some timbering, no matter whether the mine was considered safe or unsafe. Then, we consider another cause of accidents is the use of chain jigs. This is not the first time we have spoken against the use of chain jigs. We consider it is an obsolete custom, not only by reason of its causing accidents directly, but also as the indirect cause of them. If you will look down the list of accidents you will see that a fatal accident occurred in October, 1909, when one man was killed and four others injured. That accident occurred at a place where two

men were breaking away a bord on one side and two on the other side of the sheet, and somehow the whole of the ground collapsed. We contend that had a chain jig not been in use there the men would have heard the ground moving, but with the chain jig in motion they could not hear anything. I may say that the fall took place directly after the truck arrived at the top. The accident could not be traced directly to the use of the jig, but we contend that it was the indirect result of its use. Then, there have been innumerable accidents caused through men, when pulling up the jigs, getting their fingers caught between the chain and the wheel.

36. What other method do you use besides the chain?—There are ropes and brakes in some places, and these should be used in all jigs except in face-jigs. Where a chain is used an anchor chain should be used in addition.

37. How do the two systems compare for vibration?—There is more vibration with the chain jig. On most of the jigs there is no wheel. A couple of fish-plates are put on a prop and the chain runs round that, and that affects the roof. Allen and Nicholson were injured by a fall brought down in that way in No. 2 mine.

38. What does the rope run through in a rope jig?—It runs round a wheel. Then, we contend that in every coal-mining district there should be a depot, as there is at Home, for the testing of fire-fighting appliances. Such a depot should be established here, so that if a fire does take place the men would be ready to fight it, and so save a great number of lives perhaps. Then, we think the workmen's inspectors should have more powers than they have at the present time. At any rate, where a place is considered dangerous he should have the power to suspend operations until the Inspector of Mines can visit the scene.

39. What is the practice here in regard to inspections by workmen's inspectors?—The workmen's inspector goes round the mine, accompanied by the mine-manager, and reports anything which is dangerous.

40. How often do they go round?—Once a month, unless something unforeseen turns up. If a man complains a special visit is made.

41. There have been representations made to us on this subject of the extension of the powers of workmen's inspectors. It has been suggested that if a check inspector wishes the power to stop a place he should pass some examination, or show that he is qualified to express an opinion upon the question—such an examination, for instance, as a deputy is required to pass. Have you anything to say as to that?—I do not think it would raise the status of the workmen's inspector if he had to pass an examination. As far as I can learn, the passing of the examination has not raised the status of the deputy. The main point is as to whether a man is a practical miner, and I do not think the miners will ever put in a man as a workmen's inspector unless he is practical. Then, we contend that another cause of accident is the speeding-up process. There is no doubt that the present system of coal-getting—the contract system—is responsible to a certain extent for a great number of accidents, because the men take risks in order to earn a big wage which they ought not to take, and we contend that it will be almost an impossibility to prevent the accidents until such time as the system is done away with and the wage system introduced. We also recommend that in the opening up of all new coal-mines and winning-places should be taken to the boundary before commencing bord-and-pillar work. There is no doubt that a large number of accidents are the result of the companies trying to put coal on the market at an early date.

42. *Mr. Dowgray.*] In connection with the bath question, you said you were in favour of the compulsory use of baths by the miners?—Yes.

43. Have the whole of the miners agreed to that?—No.

44. How would you set about finding out whether the baths should be installed or not? Would you take a ballot of the men?—Yes, decidedly.

45. And if the men decided in favour of the baths you would make it compulsory?—Yes.

46. Then you do not agree that it should be left optional whether the men use them or not?—I quite agree that in some cases a certain allowance should be made, because we know that some men have a decided objection to stripping in front of others through some affliction. I do not think it should be made altogether compulsory, but where men endeavour to avoid the use of the bath simply because of their lack of cleanliness it should be made compulsory.

47. Do you not think that the use of the baths would become almost universal once they were erected?—Yes.

48. Do you suggest that the showers should be covered in?—Yes.

49. You stated, in reply to the Chairman, that the bords sometimes run into one another: are the workmen to blame for that, or the management?—The management.

50. *The Chairman.*] In what way?—Because the management should know by the plans the quantity of coal there is, and the distance between the bords. If the bords were driven by sight, and not in a haphazard way, that would not occur.

51. *Mr. Dowgray.*] Is it not a fact that the management sometimes alters your course?—Yes.

52. And the workmen are not always to blame?—No.

53. The chain jigs you referred to are the jigs away from the face?—Yes. These should be wire ropes instead of chains.

54. And all face-jigs should have anchor chains?—Yes.

55. In connection with check inspections, do you agree that these should be made only once a month? Here you have no difficulty in making more frequent inspections if necessary, but in other places they have?—I think the check inspector should have the power to examine the mine at any time. We have no difficulty here in regard to that matter.

56. *The Chairman.*] There has been a suggestion made that the Act should be amended to enable the Inspector of Mines to give the workmen's inspector authority in writing to inspect a mine more frequently than once a month, and for that authority to remain in force as long as the Inspector of Mines considered it necessary?—That might suit us in some cases, but in others it might be against us.

57. Would it be desirable for the Inspector of Mines to have power to give the workmen's inspector extended powers?—It might be so in some cases, but not in others.

58. What do you mean by that?—I mean that in some places the union might have sufficient power behind it to compel the Inspector of Mines to give that permission, but in other places they might not have that power.

59. In connection with timbering, do your sets come in to you prepared, or do you have to prepare them yourself?—They are supposed to come to us all ready prepared, but in some instances they do not. Our contention is that all sets should be prepared before they come into the mine, and be quite ready to be put up.

60. Can you give us any idea of the method of drawing timber here, and your opinion of it?—The drawing of timber, as far as I know, is all done by the deputies, but the men have at times drawn it with pick and hammer. We contend that that practice is dangerous, and should not be allowed. All timber should be drawn by mechanical means, such as the Sylvester.

61. Is it necessary for the timber to be drawn at all?—Yes, it is much safer for the men taking out the pillars.

62. *Mr. Cochrane.*] Have you yourself noticed any signs of the presence of sulphuretted hydrogen in this mine?—Yes.

63. Do you know the usual products of that?—No.

64. Is it not black damp?—Yes, that is what we have been given to understand.

65. Then, as to the timbering, are you paid for putting up the sets?—Yes.

66. Are you paid for putting up the props?—No.

67. Then, as to driving the bords by sight, is that not impracticable with a varying dip such as occurs in this mine?—No, the dip varies in the different sections; but a section may go for a long distance and not vary at all.

68. You mean that when driving the bords there should be a continual survey going on?—Yes.

69. You favour driving the bords 8 ft. high?—Yes, in the high coal. I contend it is the action of the air on the roof which causes it to break.

70. Would you recover the top coal separately or by pillar-work?—By pillar-work.

71. Have you worked in thick seams in Staffordshire?—No; I worked in an 8 ft. seam there.

72. *Mr. Reed.*] You recommended that all winning-places should be driven to the boundary?—Yes.

73. Now, take the new colliery here, No. 2: how many years do you think it would take the Government to drive the winning-places to the boundary there?—I have no idea of the extent of the coalfield.

74. Well, imagine that it is a mile to the boundary—that would not be unreasonable?—No.

75. If the Government had to drive the winning-places to the boundary, what would happen to the colliers in the meantime? Would they not be out of work?—I do not think that is a fair question.

76. As regards your reference to the contract system in coal-mines, did you not mean the piecework system?—Yes.

77. Are you working on the coal?—Yes.

78. Which would you personally prefer—to be able to make a large wage by your own exertion, or to be put down upon a minimum wage?—I am working on a minimum wage at present—12s. a day.

79. Which would you prefer—piecework or day wages?—If I had a living-wage assured I should prefer wages.

JOSEPH FALCON PATTINSON sworn and examined. (No. 58.)

1. *The Chairman.*] What are you?—A coal-miner.

2. With how many years' experience?—Fifteen.

3. Where?—Throughout New Zealand. I have been five or six years in the State mine.

4. Have you any office in the union?—I am a member of the executive, and a workmen's inspector.

5. What matters do you wish to bring before the Commission?—In connection with ventilation, I agree with the evidence given by the last witness on that subject.

6. Have you anything to add on any subject?—Yes, I think that the fans should be kept constantly going. They are constantly going in this mine, but I am speaking generally as to all coal-mines. Also, in connection with the supervision of the air, I contend that a person or persons should be told off specially to look after the distribution of the air. My reason for that is that when shots are fired the concussion causes the brattice to come away from the roof; the disturbance of the floor or the roof has the same effect. As regards sanitation, I agree with the views of the last witness, and also as to baths; shower-baths and basins, with hot and cold water, should be provided. A particular point I wish to make is this: that these things must be kept clean, otherwise men will not avail themselves of them. I have heard men say that the pans or baths have not been kept in a satisfactory condition where they have been provided in other places. If they are not kept clean we are better not to have them.

7. What is your opinion as to making the use of the baths compulsory?—Well, I think the matter of cleanliness will settle that point. If the baths are clean there is no doubt that the men will use them. In regard to the question of timbering, I agree with the last witness as to the necessity for setting the timber not more than 4 ft. apart—less, if necessary—that is, for props and bars, and chocks to be 5 yards apart, and less if necessary. Timbering is a very important factor. During my inspections I have had several complaints from men that they have not been able to get

the timber cut into proper lengths, and as to its not being supplied when wanted; also that when it was supplied perhaps it was round at both ends. It is ridiculous to have the supply of timber supervised in that fashion. A man should be appointed to supervise the supply of timber for each section—it is necessary that the men should get their timber expeditiously.

8. What would be a fair size for a district for one man to look after?—That could be easily decided, though there would be no necessity to provide for the size by Act. The management could soon get an idea as to what area a man could look after. I want to make it plain here that the supervision of this timber has been very badly attended to. For instance, it is quite common for them to send in split props as bars not properly trimmed and with the legs not squared. It is an important matter, because life depends upon the timbering. The question of dust in mines has not yet been dealt with, I think. I contend that all mines should be kept clear of dust. It should be either taken away or made thoroughly wet. I also contend that it is necessary for telephones to be installed in mines for the purpose of communication in case of accidents. I also think that men should undergo a course of practice in ambulance work. No doubt the deputies have to pass a slight examination on that subject, but I feel that it is necessary for them to have practice to keep them in touch with the work. The same applies to fire-fighting appliances.

9. What would you suggest to induce the men to undergo this practice?—I think men are beginning to realize the fact that life is worth something. They feel for each other, and I am sure they will be only too pleased to undergo a training if they can only get the necessary facilities.

10. If these ambulance and fire-fighting appliances are provided, how are you going to compel the men to take the exercises?—I do not think you could compel them, but I think they would willingly offer their services for the purpose.

11. *Mr. Parry.*] I take it that by their own organization they would do that?—Yes, I think so.

12. *The Chairman.*] What guarantee have you that the men would bother with them?—Through our union we know that men could be got to offer their assistance for the work. I wish to say also that I agree with the last witness in the necessity for wire ropes being used instead of jig-chains. I would also suggest that the use of anchor hooks should be made compulsory in face-jigs. In many instances the boxes get away from the faces, causing accidents to the men and to the colliery. In regard to the grading of the inclines, here in this mine I have found when on my rounds that the men have to do a great deal of pulling on the chains, and I think if a little expense were incurred in grading these inclines it would save the present bullocking and consequent injury to the truckers. As the result of the present system there are numbers of men suffering from strains of different characters and from ruptures. While on this point I might say that I do not think a trucker should have to leave his jig-head. The moment he has sent his truck away his place is at the wheel. We have had several accidents on flat-sheets. The trucker should be at the wheel, just as the driver should be at his engine. I also contend that roadways should not be less than 6 ft. high. There are places in No. 2 mine which are very low. If these roads were higher you would get the timber up more expeditiously, and in other ways it would give a man more room.

13. Supposing you have not got the coal?—Well, if there is only 4 ft. of coal the roadway should be brushed to give a 6 ft. roadway. If that were done it would be easier on the truckers. I consider that both the Inspector of Mines and the check inspector should have greater powers. The check inspector should have the power to stop a place pending the visit of the Inspector of Mines. They must have more powers, otherwise their inspections are of no use. I have gone round and found places where men were working which were not fit for a cat to go into. The stone was hanging in such a disgraceful position that we should have the power to stop such places. It seems to me that men entering that mine are going to their doom. When I say this I speak conscientiously. Then there is the matter of the relighting of the safety-lamps when they go out. Under the present Act the miner has to go back to station and have his lamp relit, but in many instances the station is some distance away, and I think there should be some better method than the present one.

14. Can you suggest any?—Well, probably an arrangement could be made for a man to have his lamp relit at the bottom of the incline—that would do away with walking to the cabin.

15. You want some one to go round for the purpose: how are you going to let him know that a lamp wants relighting?—The lamps are sent down in the trucks and put in the cabin, but they stop there unless the miners go out for them. A miner does not like the idea of walking a long distance to get his lamp. I want to say that I quite agree with the evidence of the last witness in regard to the speeding-up system. In regard to coal-extraction, I contend that for the sake of life and limb the levels should be driven to the boundary before opening out on bord-and-pillar work. During your inspection you will have noticed that nine out of ten of the bords that have been driven have fallen, whereas if the mines were worked to the boundary it would be much easier and safer to extract the coal—the roof would not be disturbed as it is at present. There should be a systematic method of driving bords: they should be driven so as to make uniform pillars. Here we have pillars of all dimensions, and that tends to cause accidents. The manager does not know where he is. Another question I wish to bring up is in regard to the section you visited yesterday where the timber was falling through to the seam below. I understand that the seam below varies from 18 ft. to 24 ft. If that is so, the place is dangerous, and the conditions should not be allowed to exist. No seam below should be worked until the higher seam is finished.

16. *Mr. Dowgray.*] In speaking of the timbering you made reference to some one being told off to look after the timber-supply: if you turn to the Coal-mines Act you will see that it is provided that the deputy or underviewer "shall see that a sufficient quantity of timber for props and other purposes is daily supplied to the workmen, and cause the same to be cut in proper lengths and laid down in the working-places"?—Yes; along with my fellow-inspector I have drawn the attention of the manager to the matter, but he did not do anything until just lately.

Lately the timber has been cut square at both ends, and some of the bars have been dressed; but even then the deputy is looking after the timber at the present time. I contend that a deputy cannot be doing two or three things at once—he may be away renewing brattice or attending to the firing of shots. We may order timber and may not be able to find where the deputy is.

17. Then the deputy has too much work to attend to?—Yes. In No. 1 mine I think there are two or three more deputies for the men than there are in No. 2.

18. *Mr. Parry.*] How do the conditions in this mine at present compare with those of, say, six months ago?—It has been "swept up" considerably this last fortnight. I would suggest that the Commission should go round every six weeks—it would be a boon to the miner.

WILLIAM ROBSON affirmed and examined. (No. 59.)

1. *The Chairman.*] What are you?—A miner.
2. With how many years' experience?—Twenty-seven.
3. Where?—Four years in New Zealand and twenty-three years in the Old Country.
4. Do you hold any office in the union?—Yes, I am on the executive, and also a check inspector.
5. What matters do you wish to bring before the Commission?—I have nothing to say in regard to ventilation further than what has already been stated by previous witnesses. In regard to sanitation, I think the two suggestions before you are both good. In respect to bath-houses, I think the shower-baths and basins are the best system; they are much cleaner than the plunge-baths. Speaking as to timbering, we have had several complaints as to the supply of timber, and have reported them to the manager. There seems to have been very little notice taken of our reports, however. The manager simply said he would see things put right, though the Act says that the timber shall be prepared for the men and brought into the face. I advocate that all bars should be round—sometimes they are cut sharp at both ends, just as it comes out of the bush. Then, if the miner cuts it himself he finds the legs too short. In regard to pillar-extraction, I would like to direct your attention to the place where I was working yesterday and which the Commissioners saw. There are four pairs of men working there right behind each other all the way. There are only 4 yards of coal between the two men. The top place started to work and came right down after you left. To prevent that sort of thing chocks should be put in both above and below the men.
6. *Mr. Parry.*] That is, a systematic method of timbering is required?—Yes. In regard to chain jigs, I may say that I have had experience of them, having nearly lost my life through one. I agree with the previous witness that inclines should be graded — a miner exhausts himself pulling up the jig-chains, and there is nothing but the flat-sheet to stand on. I split my finger and nearly bled to death when working a chain jig. We should have rope jigs instead of chains, and the inclines should be graded. The next point I wish to touch on is in regard to the travelling-roads, which should be kept clear of coaldust by sending it out of the mine. When we reported our opinion on this matter to the bosses they said there was no fear whatever, but from what I have read coaldust is the cause of explosions in the Old Country. Then I wish to refer to the condition of the lamps used in this mine. We have to use lamps which you would say had been smoked; they are in a disgraceful condition, and though we have drawn the manager's attention to them, they have not been attended to. The best lamps burn brightly and are satisfactory, but not those supplied to the miners. I also advocate the use of anchor-chains on the face-jigs. Then, there is another matter to which I wish to direct your attention, which has reference to the reports of the Inspector of Mines. He visits the mine and makes inspections, but we have no means of finding out whether he makes any complaints to the management as to the conditions he finds obtaining in the mine. We think we should be allowed to see his reports on the mine. If we saw his reports we would get some idea as to whether he was doing his duty. I think also a deputy should have no more than from four to six pairs of men to look after; then he could take the lamps out of a man's place, light them, and also see to the timber and the shot-firing.

EDWARD SMITH sworn and examined. (No. 60.)

1. *The Chairman.*] What are you?—A miner.
2. With how many years' experience?—Fourteen.
3. Where?—In the Brunner and State mines.
4. Are you a check inspector?—Yes.
5. Have you any other office in the union?—I am on the executive.
6. What do you wish to bring before the Commission?—I do not know that I have anything to say except to agree with the last speaker's views. I would like, however, to protest against the present system of shot-lighting. When you want to light a fuse you put your wire through and light the fuse, and it goes off like a packet of crackers sometimes.
7. What is your objection?—I do not think it is safe; when there is any gas about it is apt to explode.
8. What method should be adopted?—I think there should be a battery with which to fire the shots.
9. Do they use the safety lighter here?—Sometimes they do and sometimes they do not.
10. Is the use of the safety lighter a satisfactory method?—No, I do not think so. I have seen them used when the fuse has caught fire, making a blaze.
11. You agree with the other witnesses in regard to timbering?—Yes; with them I think that bars should be set not more than 4 ft. apart, and less if necessary.
12. What have you to say as to shower-baths and basins, as advocated by the last witness?—I think their provision would be a good thing. I myself would not get into a plunge-bath after another man had been in it.

PATRICK CHARLES WEBB affirmed and examined. (No. 61.)

1. *The Chairman.*] What are you?—A miner.

2. How many years' experience have you had?—About twelve years altogether—about six years in the State mine.

3. Where?—All over the Coast—at Denniston, Blackball, Paparoa, and in the State mine.

4. Are you a check inspector or do you hold any office in the union?—I am president of the miners' union and of the federation also.

5. What matters do you wish to bring before the Commission?—I think most of the subjects have already been very fully dealt with by previous witnesses, whose sentiments I indorse, but I wish to enlarge upon one or two points. Firstly, in regard to pillar-extraction: for some years we have been protesting very vigorously against the present practice of leaving so much gob, and I am satisfied that as the result of that method of working several men are lying in their graves at Greymouth to-day. White and Baker, the last two men killed, met their deaths through working in too open country—I mean without timber. We have always advocated the splitting of pillars, and we believe that until such time as the pillars are split and extraction is done in that way accidents must take place, more particularly on the high coal. Under the best system the extraction of pillars is dangerous work, but under our system here it is almost suicidal for the men. I have seen instances here where one man has been filling his truck whilst the other was listening with the lamp up, waiting for the roof to split I have seen men run out of the pit rather than remain there. The only safe way is for the pillars to be split and chocks to be put in, and, of course, more remuneration will require to be paid for the splitting of pillars and the putting-in of chocks. In connection with the timber, I wish to say that the union has been protesting against split timber going into the mine. On one occasion we had to threaten to stop the mine unless we were given better timber so as to be able to make the places safe to work in. I have known many cases where men have had to go up on high ladders to try to wedge three-cornered bars, and it is almost impossible to wedge them satisfactorily when on a ladder. I do not think any three-cornered bars should be allowed to stand there. We prefer the round bars. I think the provision of bath-houses is of national importance—they are most essential. In nearly every mining town or camp half the men are single, and live in boardinghouses, where it is not easy to get baths. They leave the mine in a sweaty condition, and perhaps have to walk half a mile or a mile, and after reaching home have perhaps to wait till their comrades have finished washing in the tubs. Under those conditions the men are apt to catch colds. I am satisfied, too, that there would be no need for a compulsory clause to make the men use the baths. I am sure 99 per cent. of the men here would prefer to bath at the mines and walk home in other than their pit clothes. It is a crying shame that bath- and change-houses have not been established before now. Regarding the matter of driving to boundaries before extracting pillars, I think New Zealand as a whole and the mining industry in particular would have been far better off if this had been in vogue long ago; but, unfortunately, the first object has always been to get out the coal as quickly as possible, notwithstanding the detrimental effect upon the mine or the industry, and just so long as the present practice lasts will the industry be up to-day and down to-morrow. There are coal-mines flooded out now which should have been working for many years to come. If there had been proper machinery installed there would have been years and years of work ahead. The present system should be replaced by one which would give more security to the miners, because we submit that to drive to the boundary first is far better both from the safety point of view and that of economics. Then, I wish to say a word or two in regard to the contract system. I believe that every death which has occurred in coal-mines during the last five or six years—I am speaking of the fatalities which have come under my notice—has been traceable to the contract system. There is no doubt that this speeding-up system has been the cause of all the accidents. Then, the sanitary system in this mine, like that in all other mines in this country, is a disgrace. There is no place for a man to evacuate unless he goes into the bords. Men have to go and clean up those bords, and have had to breathe the foul smell caused by the present system. The pan system is a good one, and would do away with the present unsatisfactory conditions in the mines on the Coast.

JOHN SOUTHWARD sworn and examined. (No. 62.)

1. *The Chairman.*] You are a deputy?—Yes, a fireman and deputy.

2. How many years' experience have you had as a miner?—Thirty-eight as a miner and four as a deputy.

3. Where?—Eighteen years in the Old Country and twenty out here.

4. What is it you wish to lay before the Commission?—The matter of the fireman's inspection of the mine. He has to visit the different places in the mine each morning by himself. It is possible for him to meet with some gases and be suffocated. We have heard of such cases in the Old Country—in fact, there was one just recently in Lancashire, where a man was suffocated through coming into contact with noxious gases when on his rounds. We consider that the present method of inspection by the fireman alone is unsafe. We discussed this matter with the management here some twelve months ago, when Mr. Bishop agreed that it was necessary that the fireman should have some one with him when making his morning inspections.

5. Not necessarily another fireman?—No. Not only is it necessary that the fireman should be accompanied by another man because of the possibility of his meeting with gas, but he has to go into the gobs, and it is possible for a man to get a knock and lay there and get buried. We would like to see a provision placed on the statute-book making it compulsory for a fireman when making his inspection in the morning to be escorted by another man. There is another matter, in regard to the safety-lamps, which I wish to refer to. The Act distinctly says that the fireman when examining safety-lamps shall see that they are securely locked. We maintain that it is an impossibility for a fireman when examining lamps to say whether they are secure or not, because

he cannot see the gauze. They have a blowing test—they blow the lamps before passing them out to the men. It is impossible to tell if there is a defective gauze in the lamp or not. It is also impossible for one man to clean so many lamps thoroughly. One man has made a boast that he can clean sixty lamps in an hour. Do you think that is possible? One witness has said that the lamps in No. 2 mine are in a disgraceful state. They are certainly kept in better condition in No. 1 mine. We cannot say it is unsafe, but it is certainly impossible for a deputy to say that they are secure when he cannot know. Each lamp should be tested with a gas-tester before it is taken into the mine. In some of the older mines I believe gas-testers are used. The next point I wish to refer to is that the Act says that the deputy shall fire all shots in a mine where gas has been found, but he can depute some one else in writing to do so; so that under the present system any man can be deputed to fire shots. This, we contend, is wrong. The fireman has to pass an examination, and he should be the man to fire all shots. It is possible to put men on to do the shot-firing who have not a great deal of experience. In connection with the Brunner disaster, I believe the Board of inquiry came to the conclusion that that disaster was caused through a blown-out shot. I remember hearing Mr. Brown, of Denniston, say that that was so. The present practice of deputing men to fire shots is a dangerous one. In No. 2 mine one man of each pair is allowed to fire their own shots. We maintain that where heavy shots are to be fired with gelignite there is a great concussion, and the firing of all shots should be in the hands of the fireman. The union wished me to bring up those three questions before the Commission.

6. *Mr. Dowgray.*] That clause you quoted states that it shall be the duty of the underviewer to make the examination, and not that of the deputy?—Yes, but the underviewer can depute the deputy to do anything. It says also that the fireman shall fire all shots, but he can authorize another man to do so. We want to see it fixed so that the fireman himself shall fire all shots. Men are put on to fire shots now who have not got an ounce of coal in their lives.

7. Of course, the circumstances you have referred to were in vogue long before the deputies' examination came in?—Yes. I maintain that the Act should be made so that no man could get a certificate unless he has been five years on the coal.

8. Would you be in favour of the Act being amended in that direction?—Yes.

OLIVER DAVIS sworn and examined. (No. 63.)

1. *The Chairman.*] What are you?—A deputy.

2. How many years' experience in mining have you had?—Fifteen.

3. And how many as deputy?—About five.

4. You have heard what the last witness—a deputy—has said: do you corroborate his evidence in detail?—Yes.

5. Have you anything to add?—No, I do not think so.

6. *Mr. Dowgray.*] Do you hold a service certificate?—No, I passed the examination. We contend that it is absolutely necessary for some one to accompany the deputy when he makes his inspection in the morning, in case of trouble.

ANDREW INNES sworn and examined. (No. 64.)

1. *The Chairman.*] You are a fireman and deputy in the Point Elizabeth No. 2 Mine?—Yes.

2. What experience have you had as a miner?—Forty years.

3. And how many years as a deputy?—Seven and a half—that is, out here, and eighteen months at Home.

4. You have heard the evidence of the deputies who have already given evidence: do you corroborate what they have had to say?—Yes.

5. Have you anything to add?—No.

6. I understand you were present when the man George Fullick was killed on the 2nd September, 1911?—Yes.

7. Will you first tell the Commission how the accident happened?—Well, we were told to draw the timber, and, of course, we proceeded to do so by the usual method.

8. What was the method used?—With hammer and axe.

9. Who sent you to draw the timber?—The underviewer, Mr. Muncaster. We had just started, when deceased went to knock two cap-pieces off the bar, and he took out one of the sets in the lift that was finished going up to the left; when he knocked the leg out the roof came along with it right over him, burying him.

10. Did you make any soundings?—Yes, we had a good look. The roof was very scabby. We could see it when it was down, but not beforehand.

11. What height was the place?—They were using 5 ft. 6 in. props under the sets.

12. Is there much timber-drawing in that way?—Well, they have been drawing very little timber in No. 2 since I went there.

13. Who determines the question of drawing timber? Do you draw it on your own initiative?—No; we are told to do so by the underviewer, Mr. Muncaster.

14. As a deputy of some years' standing, you have had considerable experience of drawing timber?—Yes.

15. What is your opinion as to the best method of drawing timber?—I have heard the men talking of the Sylvester method, but I have no knowledge of it.

16. You gained your experience at Home: were you drawing timber there?—No; there were no pillar-workings there where I was.

17. So that all your timber-drawing experience has been gained in New Zealand?—Yes.

18. And you have not seen the Sylvester system in operation here?—No, nothing but the hammer-and-pick or hammer-and-axe system.

19. Do you know what examination is made by the underviewer before he has timber drawn?—He has a look at it, of course, occasionally—he is through the mine every day.

20. Does he make a special examination before timber is drawn?—I think it is left to ourselves after he tells us. We are left to judge for ourselves. There is no compulsion to take out any quantity.

21. There is no instruction issued to take out any particular timber?—No.

22. But you say you did make a thorough inspection in this case before you started to draw the timber?—Yes.

23. And you saw nothing to indicate a broken roof?—No. There was only a slip through the stone—wide at the bottom and narrow at the top.

24. How long were you at work before the accident happened?—Only about ten minutes.

25. It occurred on the knocking of the second prop?—Yes; that prop seemed to be the key to it.

26. *Mr. Dowgray.*] Was that in the bottom seam?—Yes.

27. Is that bottom seam not often broken right up to the top seam?—No. There was only a small coal parting—the coal was visible.

28. The place which we were shown yesterday seemed to be full of slips?—It was all level at the roof. Of course, the roof was very scabby. Had it been a clean roof we might have been able to detect it.

29. When it is thick it is very hard to judge?—Yes.

30. Have you drawn any timber since that time?—No.

31. Do you consider the Sylvester method would be an improvement on the hammer-and-axe system?—Well, as far as I can hear, when using the Sylvester you can stand away in case of danger; if that is so it would be an improvement. But I have not seen it used myself.

32. Have you seen a lever used here?—No; I think they have used them in No. 1.

33. You were putting in a number of chocks in this place?—Yes.

34. How did you draw them out?—They have not been drawn out.

35. Do you think the Sylvester would be of any use in drawing them out?—In regard to some of them I think it would take the men all their time to draw them without shooting them out with dynamite.

36. Are they superior to the props in these places?—Yes.

37. *Mr. Parry.*] Do you think it would be safe to remove that timber by shooting it out?—Yes; you can get away always.

38. Do you think shooting it out would be the safest method of all?—Yes; you can always get away from it if there is any danger.

39. Then, if the timber had been shot out the man would not have been so liable to lose his life?—No.

40. *Mr. Reed.*] Was the deceased an experienced man?—Yes, and a very careful man.

41. Did he use his own discretion in the method of drawing the timber?—Yes.

42. Have either the deceased or yourself applied for a lever or chain?—No.

43. Have you heard of the Sylvester system being used in New Zealand at all?—No.

44. You stated that the miners' union had asked that the timber be withdrawn?—Yes, I was informed so.

45. Who informed you?—It was rumoured amongst the men.

46. Do you know on what grounds they made that request?—Well, their theory is that by taking the timber it is easier for the other lift to be taken off.

47. Did the miners' union or check inspectors recommend that the Sylvester or lever-and-chain method be used?—No.

48. In a seam 5 ft. 6 in. in height, would you approve of the hammer method of taking out timber when timber-extraction is necessary?—There are some places where it is quite safe, but of course it jolts the place a good deal.

49. In this particular place both you and deceased thought it safe to remove the timber in that way?—Yes, otherwise we would not have done it.

50. You said something about blasting out the timber: what about blasting it out in the goaf?—Of course, it is a nasty thing to do.

51. Would you be allowed to blast the timber out in the goaf?—Not if there were any gas about.

52. Would you recommend that the hammer-and-axe system be used in preference to blasting out the timber in the goaf?—Well, after what I have seen I do not care too much for the hammer-and-axe system.

53. Would you care for the blasting method?—If I found that it was clear of gas I would prefer it.

54. Would it not have been better to have left the timber alone?—Yes.

55. But the workmen wished it drawn, and it was done?—Yes.

56. *Mr. Dowgray.*] Was it not an old working-place?—No; though the lift was done.

57. But it had been a working-place?—Yes.

58. Did the men use shots in driving that lift?—I could not say; I was not in charge of that section.

59. They do fire shots in the pillars sometimes?—Yes.

60. You could hardly call that drawing timber in the goaf?—Well, it was the first lift.

61. That was the working-place: there would hardly be much danger in drawing the timber there?—No, I do not think there would be very much danger if everything was clear.

62. Do you think it relieves the other pillar if you get a clean fall?—Yes, it takes the weight off.

63. *Mr. Reed.*] Is this a safety-lamp mine?—Yes.

64. And in safety-lamp mines is it safe to fire shots in the goaf?—There was just the one lift, and it never extends that far back into the goaf.

GEORGE RICH WYLDE sworn and examined. (No. 65.)

1. *The Chairman.*] What are you?—A mechanical engineer, and secretary of the Westland Engine-drivers' Union.

2. What is it you wish to bring before the Commission?—I wish to direct the attention of the Commission to the situation of the ventilating-fans at both No. 1 and No. 2 sections of the State mine—the drivers complain that they are too far away from the boilers. The engine-drivers are supposed to be in effective charge of those fans at all times, and it is certainly impossible for a man to attend to the boilers and the fans at present; they should be kept closer together, or separate men should be in charge of the boilers and the fans. The fans are about 2½ chains away, and it is simply impossible for the men to be in effective charge of them. There is a pump some 3 or 4 chains down the creek, and we have been known to have to go there thirteen and fourteen times during one shift.

3. Could one man attend to the fan and the pump while another man was attending to the boilers?—They are some distance apart.

4. He has only to see that they do not stop?—It would meet the case if there were a man to look after the pump and the fan and another to look after the boilers. Or else the fans should be put alongside the boilers.

5. *Mr. Dowgray.*] Do you consider that a man ought to be in attendance at these fans all the time?—A man should be where he could either hear or see them going.

6. They should be under his observation?—Under his actual supervision.

7. Does the fan ever stop?—Well, occasionally bearings are apt to go wrong. It is the constant strain on the men that is complained of. They feel they cannot do it fairly—it is rather too much.

8. The fan could be stopped for some time without your noticing it?—Yes, it might be stopped for half an hour—the man might be down the creek.

9. What you are advocating is that where there is a fan a man should be in attendance?—Yes.

10. *Mr. Fletcher.*] What distance is the fan away from the boilers?—2 chains.

11. *Mr. Cochrane.*] Is the fan not placed in the best position for the ventilation of the mine?—I do not know—that is not a matter for me. But the boiler is some distance away.

GREYMOUTH COURTHOUSE.—27TH OCTOBER, 1911.

JAMES WARD sworn and examined. (No. 66.)

1. *The Chairman.*] What are you?—A miner

2. How many years' experience have you had?—About thirty-three.

3. Where?—On the West Coast and in the Old Country.

4. How many years have you been working on the Coast?—About twenty-six.

5. Do you represent any union?—Yes, the Brunner Miners' Union. I am deputed by the union to give evidence before the Commission.

6. You are voicing the views of how many men—what is the membership of your union?—Between one hundred and fifty and one hundred and sixty, though the men are dwindling in numbers on account of the stoppage of the North Brunner Mine.

7. What is it you wish to bring before the Commission?—First of all, in regard to ventilation, the union holds that any place is not adequately ventilated where there is not sufficient air to carry away the noxious gas and powder-smoke at the rate of from 3 ft. to 5 ft. per second.

8. And you advocate a standard of sufficiency?—Yes.

9. You are not troubled with excessive heat?—No. Then, for the prevention of accidents there ought to be systematic timbering, which should be beyond the discretion of the management of the men. There should be a prop set every 3 ft. or 4 ft. whether the roof is good or bad.

10. Do you suggest that should be made compulsory by statute?—Yes.

11. How would it meet the case if larger powers were given to Inspectors of Mines to compel the putting-in of timber?—We hold that the Inspector is only an individual, as we ourselves are, and he should have no discretion in regard to that matter. We also contend that the sanitation of mines should be provided for by having the pan system in every incline.

12. There has been a suggestion made to the Commission that a truck should be used in a dead end, with ashes or some other deodorant, and that the miners use a shovel and shovel the excreta into the truck, which could be regularly emptied. Objection has been raised to the pan system on the grounds that some men do not care to use the seats after other men?—I think that would meet the approval of the miners.

13. At any rate you want some system; so long as it is reasonable and regularly attended to you do not mind which system is adopted?—Yes. Then, my union holds that there should be baths erected at each mine.

14. Plunge or shower baths?—Plunge and shower—you want a plunge, because you require to wash all over.

15. Some men object to the plunge because the men neglect to empty the water out when they have finished?—We advocate the provision of both plunge and showers.

16. How many men do you think should go to one bath—supposing there were one hundred men employed, how many baths would be required?—About twenty would be reasonable, I think.

17. That is, one bath to every five men?—Yes.

18. If the erection of baths by the management were made compulsory, should the men be compelled to use them?—I think it should be discretionary. A man's home may be handy to the mine, in which case he would not need to use the bath, but if he lived any distance away he would bath at the mine.

19. How could the management decide as to how may men to make provision for?—Simply by the number of men employed.

20. But you do not know how many men are going to use the baths?—That depends upon the men's habitations, as I said before.

21. You would advocate one bath for every five men whether they used them or not?—Yes.

22. And leave their use optional with the men?—Yes; that is only reasonable.

23. Have you any suggestions to offer as to the prevention of accidents?—My union suggests systematic timbering, to which I have already referred, with a view to preventing accidents.

24. Have you anything to say as to explosives?—Yes, we hold that no one should be allowed to fire shots except mine officials.

25. *Mr. Dowgray.*] What is your opinion in regard to inexperienced men starting on the coal and having charge of working-places?—I reckon that no man should have charge of a face who has not been in a mine three or four years at least.

26. It has been suggested in some places that a man should have at least two years' experience in a coal-mine and three months along with an experienced man before he takes charge of a face?—I think that limit is too short, for the simple reason that boys go into the coal-mines at very early ages. It would be well to have a stated age below which a man should not be in charge of a place, as well as the provision that a man must have three years' experience. He would be capable after three years. Boys of sixteen and seventeen go to work in the mines.

27. Is it customary for a boy sixteen or seventeen years of age to start on a coal-face?—Yes, I have taken my own son in when he has been that age.

28. You think a man should have at least five years' experience?—From seventeen to twenty they should have three years' experience, and after that five years.

29. And if he is over twenty-three?—If he is over twenty-three he should understand coal-mining.

30. But in any case a man under twenty-three should not be allowed to take charge of a working-place?—Yes.

31. What is your opinion of chains being used on these long jigs instead of ropes?—The only objection I have to chain jigs is on account of the noise they make

32. Is there any danger caused by the noise?—Yes, you cannot hear what is going on so well as with the rope, which is more silent.

33. You think accidents would be avoided if ropes were used?—Yes.

34. But at the face you could hardly do without a chain?—Well, that would depend on the method of working. Perhaps a short chain would work better there than a rope.

35. It has been suggested that there should be an anchor-chain on all face-jigs?—Yes, to prevent runaways it would be a good thing.

36. Is your ventilation satisfactory?—I am not working in a mine at the present time. The last I was in was the North Brunner, and the ventilation there did not give satisfaction.

37. Was there a fan there?—Yes.

38. *Mr. Reed.*] You recommend a quality standard for ventilation in preference to a quantity standard. How would you determine the presence of gas?—We hold that if there is not sufficient ventilation to carry the smoke away, say, from 3 ft. to 5 ft. per second, the place is not well ventilated.

39. That is a velocity standard, not a quality standard?—Yes—to carry the smoke away.

40. So that you do not determine the presence of gas at all?—That is a gas.

41. Which is?—Powder-smoke.

42. The only thing that troubles you is the powder-smoke?—Yes, because it is more detectable than anything else.

43. As regards systematic timbering, which you considered should be made compulsory, are you aware that there is little or no timber in some coal-mines—the Taupiri Mine at Huntly, for instance—and yet they have very few falls? Do you not think it would be a hardship for a mine like that to require to be systematically timbered?—Has there never been an accident at that mine?

44. Only one in thirty years?—Well, for that one accident they would be justified in putting in the timber.

45. I do not know whether it was proved that it was the lack of timbering that caused that accident. Would you recommend that all mines should be systematically timbered?—Yes.

46. You recommended pans in every incline for sanitary purposes?—Yes.

47. Would that be in the intake or the return?—In the dead ends.

48. Not in an incline, then—you amend your evidence?—I say they should be in a dead end—not in an air-course.

49. In regard to compulsory bathing, would you recommend that every man living in close proximity to the mine should be compelled to use the baths?—No, it might pay a man better to go home to bathe if he lived close.

50. In the event of the whole of the men living close to the colliery, the men would not use the baths?—A certain section of them would not.

51. Do you not think a great number would not use them?—It is a new thing, and should be given a trial. I should not be in favour of the compulsion.

52. It might be an expensive matter for the companies to erect the baths?—I cannot see where the expense is going to come in.

53. In Europe they find that it costs £5 per man to provide baths?—We do not want to go into the question of the cost. It is not the management which pays the cost—it is the consumer of the coal.

54. If you add to the cost of production you raise the price to the consumer?—Yes, to the public.

55. So it is the public which will bear the expense of the experiment?—Yes, but I do not think it is an experiment.

56. But did you not say it should be tried to see whether the men living near the mine would use the baths?—I said it was justified.

57. As regards the noise from jig-chains, do you know of any accident which you can attribute to the noise caused by them?—Yes. There is a man here named Cherrie who was caught and injured by a runaway truck in the Wallsend Mine twenty years ago. I could also enumerate a number of other similar cases.

58. You recommended chains for short jigs?—Yes, there is more noise in a long jig than in a short one—say, for a 14-yard pillar.

59. Will you give us your reasons why you would prefer a chain to a rope for a 14-yard pillar?—Simply because it is more easily worked—you have more power on the brake.

60. *Mr. Cochrane.*] I wish to be clear as to the rate you desire the current of air to travel—how many feet per minute?—From 3 ft. to 5 ft. per second.

61. *Mr. Dowgray.*] The short jig you referred to is the face-jig?—Yes, the face-jig.

BLACKBALL (STEVENSON'S HALL).—30TH OCTOBER, 1911.

WALTER ROGERS sworn and examined. (No. 67.)

1. *The Chairman.*] What are you?—A miner.

2. How long have you been mining?—I have been practically thirty years in and about mines.

3. You are secretary of the union here?—Yes, secretary of the Blackball Union.

4. What is the strength of your union?—Our membership is about two hundred at the present time.

5. Have you discussed at your union the matters which you are about to bring before the Commission?—Yes.

6. Are you unanimous upon them?—Yes.

7. What matters do you wish to speak on?—In regard to ventilation, my union considers that the 150 cubic feet of air per man should sweep undiminished along the airways and right up to the face where the men are employed; and, further, that in any part of a mine where noxious gas is found the air should be increased sufficiently to sweep all the noxious gases from the face. We also believe that the air should be split into sections. At the present time you will find that where, say, two hundred men are employed one current of air is serving the majority of them, whereas each section should get the full quantity.

8. How is it dealt with in the Blackball Mine?—It is split into three sections.

9. Does each split of air go direct to the return airway?—No, that is the trouble; that is what we require. The air should go to the return instead of passing over other men. Then, we are of opinion that proper sanitary arrangements shou'd be prov'ded in all mines.

10. Have you any suggestion to make as to the system which should be adopted?—My union prefers the pan system. They consider that there should be one pan for each bank at the least.

11. There is an objection on the part of some miners to using a common seat, and we have received a suggestion that a truck should be used in a dead-end, with a shovel, and that the truck should be emptied regularly?—Well, your suggestion as to a truck has not been considered by our union, but from your description it may be the better s stem.

12. At any rate, you want some system?—Yes, we want some sanitary arrangement provided. Then, there is the matter of change and bath houses. We consider that these should also be provided, and that there should be hot and cold water for the baths.

13. Shower or plunge baths, which do you prefer?—I think our members would prefer the showers.

14. And what proportion of men should go to a bath?—Probably four or five men to a bath.

15. On what proportion of the men employed in a mine, willing to use them, would you ask for baths to be installed? Would you say that baths should be erected if 50 per cent., or 75 per cent., or 25 per cent. of the men desired to use them?—Speaking locally, I should say that you could put the whole of the men in, because it would be a very small proportion of the men who would not require them. It stands to reason that the miner knows that he runs the risk of contracting different diseases by remaining in his wet, sweaty clothes. Quite 90 per cent. of them would use the change and bath houses.

16. There has been a suggestion that the use of the baths by the men should be made compulsory: what do you say to such a suggestion?—I should be inclined to make it compulsory, unless in certain cases and for strong reasons—for instance, such as a married man living handy to the mine.

17. There have also been suggestions made that the men should contribute towards the upkeep of the baths and have some say in their management?—I do not consider that the men should have any part in their upkeep; the industry should be forced to erect the baths. Then, for the prevention of accidents, there should be a system of timbering introduced and made compulsory. Under present

conditions the miner has the right to timber a place practically as he pleases, but I believe if there were a compulsory system of timbering—that props or sets should not be more than 4 ft. apart—it would save many accidents which at present occur.

18. You would make it compulsory to have a set at least every 4 ft.?—Yes, and props the same. There is a good deal of risk taken by the very best miners. They often think the roof is sound, and neglect to examine it.

19. Have you anything to suggest as to accidents from explosives? Have you shot-firers here, or do you fire your own shots?—The miners fire their own shots in this mine.

20. Have you any preference for shot-firers?—I do not think we have had an accident from the handling of explosives, but I believe myself it would be more satisfactory if shot-firers were employed.

21. You do not fire any number of shots at once, so you have no difficulty about lighting them?—No. In a roadway where the roof is broken, instead of using sets or props, I consider it would be safer to use chocks, say, 4 ft. 6 in. apart.

22. You would want a very wide roadway, then?—I believe it would pay to excavate for the distance required.

23. Have you anything to say as to opening out or breaking away bords?—Yes, I think they should be from 8 ft. to 10 ft. wide for a start for the first 3 yards.

24. Would you provide a maximum width?—I would not extend a bord beyond 18 ft. wide.

25. Have you any difficulty with wide bords? In some of the mines we found the bords being driven very wide, and the pillars being robbed?—We have no such trouble here. In connection with the prevention of accidents, we consider that the check inspectors appointed by the miners have not sufficient power to do any good for the men. My union also considers that the Inspector of Mines is appointed by the Government to see the Act carried out, and we think he is not doing this. He seems to favour the company in preference to the workmen, and we think that if the check inspectors were given more power it would assist us a great deal.

26. In what direction?—That the recommendations of the check inspectors as to extra timbering and other matters should be carried out.

27. That matter has been discussed, and a suggestion came from the Commission that if the check inspectors wanted greater powers they should submit to an examination similar to that which a deputy has to undergo, in order to show that they were capable of exercising those powers?—Well, I should not favour that. According to my experience, the miners choose the most practical and best men for their check inspectors, and I have never seen them make a mistake. Moreover, most of the mine-managers will admit that the men have been really practical men. I have never heard a mine-manager say anything against a check-inspector yet, so far as his knowledge was concerned.

28. There has been another suggestion made that, instead of granting by statute extended powers to the check inspectors, the Inspector of Mines should have the power to grant to check inspectors extended rights of inspection?—You mean as to the number of visits a check inspector is entitled to make into a mine. Well, so far as that is concerned we have no trouble. The check inspectors here have had no difficulty in going into the mine at any time. The mine-managers are willing to let them do so, and I think they should be allowed to do so. If everything is aboveboard the mine-manager should have no objection to the men inspecting the different places at any time. Another point I wish to mention is in connection with pillar-workings. My union considers that after a pillar has commenced to be removed not more than two men should be allowed to work extracting that pillar unless there is a pillar 8 yards thick between them and another pair of men. That is as a matter of safety. In pillar-extraction there is a constant creep going on, and consequently a good deal of risk, and my union is of opinion that two men are plenty to be working there unless there is a pillar 8 yards thick between them and other men. We also consider that the Government of the country should see that a mine should be driven to its boundary before coal is extracted, as a means of safety. The block-out system is the safest, and should be adopted.

29. That is both for bords and pillars?—Yes; they should be worked on the block-out system, or what we call "jigging" in coal-mines. The use of chains has been the cause of accidents, by reason of the noise they make. The men cannot hear any indications of a creep which may be going on, and they think the wire rope should be adopted instead of a chain.

30. Have you blocks and anchor chains on your jigs?—No, I think not.

31. Have you anything to say as to the necessity for them?—It would be safer to have them.

32. *Mr. Dowgray.*] In connection with jig-chains, you can hardly avoid using the chain on face-jigs—the chains you refer to would be those below the face-jig?—Yes, they would have to use the chain on the short jig up the face.

33. And the anchor chain you referred to also is in connection with the face-jig?—Yes.

34. In connection with bath-houses, you said your union preferred showers: do they prefer them in a line or separated by screens?—They prefer them separated.

35. *The Chairman.*] There was a suggestion to have galvanized-iron stalls high enough to screen each man off?—Yes, that would be a suitable arrangement.

36. *Mr. Dowgray.*] In conjunction with the showers, would you want hand-basins?—Yes, they would be necessary.

37. In connection with timbering, you said that your union was in favour of systematic timbering, 4 ft. apart, in all mines. Do you not think it would be a better system if the mine-manager, the men, and the Inspector of Mines were to draw up a code of special rules for each particular colliery? In one mine timbering 4 ft. apart might be satisfactory, but not in another?—I do not know how that would work.

38. It would meet your case if you got systematic timbering?—Yes.

39. And, in regard to check inspectors' powers, is the power you want the power to stop a place if it is considered by the men to be dangerous?—Yes, until it is inspected by the Inspector of Mines along with the check inspector.

40. Do you want the Government Inspector to have the power to prosecute without referring to any one else?—Yes; but I understood the Inspector of Mines always had that power.

41. You would be in favour of his powers being extended also?—Yes.

42. *Mr. Cochrane.*] In regard to this timbering which you advocate, in many mines, such as lignite-mines, there is no timbering required: would you insist on systematic timbering in such mines?—Yes, I would. I do not consider any mine should be without protection for the men working there. If a mine is worth working at all, the first thing to look to is the safety of the men. No mine should be worked without timbering for protection.

43. *Mr. Reed.*] Have you ever been in the Taupiri Mine?—No.

44. I dare say you have heard of it: they do not take out their pillars, and their bords are not wider than 9 ft. There is hardly any timber, and yet in thirty years there has been only one accident. Now, in such a case as that, do you not think it would be a great hardship to insist upon timbering where it is absolutely not required?—Is there any pillar-extraction?

45. No, they cannot take them out there?—If the mine is not being worked by pillar-extraction, then the supports are left. There may be one mine good enough to work in the solid like that, but that is an exceptional case.

46. Under those conditions would it not be an extreme hardship to saddle the management by making them timber when timbering would be of no use?—There is this in it: the mines certainly pay to work, and if the miners are practical men and suggest that timbering is required, they know, and it should be done.

47. In this case the miners do not suggest it?—I am only speaking from my own personal experience.

48. In regard to ventilation, you stated that 150 ft. of air should sweep undiminished. You do not mean us to take that absolutely, because the air cannot sweep undiminished—you must lose air through stoppings and leakage. You would like 150 ft. of air per man at each working-face?—Yes.

49. Now, supposing there were no noxious gas in a place, and two men were working there, would 300 ft. of air be sufficient to supply those men?—I would not like to say that, but if there were no noxious gas 300 ft. would suit.

50. Then that 300 ft. of air would go round the next bord after it had served those men, and it would suit the next men too?—I do not know that, because it would be diminished. I mean that there should be 150 ft. of air for each man.

51. *The Chairman.*] Do you mean, undiminished in quality or in quantity?—In quality and quantity as well.

52. *Mr. Reed.*] But the first two men must exhaust some oxygen from the air. You see the difficulty in sending the air undiminished round the mine—it cannot be done?—The Act at the present time says it must be done.

53. It does not say the quantity shall be supplied at the face?—I take it that it means that.

54. You wish for 150 ft. per man?—Yes.

55. And 300 ft. for two men?—Yes. My instructions are to request that 150 ft. per man be provided, and that it should sweep undiminished up to the working-face.

56. You referred to chocks: what is the maximum height of seam that chocks are effective with?—I consider that chocks are effective at any height.

57. Would you put chocks into a seam 20 ft. high?—Yes.

58. You said that the Inspector of Mines favours the company: which Inspector do you mean?—I will make no mention of names, but to us, when a crisis crops up, it seems that the Inspector always favours the company.

59. What gave you that impression?—Several incidents.

60. How long ago?—In one particular instance about two and a half years ago.

61. There have been two Inspectors since then. Have you had any instance of it since then?—I know of none since then.

MATTHEW HALL sworn and examined. (No. 68.)

1. *The Chairman.*] What are you?—A miner.

2. With how many years' experience?—About twenty-four.

3. Are you a check inspector?—Yes.

4. What matters do you wish to bring before the Commission?—I wish to corroborate the evidence of the previous witness.

5. Is there anything you wish to add to what he has said?—Well, in regard to sanitation, Mr. Rogers suggested the pan system, but since hearing the discussion which has taken place I think the truck system would be preferable, though I have never seen either of them used myself.

6. What is your opinion of the suggestion that check inspectors should submit to an examination if they want extended statutory powers?—I do not think it should be necessary to ask miners to sit for an examination like that.

7. But, you see, the Inspector of Mines, mine-manager, and the deputy has to submit to an examination and obtain a certificate before accepting a responsible position, and you are asking for powers practically equivalent to those of the Inspector of Mines?—Scarcely those powers. We only would like to be able to say whether a place is unsafe to work in, and if the check inspector is a practical miner, as he is, he should be able to judge that.

8. So you do not think the suggestion as to the examination of check inspectors should be given effect to?—No.

9. *Mr. Dowgray.*] You say you favour the truck system for sanitation?—Yes, since hearing the explanation of it.

10. There is plenty of cinders and slack for use?—Yes.

WALTER MEADOWCROFT sworn and examined. (No. 69.)

1. *The Chairman.*] What are you ?—A miner.
2. Are you a check inspector ?—Yes.
3. How many years' experience have you had ?—About fourteen years.
4. You have heard the evidence given by the first witness, Mr. Rogers: do you corroborate it ?—Yes.
5. Do you wish to add anything to his statement, or vary it in any way ?—I agree with what Mr. Rogers has said on the matter of sanitation. I think the tub system would be better than the pan system.
6. Have you anything further to add ?—I would like to say that our objection to the use of chains is that they are not properly attended to—they are not annealed as they should be. They should be taken out and heated to a dull-red heat, so that any flaw may be detected in them. From my experience I should say the wire rope is the better.
7. Have you ever known the chains to break ?—Yes.
8. Have you known any accidents caused that way ?—Yes, I have known men to be injured by chains breaking.
9. Have you ever known falls or accidents occur as the result of vibration set up by the chains ?—Yes, and I have seen props pulled out by them. I do not think the rope would cause so much vibration and noise.
10. *Mr. Dowgray.*] Do you mean to infer that a rope is required on the face-jig too ?—Yes, with the wheels that are in use at the present time.
11. How are you going to get over the difficulty of the place going up ?—You would have to have a little chain, or they could lengthen the rope. There would be a chain on each side to hook the empty and full tubs on to. If the chains were properly looked after it would be better both for the men and the management.
12. You mean there should be a wheel used instead of a prop and two fish-plates ?—Yes.
13. *Mr. Parry.*] What is your opinion of a man having to have two years' experience with a practical miner before being given charge of a place ?—He should be required to work eighteen months or two years before he is allowed to take a place—between eighteen months and two years.
14. In connection with the extraction of pillars, do you think it would have a tendency to minimize accidents if pillars were extracted only on one shift ?—Yes, if that were done I do not think there would be so many accidents as there are at the present time.
15. *Mr. Reed.*] In regard to the Blackball Mine, you have no complaints to make ?—No, the method of working this pit is good; but the men must protect themselves against accidents, and whenever we get the opportunity we intend to do so.
16. You consider the Government inspection is good ?—Yes; but I agree with what Mr. Rogers has said as to inspection of mines.
17. Is there any firedamp in this mine ?—Yes.
18. Do they use plenty of brattice ?—Yes.
19. What is the ventilating-power ?—A fan.
20. How long does it take the fan to clear the smoke out ?—Several hours in places.
21. Is the fan not powerful enough, then ?—The fan is powerful enough, but I do not think the ventilation is properly conducted. Of course, the brattice gets torn down by the trucks.
22. *Mr. Dowgray.*] Is the brattice led right up to the face ?—No, not in some places.
23. In regard to the complaint which Mr. Rogers made about the men working in the pillars, does that not apply to Blackball ?—Yes.
24. *Mr. Parry.*] What other mines have you worked in ?—Only Denniston.
25. How does Denniston compare with this mine as regards smoke ?—It would not compare with this one at all.
26. Which is the worse mine for smoke ?—I think there is not much to choose between the two, but the compressed air blew out the smoke at Denniston. Of course, at that time there were no pick-and-shovel men there; it was all filling.

HARRY CHILTON sworn and examined. (No. 70.)

1. *The Chairman.*] What are you ?—A miner.
2. With how many years' experience ?—About twenty.
3. Are you a check inspector ?—Yes.
4. You have heard the evidence of the previous witnesses: do you corroborate it ?—Yes, I would like to corroborate Mr. Rogers's evidence, on the whole.
5. Have you anything to add to it ?—I would like to clear up what appeared to be a misapprehension as to what he wanted in the way of ventilation. I think he said that not less than 150 ft. should be provided, but he did not stipulate for 150 ft. as a hard-and-fast rule.
6. What are your views on that point ?—That there should be not less than 150 ft.; you can have as much more than that as you like, but not under it.
7. Supposing there were twenty men working in one place in a mine, how many feet of air would you require to be supplied ?—That could be worked out.
8. That was the object of some of the questions put to Mr. Rogers ?—Yes, but I am not able to work it out. I am a miner, not a chemist.
9. At any rate, you want 150 ft. of good air delivered to each man where he is working ?—Yes. I wish also to say that I think the truck system of sanitation would be preferable to the pan system, but ashes or other material should be provided for use with the truck. I am also in favour of timbering, say, not more than 4 ft. apart. The English Act has a general rule on the subject, and we could have a similar one. Their rule was made about three years ago.

10. Supposing power were given to the Inspector of Mines, a representative of the management, and one from the men to draw up rules for each separate mine according to the local conditions, and those rules to have the force of law, would that not meet the case ?—Yes, I am in favour of something on those lines—that is, on the style of the special rules in the Old Country.

11. You think that would be a satisfactory system ?—Yes.

12. The difficulty about making a hard-and-fast rule is that it might not apply to all mines. Take the mine at Huntly which Mr. Reed instanced, it would be a hardship there ?—Yes ; but that difficulty was got over in the Old Country—in Staffordshire, where I came from. They worked in rock—in stone drives—they had three props, and carried the last prop forward.

13. *Mr. Parry.*] Do you corroborate the last witness in regard to a man requiring to have two years' experience with a practical man before being allowed to have charge of a place ?—Yes, I would say two years.

14. And in connection with the extraction of pillars on one shift, so that no man should be compelled to follow another, because he would not understand his timbering ?—Well, I would hardly like to express an opinion on that point, because, generally, a man selects his cross-mates and they work together. There is another matter I want to refer to. I have seen the difficulty got over, which Mr. Dowgray was inquiring about, in regard to the chain. You take, say, 100 yards of rope, and you have as much unrolled off the coil as is necessary to jig for the time being, the rest being lashed together and hung on the back of the skip. As you go on just sufficient is unrolled—that is, for jigging one truck at a time. There was a wheel used there.

15. *Mr. Dowgray.*] It is the chain down below that is objectionable ?—Yes; but I have seen the other idea working.

16. *Mr. Reed.*] In regard to sanitary matters, what sanitary arrangements did you have in Staffordshire ?—The men went into the old workings, as they do here.

17. Was that not perfectly satisfactory ?—Only as long as they were old workings.

18. The Royal Commission reported that it was better for men to relieve themselves before going into the mine, and in the event of there being plenty of coaldust that that should be used in preference to the pan system, but in those portions of a mine where there was no dust the pan system should be used ?—I think it should be taken outside the mine in every instance.

19. Is not coaldust a good deodorizer and disinfectant ?—I have not gone into the chemical properties of coaldust. I do not know.

20. I have seen pans used, but have never known them anything but offensive—they are not cleanly. Have you ever worked in mines where they have been used ?—No.

21. Do you know why the British colliers do not requisition for baths ?—I could not say. The subject was never discussed in our district in any shape or form.

22. You think it is better for the men to have baths ?—Yes.

23. But they prefer to wash at home when they live near the mine ?—Yes, some do.

24. Have you worked in the 10-yard seam at Dudley ?—No, I do not know South Staffordshire—only the north.

25. You do not know anything about the use of chocks in these big seams ?—Yes.

26. Up to what height have you seen them used ?—Up to 18 ft.

27. Effectively ?—Yes.

28. On what method did they work in your part of Staffordshire when extracting the coal ?—On much the same style as they do here.

29. How many men work on a pillar ?—Only two.

30. During your experience have you worked much on the night shift ?—Yes, a fair amount.

31. Have you reason to believe that accidents are more frequent on the night shift than on the day shift ?—Yes, I have known a few more on the night shift, but I think there is not much difference.

32. To what do you attribute that ?—I have never reasoned it out myself.

33. Comparing the Government inspection in Staffordshire and here, do you consider our inspection as thorough as the British inspection ?—Yes, they are much on the same level.

34. Do you think the inspectors visit the mines more frequently here ?—I really could not say, but I should think so.

35. Is it long since you left England ?—Three years.

36. You are only speaking in regard to this mine ?—Yes.

37. *Mr. Dowgray.*] In connection with the baths, what reason did you give why the British miners did not use the baths ?—I have never heard the question discussed.

38. You are not aware that their reason was because of the compulsory clauses ?—No, it was never argued in our district.

NELSON COURTHOUSE.—2ND NOVEMBER, 1911.

JAMES PHILLIPS sworn and examined. (No. 71.)

1. *The Chairman.*] What are you ?—A miner.

2. How many years' experience have you had ?—About thirty-two.

3. Where ?—Two years here, and thirty in Scotland.

4. Are you a check inspector, or do you hold any position in the union ?—No, simply that of a member.

5. Have you been appointed by the union to come here and give evidence ?—Yes.

6. What is the strength of your union ?—About fifty.

7. How many men are employed altogether?—Somewhere about thirty underground in the daytime.

8. What matters do you wish to lay before the Commission?—The instructions I received were in regard to ventilation and sanitation. Respecting ventilation, the complaint of the men is that the air is not distributed throughout the workings. There is not sufficient ventilation to clear away the foul gas and powder-smoke.

9. What is the system of ventilation: is it natural ventilation?—They have a fan.

10. An exhaust fan?—Yes.

11. Do you know its capacity?—No.

12. You work in that mine?—Yes.

13. How many sections are there in the mine?—Four.

14. Is the air split for these sections?—Not that I am aware of.

15. Is it an inclined drive?—Yes.

16. How does the air go to the lower dip?—It goes down one side and back up the other.

17. Does the return air pass through the working-faces on the return side?—There is nobody working on the return side. The air passes through the whole four sections.

18. How many men are there in each section?—About four.

19. You do not complain about the quantity of air entering the mine—it is the distribution?—Yes.

20. Is there not sufficient brattice?—It is the want of stoppings which is the trouble. If there were more stoppings the ventilation would be better.

21. Does the air go into the old workings, or how does it escape?—Down where the machines are cutting the men say they have no air. The only air they get is compressed air, and they cannot always get that.

22. How often does the Inspector of Mines visit the district?—He comes very regularly. I cannot say how often.

23. Do you know whether his attention has been drawn to the distribution of the air?—I could not say. I have never been working in a bad place. Where I work the air is sufficient. It is the men on the lower section who complain.

24. And you think the ventilation could be remedied by stoppings and an improvement in the distribution?—Yes.

25. Have you any other matters you wish to refer to?—In regard to the sanitary conditions of the mine, we are badly in need of an improvement in the way of some sanitary arrangements where we are. I was down there one night, and it was very bad to pass through it.

26. Where is it?—In the stentons in the old workings.

27. In the return airway?—No, in the intake, where the air passes down to the men.

28. What is the distance from the intake to where it is?—I suppose, about 20 to 30 chains.

29. What is the grade?—About 1 in 3.

30. The men do not go to the surface?—No.

31. Now, what sort of system would you advocate?—They should set apart a place, and have a box or an ordinary truck with some dust or other material handy, and the men could put it into the truck, which could be emptied regularly.

32. That system has been advocated in several places, and also the pan system, but there has been some objection taken to the latter on the ground that the men do not care to follow one another and use the same seat. You would be satisfied with the truck system?—Yes. In one place where I was there was a stable, and the men set the place apart for that purpose.

33. There is no stable where you are now?—No, nothing.

34. Have you any complaints to make in regard to accidents?—No, that is one good point about Puponga; it is very safe to work in.

35. Do you work in the pillars?—Yes. They are about 8 ft. 6 in.

36. Do you take all the coal out?—Yes. And it is a fairly good roof.

37. Do you use timber?—Yes.

38. Do you draw the timber?—Yes.

39. What system of drawing timber do you use?—The chain-and-lever system.

40. Do you find that satisfactory?—Yes, as far as I have seen. I had not seen this system till I came here; what I had seen was the Sylvester system.

41. What is the difference between the two systems?—The Sylvester, in my opinion, is more powerful, and you can get further back, but if you cut a prop you can put more power on to it.

42. Now, about baths and change-houses?—We have baths and change-houses at the present time, but the men are dissatisfied with them.

43. In what way?—Every man goes in and strips, and walks under two sprays. They advocate separate baths screened off.

44. There are only two showers?—Yes.

45. How many miners use them?—About fifteen or sixteen.

46. Out of fifty?—Yes. Of course, there are more men on the other shift. About half the men use the baths.

47. Supposing these showers were built in the form of stalls, with screens round them, do you think they would be more used?—Yes, the men say so. I have always used the baths, but plenty of men will not do so because every one has to go in collectively.

48. How many men should be accommodated by one shower?—Well, four under each is quite sufficient.

49. Do they all go in together?—I have seen twelve in together.

50. What kind of spray is it?—The spray is provided by kerosene-tins with holes in the bottom.

51. Is there any other matter that you wish to refer to?—Yes, in regard to the Mines Act. They tell me that the Inspectors have no power apart from that of inspection. If there is a certain amount of air coming into the mine it does not require to pass through the working-faces before the Inspector can prosecute. At Home, if there were not a certain amount of air passing through, the Inspector could send the men out and make the management put the air in. Here it is different, apparently.

52. However, you think it should be made quite clear that the quantity of air required by the men should be delivered at the face?—Yes, sufficient air to carry away all the impurities in the face.

53. Of course, you are not troubled with extra-hot places here?—No, it is very cool.

54. Have you had any experience of hot places?—Yes, at Home. The mines there are very deep.

55. What is your idea of a hot place—what temperature?—There is one mine abot 80°, I think.

56. How did you manage to work there?—There was plenty of air, but it was hot, and we worked with safety-lamps. It was far hotter than Puponga.

57. With the temperature at 80° and plenty of air, could you work?—Yes.

58. For how many hours?—Eight.

59. Is there any other matter you wish to deal with?—Yes, as to the length of time a man has to serve in New Zealand before getting a permit to manage a mine.

60. What is the suggestion?—It is suggested that a man should be from three to five years at least in and about a mine before he is allowed to get a permit to work with six men.

61. Have you any opinion to offer as to what experience a miner should have before he is given charge of a face?—Well, I think a man should have two years' experience, at any rate.

62. And for pillars?—Yes, some time extra for pillars. And then, when he does go into a coal-mine, I think he should work with an experienced man for a while.

63. Have you any experience of workings other than pillar-workings?—Yes, I have worked long-wall for years.

64. How do you think they compare?—Longwall is the safer system.

65. That is, in a low seam?—Yes, from 2 ft. to 2 ft. 6 in., and up to as high as 4 ft.

66. *Mr. Dowgray.*] In a longwall seam, what length of wall has one pair of men?—On an average, from 12 to 14 yards—40 ft. to 50 ft.

67. Under that system you would not be working all together as you are in pillars?—No.

68. In the pillars in the Puponga Mine how many men work together?—Two men in every pillar. In the Old Country there was never more than four in a pillar.

69. What was the size of the pillars in the Old Country?—From 80 ft. to 90 ft.

70. Much larger than they are here?—Yes.

71. So that the four men working there would not annoy men with the noise of their shovels?—No, not until they came to the end, and then sometimes they were taken away.

72. What is your idea of more than two men working in a pillar here?—I think it would be very unsafe for more than two men to work in one pillar.

73. In connection with the air at Puponga, are we to understand that it makes a short circuit into the return?—Yes.

74. Returning to the stoppings, is the end of the main road not bratticed off?—There are not sufficient stoppings to send the air right down where these men are working.

75. Would there be any difficulty in making any of these separate sections ventilate themselves by splits?—It would not be an easy matter, but it might be done. It would be very expensive. If there were stoppings the air could be conducted down and then brattice led in.

76. In regard to the bath-houses, have you hand-basins?—There is only one basin.

77. Do you think there ought to be hand-basins as well as shower-baths?—Yes; and they also require a method of drying clothes—there is no appliance for the purpose at present.

78. You said you worked in a coal-mine in the Old Country where the temperature was 80°: which mine was that?—Hallside Colliery.

79. Did you see the temperature taken there?—No, I am only guessing the heat of the place.

80. *Mr. Fletcher.*] How many colliers are there at Puponga?—About thirty.

81. All on the day shift?—Yes.

82. Do they work singly or doubly?—Doubly.

83. Then there will be about fifteen places?—Yes.

84. Are there stoppings down the incline to the landing?—No.

85. But the air goes down undiminished to the landing?—No.

86. On the inby side of the landing?—Yes.

87. How far are you working from the landing?—I am about half-way down—I am near the top. There would be sufficient air to go down to those men if it were led into each man's face by brattice.

88. What kind of fan is employed?—I do not know.

89. *Mr. Cochrane.*] You said there were ten or twelve men in the bath-house at once?—Yes.

90. But are there not separate kerosene-tins?—Only two.

91. Then, you told us about Hallside Colliery: how many fathoms down is that seam so hot?—250 fathoms down; then there is a dip running down.

92. In which mine were you working longwall?—Hallside, and also in the Glasgow Coal Company's mine. I had been working about twelve years before I left Home.

93. But the longwall system would not be suitable for Puponga?—No.

94. Do you take advantage of the clause in the Act in connection with workmen's inspections?—No.

95. Why?—Well, the powers of the workmen's inspectors are so limited that it is not worth the trouble.

96. If there were an extension of their powers would you take advantage of it?—Yes, I believe we would.

97. What power would you require?—Power for a competent man to inspect the place, and, if he thought it dangerous, to say it was unsafe, and be able to stop it until the Inspector came to inspect it.

98. And leave it then in the hands of the Inspector of Mines?—Yes.

99. What is your opinion in regard to the extraction of pillars with two shifts?—It has been a failure, in my experience, all the time.

100. You think it would be safer to extract them on one shift?—Yes.

101. *Mr. Dowgray.*] Is it customary to extract pillars with only one shift in the Old Country?—Yes, practically.

JOHN ATKINSON sworn and examined. (No. 72.)

1. *The Chairman.*] What are you?—A coal-miner.

2. How many years' experience have you had?—About twenty-three.

3. Where?—Fourteen years in Australia and nine in New Zealand.

4. In which mines in New Zealand?—In the Westport Coal Company's mines and at Puponga.

5. How long have you been at Puponga?—Eight and a half years.

6. Do you hold any office in the mine?—No.

7. Are you a member of the union?—Yes, only a member.

8. You have heard the evidence of the last witness: do you corroborate it?—Yes.

9. Entirely?—Yes.

10. Have you anything to add to what he has said?—Yes, there is one matter I would like to speak on. Some five years ago, as near as I can recollect—I was working on the coal at the time—the deputy ordered me to clean the sump out. It was a dam where all the filth ran into. Through my going in to clean this out with a bucket I got blood-poisoning in both legs, and was off work for some fourteen weeks, but could get no compensation because the insurance company would not consider it an accident.

11. What do you attribute the blood-poisoning to?—To the water and the filth in it—to the insanitary condition of the mine.

12. So you advocate systematic sanitation?—Yes.

13. What have you to say to the truck system?—I prefer the truck to the pan system: many men whom I know would not use a seat after other men. There is another matter I would like to mention, in regard to timbering. A great deal depends on the setting of the timber. It must be set according to the fall or pitch of the ground. I have known men to set a prop 6 in. short, and stick that prop on top of a piece of stone. Then, when you came on on the next shift you would not know of it, whereas if you put the prop up yourself you would know all about it.

14. You advocate that pillars should be worked on one shift?—Yes.

15. About how many men on a pillar would you advocate?—About two.

16. What class of roof have you?—It is a good roof.

17. How many men do you work on the pillars?—Two.

18. *Mr. Dowgray.*] Have you any jigs there?—Yes.

19. Are they worked with a chain?—Yes.

20. It has been suggested in some other places that there should be an anchor chain attached to all face-jigs: have you ever seen that system in vogue—a stationary chain with the truck anchored by it. Do you think that system would minimize accidents?—It would, but the sheets at Puponga are satisfactory.

21. When they take the full truck off at the bottom is the full truck not apt to run away?—Yes, but we get a rail and make a hole in the bottom, and put the rail below the truck.

22. When you have one or two jigs running together, do you still use chains, or ropes?—We use a rope sometimes.

23. *The Chairman.*] Do you use the rope to any extent?—Yes, there are one or two in use.

24. It is the more satisfactory?—The rope and the wheel is the easiest to work, and makes less noise.

25. And how about the safety of working?—It is very safe.

26. Is it as convenient as the chain? Do you lose any more time with it?—No, practically less; in places the rope is superior. I want to ask whether anything can be done for the coal-miner in the way of legislating as regards an accident.

27. *Mr. Dowgray.*] What is your experience in regard to that?—I think they ought to legislate for a miner and not for a new-chum. I have been in a mine where there have been twenty or thirty men working, and not five coal-miners amongst them. They put up props which you expect to be safe to work under, but soon find that they are not so. You find they are not set with the lay of the ground and will not carry the weight. I think every man ought to hole and cut his coal properly; they blow the coal out with gelignite instead of cutting it. If my suggestion were adopted there would not be half the smoke you get in a mine at present.

28. If the coal were prepared properly there would not be so much smoke?—That is so.

ROBERT MCEWAN sworn and examined. (No. 73.)

1. *The Chairman.*] What are you?—A mine-manager.

2. What experience have you had?—It is about forty-three years since I entered a mine first. I have not been all the time in the mines—I have been out for some ten years during that period.

3. How long have you been a manager?—About eight years and a half.

4. All the time at Puponga?—No.

5. Where were you before that?—Hikurangi, Drury, and Taupiri West, Huntly.

6. What matters do you wish to bring before the Commission? Firstly, in regard to the ventilation of your own mine, have you anything to say in regard to what the miners have stated?—I wish to say that the miners have the full scope of the Act for sending their check inspectors to make examinations of the mine, and I have here a copy of the last and only check-inspection report which has been made since I took charge. That examination was made about a month after I took charge. [Report produced.]

7. This report is dated the 6th December, 1909?—Yes. No check inspection has been made since then.

8. Have they ever asked to be permitted to make an inspection? Has there ever been any dispute or disagreement about an inspection?—No; as a matter of fact, I rather court inquiry by the men in such cases. I have never heard anything in the shape of a complaint about the ventilation. The Inspector of Mines has always given me a clean sheet. In the section referred to by previous witnesses as being deficient in ventilation there are four men and a trucker working, and I am satisfied that an anemometer would show very much more air than the Act requires, and it is canvassed right into the face. We have machines working with compressed air, and when shot-firing, if there is any lack of fresh air, they can put the blast on at any time.

9. Do you know your air-measurements?—I have not an anemometer at the mine, but the last time the Inspector of Mines took the air he got 26,640 cubic feet.

10. Where was that measurement taken?—At the intake. We had about twenty-nine men in the mine at the time, which gave a little over 900 cubic feet per man per minute.

11. How is it distributed?—It goes right in in one stream. I might explain that during the last eighteen months or two years we have taken a certain number of the pillars away from the east side of the main haulage dip. In the section which one witness mentioned to-day there are only two men working—there are generally three. One of them is here to-day. Another section has only one pair of men in it. We are simply going to take out the pillars. The question of splitting the air in Puponga Mine at present is out of reason altogether.

12. Will not that removal of the pillars leave a large space for leakage of air?—Not necessarily a leakage.

13. Will it get back into the air-course?—Yes, we take it within 4 or 5 chains of the furthest dip. The air will almost pull the hair out of your head, it is so strong. Our fan has a capacity of 40,000 cubic feet.

14. What do you run it at?—It was running at eighty revolutions instead of one hundred and forty. We can get plenty of air. The only trouble we have is in this new section which is being opened out, and the probable cause of the ventilation there being a little slack at times is because the intake to it is in one of the laybys where there is a considerable stream of water passing, and the hole is not so large as I would make it otherwise. I do not want to infer that I am making this an excuse for not sending the ventilation down. As a matter of fact, we have another place just coming through, and instead of getting 150 cubic feet they will be able to get perhaps 900 ft. As I said before, we have the capacity. We are blessed with a fairly efficient fan and a good engine, and we have the power consequently to increase the ventilation at any moment.

15. In regard to bath and change houses have you anything to say?—Well, we have some provision for bathing. I think there would be some rather peculiar statistics in regard to that if the whole matter were placed before you. I do not want to say too much on this question, except that, crude and all as our arrangements are, they are an absolute luxury for the men. It is very much superior to what is provided in the coal-mines of New Zealand. It is the only mine in New Zealand where you get even a kerosene-tin shower-bath. There are not more than 50 per cent. of the men who take advantage of it to clean themselves when they come out of the mine. It has been assumed by one of the witnesses that that state of things was on account of the want of space and lack of privacy; but I know of men—and the witness could have mentioned this too—who have passed those baths for two years when there was no one using the bath at all, and they could have had it all to themselves if they had wished to avail themselves of a bath. There may be something in the matter of delicacy, however, and something might be done in the shape of having less men using the different compartments; but I am convinced by my experience there that the inducement would require to be a very strong one to make some men take advantage of the showers—in fact, you would have to tie them down to get them under the water. I am speaking candidly.

16. They are used by about 50 per cent. of them?—Yes, about 50 per cent. of the underground workers and about 5 per cent. of the surface workers. Still, I do not say that it would not be taken greater advantage of if there were more privacy.

17. Is there any matter you wish to bring before the Commission on your own account?—Yes, there is just one point in connection with the pillar-work I would like to say a word on. It has been suggested by one of the witnesses that working the double shift was dangerous. Now, I want to say that I have had very little double-shift work done, though really my experience has shown me that the quicker a pillar is taken out the safer the work is, whether it is done by double shifts or any other kind of shift. There is less liability for the roof to begin to move and come away. So that if I had a lot of pillars to work—we have very little more pillaring to do now—similar to what we have there, I should certainly double-shift them and consider I was doing that in the interests of the safety of the men.

18. The complaints have been that where pillars are being taken out under a bad roof, too many men are worked and they cannot hear the working of the roof?—I am quite in sympathy with that, but there should be no danger if there are only two pairs of men working, one going along the top of the pillar and one going up the side, to meet at the corner. Of course, when they are coming close together there would be a tendency of the noise being dangerous.

19. The only objection was as to the noise?—I cannot see where the argument would come in. If I put in a double shift there would only be two men working there at a time.

20. The objection to that is that the man coming on shift does not know the conditions left by the previous miner?—That brings up rather an important question which has been legislated upon. I think that in cases of that kind the men coming on shift should be able to see their mates at the face. The law provides that they must have only eight hours from bank to bank, and the result is that the men meet their mates at the mouth of the mine, and have no chance to show them how the timbering is. But, apart from the timbering question, I am still strongly of opinion that the quicker a pillar is taken away the safer the work is.

21. *Mr. Fletcher.*] What is the size of your pillars?—They are 36 ft. square.

22. You have a good roof?—Yes.

23. So that there is not so much danger of working four men on a pillar as there would be with a bad roof?—No, ours is an abnormally good roof. We are highly favoured in that respect. We have been very immune from accidents there, and that is on account of the roof.

24. How long will it be before you get that place holed through to improve the ventilation in that section you referred to?—About a fortnight.

25. *Mr. Cochrane.*] Are there any men working on the afternoon shift?—Yes, a few machine men.

26. And you keep the fan running in the afternoon?—Yes.

27. You approve of keeping the fan running?—Yes.

28. What kind of stopping have you on the west side of the dip?—There are two doors, ordinary trap-doors. One is a double door. The other stoppings are just stone stoppings. I might say that the stoppings on the west side do not materially affect the question of ventilation which has been brought up by the witnesses.

29. But would not stoppings on the west side prevent short-circuiting of the current?—They would prevent it more on the east side, where the ventilation is going down. There is a tendency to leakage there. I think the matter has probably been misunderstood by the other Commissioners. We work the dip from several laybys just for the purpose of getting these few pillars away. Of course when we get them finished it can be stopped up effectively.

30. Have you a plan of the mine with you?—No.

31. You have a good second outlet?—Yes, we have four outlets.

32. *Mr. Dowgray.*] It does not follow that because you get 26,642 ft. of air in your intake your mine is well ventilated?—No.

33. That will only show you the capacity of your fan?—Yes.

34. Was the return measured on that date you quoted?—No, the Inspector just took the intake.

35. You said that the stoppings on the west side—which is the side of the return—would be immaterial?—Yes.

36. Should the air not naturally find its way back to the men at the bottom of the dip?—Yes. They could not live in it if they got all the air we get at the top; it would blow them away. I am quite satisfied that there is more air going through these new workings than what is required by the Act.

37. Of course the 150 ft. specified in the Act is not a maximum?—That is so, and my endeavour at all times has been not simply to comply with the Act, but to get the best ventilation possible.

38. You admit that it could be improved upon?—Yes; we can give more than would satisfy the requirements of the Act, and we will, in another fortnight. There will be no reason to complain about it then. As a matter of fact, I have never heard any complaints, or I might have endeavoured to give the men better air before.

39. It appears that the matter has been brought up at the union's meetings?—Yes, but I think it should have been reported to us.

40. In connection with your baths, I am rather pleased to find that there is a coal-mine in New Zealand which has some bathing-accommodation, even of a primitive nature. It is also gratifying, I am sure, to find that 50 per cent. of the men use the baths. If, in their present state, 50 per cent. of the men avail themselves of the baths, do you not think, say, 75 per cent. would use them under even better conditions?—Yes, they might.

41. Do you see any difficulty in regard to the use of a truck for sanitary purposes?—No; and personally I think the pan system would be more expensive to operate. I do not think the difficulty of using a tub for sanitary purposes will be hard to get over.

42. You do not see any difficulty in instituting the tub or truck system?—No, except that there is always the matter of expense. Then again, with some men you would have, I believe, almost to tie them down and take them along in order to make them use it.

43. You could provide a fine for men not using the tub?—You would have to make stringent conditions.

44. We admit that miners do not adapt themselves easily to new conditions?—No.

45. In regard to working the pillars, you are of opinion that once the pillar is started the sooner it is taken out the better?—Yes, that is my experience of Puponga, when we are not able to get back to it for, say, two or three days, on account, perhaps, of shortness of shipping accommodation.

46. *Mr. Parry.*] You say that it is an advantage to keep your men cool, because you get better results from them?—Yes.

47. What is the highest temperature in your mine?—I have never taken the temperature regularly, but there is nothing above 60° in the mine. I have seen men working there with their coats on.

48. In places where the temperature went up to any great extent, would you suggest that the hours of labour should be decreased?—I do not know about decreasing the hours. Of course, a man would not do as much work, even if he stayed there all the time.

49. In the event of it not being possible to reduce the temperature, what would you suggest?—I would suggest that he should work eight hours there, but it would not be reasonable to expect him to do so much work.

50. What would you suggest to compensate that man for working the whole eight hours?—Well, you give him his full wages for less work.

51. The same as a man who was working in a temperature of 60°?—Yes.

52. Have you worked in hot places?—Yes.

53. In what temperature?—75°: and it was hot enough.

54. Do you not think that eight hours was more than sufficient to work in that temperature? I had to do it.

55. How long ago was that?—About twenty-six years ago.

BRIQUETTE-MANUFACTURE.

THE PROFITABLE UTILIZATION OF THE SOFT BITUMINOUS AND LIGNITE COALS OF THE WESTPORT DISTRICT.

WESTPORT COURTHOUSE, 13TH OCTOBER, 1911.

HORACE TOMKIES sworn and examined. (No. 74.)

1. *The Chairman.*] You are manager of the briquette-works?—Yes, at the present time.

2. Can you give us any information as to the cost of manufacture?—No. I would like to explain that I have never had anything to do with the financial part of the business—all my experience has been in connection with the manufacture of the briquettes and eggettes.

3. You can give us some information on that point. First of all, will you give us the proportions of materials used in making the briquettes?—Well, on an average a very good mixture is 8 per cent. of pitch. With some classes of coal we can use less, and with some we have to use more.

4. What coal do you use?—The Seddonville Mine coal.

5. With that coal what proportion of pitch do you use?—On an average, 8 per cent.

6. And are those the only ingredients—the coal and the pitch?—Yes. Pitch is the only binder we use.

7. What class of coal do you use?—Seddonville slack.

8. Can the coal which you use for briquetting be used for any other purpose?—Yes, for steaming purposes. Very often at the mines they use nothing else. Shipping companies take it, but as a rule they do not care for it.

9. Have you any idea of the market there is for it?—No.

10. Do you know any one who uses it extensively for that purpose?—No.

11. Do you know of any other binder or any other method by which the material could be made to adhere without pitch?—Yes, there are many binders, but none really satisfactory, for the reason that they will not stand the weather or the handling. Pitch is the only thing which stands them.

12. What are the other binders?—Tar, starch, tar and pitch, and lime. A Mr. Shekleton had a patent process, but I do not know what his ingredients were.

13. Did you see any of the product of his process?—Yes, we made some for him at the works.

14. How do they compare with the briquettes made with the pitch?—Not at all well. The pitch-made article would stand the handling, but Shekleton's require to be handled like eggs.

15. How were they for burning?—They were never tried, to my knowledge. I do not know.

16. You do not know how they sold Was any quantity of them made?—About 200 to 300 tons.

17. How long ago was that?—In the early part of last year.

18. Have you had any experience of these other binders?—We have made a few ourselves for experimental purposes.

19. With which binders?—Starch. And I have made a few myself with tar. It has turned out satisfactorily with briquettes, but not so well with eggettes.

20. How did they stand the handling?—Very well; but I found the cost of the tar was almost as high as that of the pitch.

21. How did they sell?—There was none sold.

22. How did they compare for burning?—Very well in comparison to the pitch-made article; but, of course, they were not analysed.

23. You have no idea of the comparative cost?—Well, if anything, it would be a little cheaper than the pitch.

24. What proportions did you use?—8 per cent. of tar.

25. And what of starch?—I really forget, but Mr. Milne will be able to tell you.

26. You said that you used State coal: have you used any other local coals?—We have never used any other than State coal. One day we got a truck of Stockton coal by accident; it made up very well, but not so good as State—it was inclined to break.

27. What was the difference in the two classes of coal ?—The Stockton appeared to be a softer coal.

28. *Mr. Cochrane.*] Do you know of any other way of utilizing the small coal ?—None, with the exception of as a coke.

29. Have you ever heard of small coal being forced into boiler fires by a strong draft ?—No.

30. *Mr. Reed.*] Have you any knowledge of the analyses of these coals and briquettes as made by the Dominion Analyst ?—No.

31. Have you had any experience of briquette-manufacture elsewhere ?—No.

32. How long have you been engaged upon these briquette-works ?—About three years.

33. You spoke of this article (the briquette) as a splendid household fuel: if that is so, why are the sales to private consumers so small ?—I understand that the business with briquettes and eggettes is never pushed.

34. But there has been a falling-off in the sales from the depots during the last year, as compared with that of the previous year: does that prove that it is a splendid household fuel ?—It is not to say that it is not.

35. Is there much demand ?—I believe there is. From what I have learned from men on the boats, they are crying out for it in Christchurch and Wellington.

36. How is it that you have not worked more time then, and produced more briquettes ?—I believe the fault has been in not getting the pitch.

37. Are you aware that there has been an annual loss upon the briquette-manufacture ?—I believe there has been a loss. There is a loss, I think, in the way they import the pitch.

38. Do you think the present method of manufacture is efficient and economical ?—There is only one way you could economize, and that would enable you to dispense with one man.

39. To what extent would that effect the cost of production ?—10s. a day.

40. How many men are working now ?—Eleven.

41. Would that reduction entail more work on the remaining men ?—No. It would be a mechanical alteration.

42. Would it be costly ?—No, at the very outside from £10 to £15.

43. Have you recommended that to the Government ?—No. I have never had any communication with the officials.

44. Why did you not make a recommendation to that effect ? Was it not your duty to make that recommendation ?—I would have done so if I had known the works were going to continue, but I was engaged only with the idea of working out the pitch.

45. So, with the exception of that economy, you think the manufacture of briquettes is being carried on as economically as it can be ?—Yes.

46. As regards the moisture in the coal, there were complaints that the coal was excessively moist and that the driers were not adequate to reduce that moisture: is that not the case ?—Well, sometimes it gets very wet, and it is then very awkward to work, but they get over that without any additional expense, and it is not often we get the coal very bad in that respect.

47. Have you heard how the Railways find these briquettes—whether they are satisfied with them ?—I have heard drivers and firemen say they prefer the eggettes to screened coal. Two drivers were looking round the works, and in answer to my inquiry they said they did not like the briquettes, but they would take the eggettes every time they could get them.

48. Did you ask them if they preferred the eggettes to the screened coal ?—Yes.

49. Is that the general opinion among the drivers ?—I only know what these two men said—one was from Dunedin and one from Christchurch.

50. How many shifts are working on the briquette-works ?—Only one shift while I have been there.

51. And before you were there ?—I think it was always only one.

52. Do the briquettes break when being shipped ?—No, I have seen them drop and not have a corner chipped off even.

53. Do you think the percentage of pitch could be reduced ?—I think it could be reduced if the works were situated away from Westport, but I do not think it could be reduced otherwise.

54. *The Chairman.*] You mean, if they were manufactured nearer the actual market ?—Yes.

55. *Mr. Reed.*] Have you thought of the substitution of a small percentage of resin to reduce the quantity of pitch agglomerant ?—No. I have only tried the tar, but I do not think it would be worth while entertaining the idea.

56. You have heard that resin is much used in Europe to reduce the quantity of pitch ?—No; it appears to be difficult to get any literature on the subject.

57. Are you able to say whether this is an up-to-date machine or not ?—I believe there are more up-to-date machines than ours.

58. *The Chairman.*] Would a more up-to-date machine reduce the cost of manufacture ?—I do not know.

59. *Mr. Reed.*] Who is the maker of your machine ?—Johnston.

60. What is its capacity for eight hours ?—The capacity of the briquette-machines is 45 to 50 tons.

61. How many briquetting-machines are there ?—Three, but only one is being used.

62. So each unit has a capacity of 45 to 50 tons per shift ?—Yes.

63. How many eggetting units have you ?—Only one. We can turn out 80 tons of eggettes per shift.

64. Are there any complaints made as to the Seddonville coal supplied ?—Sometimes we get it a bit dirty, and then it has to be given a little more pitch.

65. Have you ever received any trucks of coal which were unsuitable for the work?—Yes, at times, but on the average it is very good.

66. Do they send you the run-of-mine slack or picked coal?—I believe they have a bin purposely for it.

67. So they send you approved slack?—Very likely.

68. Do you know what they do with the other slack at the mine which is unsuitable for briquette-making?—I believe they throw it into the creek.

69. So that all slack is not suitable for briquette-making?—Well, I have not seen the slack they throw away. If it were sent down for trial I could say. I have never been up to the mine myself.

70. *Mr. Dowgray.*] You are not sure that it is all suitable for briquettes?—No.

71. It is not because it is unsuitable that they throw it into the creek—it is because they cannot use it?—Probably.

72. You think the briquette-works would do good work if the industry were encouraged?—Yes.

73. You feel it is not sufficiently encouraged?—I do.

74. *The Chairman.*] You have no demand locally?—No.

75. Are you the business manager?—No, but they sometimes come to me. Mr. Wilson is the business manager.

76. Do you communicate the orders you receive to him?—Yes.

77. Do you supply without an order from Mr. Wilson either briquettes or eggettes?—Yes, they are just small orders. I send a note of it on to Mr. Wilson.

78. Can you say from your own personal observation that a market might be found even in Westport for these briquettes and eggettes as a household fuel?—Yes, I believe there could be a trade worked up here.

79. *Mr. Parry.*] In your opinion, if the necessary alterations were made in the production of these briquettes, together with the pushing of the sales and so on, would the cost of the production be very nearly overcome?—No, it would not be overcome, because the greatest item is the landing of the pitch here.

80. *The Chairman.*] You remarked that the loss was on the method of getting the pitch: can you tell us now in what way the getting of the pitch could be improved?—Well, the last pitch came in two shipments. It went to Wellington and was transhipped from there to Westport. That was an extra cost.

81. That would not account for the difference—it would not make up the loss. According to the balance-sheet there is a big loss per ton. The Wellington transhipment would not run into anything like hundreds of thousands of pounds?—I do not suppose it would. As I said before, I have not been in touch with the financial aspect of the business. I feel sure, though, when you call Mr. Milne he will go thoroughly into the matter.

82. *Mr. Dowgray.*] You are not aware that tar and sawdust is used extensively in the Old Country?—I have heard of it.

83. You have never seen it used?—No.

84. *Mr. Reed.*] Have you ever heard of tar and sawdust being profitably used at Home?—No.

85. *The Chairman.*] Is there anything you wish to suggest on your own account?—No, I do not think so.

86. With regard to what you heard from the engine-drivers, you say they favoured the eggettes, and the reason they gave was that the briquettes were not so handy to handle: was there any complaint about their composition?—No, and it was not altogether the handling they complained of. They said the briquettes were not a good burning size.

87. Would that apply to household use as well, or only to engines and furnaces?—Yes.

ANDREW WATSON WILSON sworn and examined. (No. 75.)

1. *The Chairman.*] What are you?—I am agent for the Seddonville State Coal-mine; it is also part of my duty to attend to the clerical work connected with the briquette-works.

2. How far do your clerical duties extend? Do you keep the accounts and attend to the shipping of the briquettes and eggettes. I receive the orders from Wellington as to where they are to be sent and arrange for shipment.

3. Do all payments go through you?—Yes, for wages.

4. Do you receive money here?—Yes, for local sales only. I have nothing to do with any other sales.

5. You have nothing to do with the orders outside Westport?—No.

6. You know the class of coal that is used for briquette-making?—Yes.

7. What does it cost per ton?—The briquette-works are charged 5s. 6d. per ton for it at the works. That includes 2s. 6d. a ton haulage from Seddonville. There is a special rate on coal for briquettes.

8. Is that the total cost of the coal at the works?—Yes.

9. Do you know anything about the price of the pitch?—Yes.

10. What does it cost?—From £5 5s. to £5 15s. per ton. The last shipments of pitch came to £5 15s. per ton at the works.

11. You have heard the last witness say that a saving might be effected on the shipment of pitch: do you know anything about the method of shipment?—No, I am not in a position to say whether any saving could be effected, because it is not arranged here at all.

12. The shipment of pitch which cost £5 5s., did that come direct?—It was transhipped at Wellington. It came just the same way as the £5 15s. shipment. The difference was in the price at Home. The first shipment which came was shipped in bulk, but that was before I was agent here. I have not the figures for it.

13. You do not know what it cost?—No.

14. Now, what do you sell briquettes or eggettes at locally ?—17s. per ton.

15. What sale have you for the class of coal which you manufacture into briquettes ?—There is very little sale for it. It is too fine for ordinary steaming purposes.

16. Have you had any sale at all for it ?—Sometimes coal has come down for the briquette-works, and perhaps they have had a breakdown and I have arranged with the Union Company to take it, but they mix it with some other coal.

17. And what do you get for it ?—I do not know what is the price. That is a sale outside Westport, and is charged from Wellington.

18. Have you no price quoted for the sale of that coal in Westport ?—If it were sold to any one in Westport they would be charged 6s. a ton for it, but the Union Company have an arrangement with the Department for bunker coal.

19. You say there is very little market for it ?—Yes.

20. Is there any quantity of it shipped ?—Well, we have shipped the same class of coal to Dunedin. They use it there for lime-burning.

21. In large quantities ?—No, just an odd 200 tons.

22. Do you know the price ?—No ; that is charged in Wellington.

23. Do you know any other use it can be put to ?—No.

24. According to the balance-sheet a large proportion of briquettes are supplied to the railways and other works : do you know what price they are charged for them ?—No ; they are charged from Wellington.

25. Can you give us the cost price of the briquettes—that is, taking your coal, pitch, and labour ?—That is all worked out in Wellington. I simply send on the wages-sheets and statements.

26. Cannot you ascertain the quantities of coal and pitch used in a given term, and the amount paid in wages for labour ?—Yes, I could prepare it by this afternoon if you wish it.

27. *Mr. Reed.*] Are you unable to speak of this briquetting business as a commercial enterprise ?—I am unable to speak as to that.

28. Can you give us the total quantity of coal manufactured into briquettes during the past year ?—Yes.

ANDREW WATSON WILSON re-examined.

29. *The Chairman.*] Have you the tables you promised to prepare for the Commission ?—Yes. [Table produced.]

30. This gives the total amount of coal used, the total quantity of pitch, and the total result ?—Yes, and the cost at the works. That is up to the 31st March last.

31. You make the cost 17s. 11d. per ton ?—Yes.

32. What were you selling it at ?—17s. per ton here.

33. Have you any idea of the quantity you sold at Westport ?—Yes. [Table produced.]

34. You say the bulk of your output went to the other centres ?—Yes.

35. To this cost you would have to add freight ?—Yes, and Head Office charges, the charges on the briquette plant, and profit and loss statement.

36. So that the manufactured cost here was practically equal to the market-value ?—Yes, in Westport.

37. It is 11d. in excess of the market-value, not counting the intermediate charges ?—Yes, that is so.

38. You have no practical experience of the works ?—No.

39. Do you know anything about any other use which could be made of the slack ?—No, unless for steam purposes.

40. Have you had any local shipments of any extent ?—The Union Company is the biggest consumer of steam coal.

41. Can you give us the quantities delivered to the Union Company ?—No, sometimes it is diverted to the Union Company. Any information I might give might be misleading.

42. At any rate, the net result of the working is a loss ?—Yes.

43. And the shipping of the briquettes and the putting of it on the market resulted in a bigger loss ?—Yes, according to the profit and loss statement. [Exhibit 21 put in : (1) Local sales of briquettes and eggettes at Westport, 1st April, 1910, to 30th September, 1911 ; (2) coal, pitch, and stores used in manufacture of briquettes and eggettes.]

JAMES CUMMING sworn and examined. (No. 76.)

1. *The Chairman.*] You are the president of the Seddonville Coal-miners' Union ?—Yes.

2. What is it you wish to bring before the Commission ?—Well, this briquette plant is worked in connection with the Seddonville State Coal-mine, and according to reports there is likelihood of that institution being closed down. We wish to get the Government to keep it going, because its shutting-up will mean a considerable loss to the men and to the State. When the briquetting plant is going full time they utilize about 300 tons of slack coal a week, and if the works are closed down, of course, that 300 tons has to be pitched into the creek, which would be a certain amount of loss.

3. Are you speaking with any definite knowledge of the quantity ?—I only know what I have been told at the manager's office at the mine. I do not wish my figures to be taken as accurate.

4. Prior to the commencement of this briquette-works what was done with the slack ?—It was sold.

5. To whom, do you know ?—I do not know exactly where it was sold, but it was not emptied into the creek until the screening of the coal was started.

6. How long has the briquette plant been working ?—About four years.

7. How long have you been in the district ?—About eight years.

8. It has been said that the briquette plant has been working four years, so that between four years and eight years ago this slack was sold and not thrown into the creek ?—Yes. That may have been for a short period, but it was after the screening commenced.

9. It was sold as part of the general output, not separately ?—There was coal screened.

10. What proportion of the slack has been thrown into the creek since the briquette-works have been going ?—Between 5,000 and 6,000 tons are lying there now. Before that a good deal was utilized at the time of the Newcastle strike. We think the Government might be induced to start other works for the utilization of this small coal that is lying out at Seddonville—say, by opening chemical works. The idea is that pitch and tar might be manufactured by a process and then utilized in the manufacture of briquettes.

11. Have you any idea as to what it would cost ?—No. I wish to make the suggestion that the Government be recommended to go into it and find out what the cost would be. I am not prepared to go into it myself.

12. *Mr. Dowgray.*] What loss to the Government does the utilization of this slack for briquettes represent, in view of the fact that if it were not so used it would be thrown into the creek ?—There is the 2s. 6d. a ton paid to the Railway Department for haulage, though, of course, that is not a loss to the Government. The suggestion is for the Government to start an industry to utilize the by-products of this coal in the manufacture of pitch and tar, to be utilized in their own works for the manufacture of briquettes.

13. But you have no data or scheme to submit to us ?—No, just the suggestion—for chemical-works, coke-ovens, and so on.

14. *Mr. Reed.*] Are you aware that for the two years ended the 31st March, 1911, the briquette-works lost £5,158, according to the balance-sheet ?—I do not know that for a fact, but the Minister himself told me that the briquette plant was losing £100 a month.

15. Would you be surprised to hear that the balance-sheet certified by the Minister shows the loss for the year on the State mine briquette-works to be £2,673 13s. 6d. ?—Yes; but the briquette plant was standing idle a considerable time, and that might have accounted for it.

16. Are you aware that the output for the last year was more than double that for the previous year ?—I do not know.

17. You stated that the briquette-works used 300 tons a week: would you be surprised to know that during 1911 the works consumed only 170 tons a week, and in 1910 only 83 tons a week ?—Then it was not working full time. I meant, when they were working full time.

18. But if the plant was going where would you get the market for the briquettes ?—Well, they have never been properly put on the market. You can take up the paper any day and find that out.

19. Would you be prepared to approve of the country losing 6s. 3d. a ton on every ton of briquettes sold ?—No.

20. Are you aware that the present Seddonville Colliery is rapidly approaching exhaustion ?—To a certain extent I am.

21. Is not the soft coal used for briquetting obtained by the hewers when they are getting round coal ? The hard coal occurs fragmentally. Is it not necessary for the men to win the soft coal too ?—Yes.

22. Can the miner avoid getting soft coal when he is winning hard coal ?—No.

23. So that the coal which is sent to the briquette-works is unavoidably obtained—it is not specially obtained for the briquette-works ?—No.

24. *The Chairman.*] It is not a class of coal you mine for specially ?—No.

25. *Mr. Reed.*] So that when the coal is on our hands we must do something with it, and it is better to turn it into a briquette than throw it into a creek ?—Yes.

26. But with the high price of pitch, which means that there is 9s. 9d. worth of pitch in each ton of briquettes, the manufacture of briquettes is prohibitive, is it not ?—Yes; but our idea is for the Government to produce the pitch.

27. Is not the pitch manufactured in Europe the residuum after the distillation of mineral-oil ?—I have been told that it comes right out of the coal.

28. Are not the other by-products of the coal marketable as well ?—Yes.

29. So you recommend the Government to manufacture its own pitch ?—Yes.

30. Do you know what it would cost ?—No.

31. If it could be successfully carried out, is it not reasonable to suppose that other companies would have started manufacturing briquettes in Australasia ?—There are companies manufacturing briquettes.

32. At a profit ?—Well, they have been carrying on for some time.

33. Where ?—At the Great Morwell Mine, South Gippsland, Victoria.

34. What bond do they use ?—I could not say. It is a German process that is used. They use the Victorian brown coal.

35. Is it working now ?—I think so.

36. *The Chairman.*] How long is it since you have known of the works being in operation there ?—Fifteen years.

37. How long had they then been going ?—Not very long.

38. *Mr. Reed.*] If that plant had been a success, do you not think that the New South Wales collieries, for instance, would have installed briquette plants ?—Well, they might have had plenty of output, and they may not have been troubled with so much small coal as we are.

39. *Mr. Dowgray.*] You stated, in reply to Mr. Reed, that the slack coal used for manufacturing briquettes could hardly be avoided: is the miner paid for that coal ?—Yes, 2s. 4d. a ton.

40. And the haulage rate, 2s. 6d. a ton, that would be a direct loss to the Government if the slack coal were thrown into the creek ?—Yes, it goes to the Railway Department.

THOMAS DOUGLAS DUTCH MILNE sworn and examined. (No. 77.)

1. *The Chairman.*] What are you?—A marine and mechanical engineer.

2. You were at one time manager of the State briquette-works here?—Yes.

3. How long ago?—I was dismissed when the works were closed down on the 4th February of this year. I had been with them for four years and a half previous to that.

4. Can you give us any information as to the manufacture of briquettes—for instance, the class of coal used?—It is bituminous slack coal.

5. Has that slack any market-value apart from being used in that way—can it be used for anything else?—Well, as a rule, it is washed away.

6. Could it be used?—Yes, for coking.

7. What market would there be?—The market is small.

8. Do you think it could be profitably coked?—I do not know that it would be a splendid coking coal, but it could be coked.

9. Can you give us any information as to the profitable use of it for coking?—No, I have never gone into that subject.

10. Is there any other market for it other than for coking?—Not to my knowledge.

11. Well, have you any idea of the price it brought during the time you were at the briquette-works?—Yes, but I was not supposed to know.

12. What proportion of pitch did you use in the manufacture of your briquettes?—From 7½ to 9 per cent.

13. Do you know of any other binder which could be used for the same purpose?—Yes, there are a good many binders—inorganic binders, such as magnesia, silicate of soda, lime, fireclay, starch, and many others, also the residue of oil.

14. Do you know of any that would be available for use here that could be got reasonably, and that could be depended upon to turn out a marketable article?—Well, with those inorganic binders I think it is impossible to turn out marketable and commercial briquettes, because in the first place the weather affects them and tends to disintegrate them, as they have not the weather-resisting power of pitch-and-oil binders. As far as they are concerned I do not think New Zealand would be a suitable country to use that process in; but as far as New Zealand is concerned there is a beautiful opening in the near future for briquetting with a residuum of oil, once our oilfields are satisfactorily opened up, because in California it has been proved that you can briquette with about 4 per cent. of that oil and get a good satisfactory briquette. It goes about 2s. or 2s. 6d. a ton for the binder. But that is only satisfactory where you have an oilfield convenient.

15. Would the New Zealand oilfields produce suitable oil?—Well, it will have to be an oil with an asphalt basis, so as to produce a suitable proportion of pitch in the residuum of the oil. Of course, that remains to be proved. I do not know myself the character of the oil.

16. Assuming that the oil were suitable, do you think the briquette-making might be made payable under those circumstances?—Yes, I am quite certain of it—at that cost for the binder.

17. What proportion of residuum would you require?—About 4 per cent. I think in California it costs something like 11 dollars a ton, which makes it about 2s. or 2s. 6d. a ton for binder.

18. At what price do you think briquettes could be sold?—They could be sold at as good a price as the best of the screened coal, because it would have heating value added to it.

19. Could it be sold at the same price as good coal from the same pit?—Yes, they find they can sell it as readily as that in America.

20. Have you any suggestions or recommendations to make as to the cost of manufacture, apart from the material, which would affect the sale? Is there any saving which could be effected on the present process?—Yes, a good deal.

21. In what way?—Well, I had that question put to me from headquarters by Mr. Blow, and in reply I wrote a report giving my views on the matter, and if you have no objection I will read a copy of that report. There is nothing private in it. It is as follows:—

"SIR,— "Westport, 6th November, 1909.

"I have the honour to report to you *re* economies which might be effected in the manufacture of briquettes and eggettes.

"Briquetting, like all other commercial enterprises, demands that cost of material, production, and deterioration on the one hand must be more than counterbalanced by profit derived in marketing the product on the other hand.

"Firstly I shall deal with cost of material, principally coal and pitch. Coal, as supplied to us at the works, it is unnecessary to discuss, since if reduced below present cost it would mean that the increased profit at the works would effect a corresponding decrease of profit at the mine, and while working in conjunction it is immaterial to the Department where the profit shows. Regarding pitch the position is different. This we are purchasing outside our own Department, and every penny saved means profit. For example, I may state that if pitch is supplied to us at £3 instead of £5 per ton our saving per ton of fuel, working with 8 per cent. of pitch, would be the difference between 8s. and 4·8s., which is 3·2s. per ton. I have before me quotations for pitch at different shipping centres at Home on the 5th July, 1909: Liverpool, £1 6s. 6d. per ton f.o.b.; Glasgow, £1 7s. 6d. per ton f.o.b.; London, £1 10s. per ton f.o.b. I have also made inquiries as to the probable cost of freight by sailing-ship to Westport, and I am advised that the freight could be arranged at about £1 per ton, and if a cargo could be arranged for the same ship from Westport to some other port freight might be got at 15s. per ton. I contend that herein lies the secret of briquetting profitably in New Zealand, since a saving of 3s. 2d. per ton would be effected by this method of shipping. The pitch quotations are for bulk; barrels might be 8s. more.

"Secondly I shall deal with labour costs in production. In this part of the manufacture I do not think I can reduce expenses in working under present conditions. I have applied all the labour-saving

devices which are advantageous under the present conditions. However, existing conditions could be very much improved so far as economy of production is concerned. Up till the present we have seldom worked more than one machine in a four-machine plant; accordingly that machine is working to pay for the three idle ones, and striving to show a profit on the whole. We have three briquette-machines and one eggette-machine.

"Eggetting: This, to my mind, judging from practical experience and demonstration, is the profitable process; it also produces the article most in demand. Our eggette-machine has an output of 75 to 80 tons per day under favourable conditions, on a wages-bill of £5 10s. per day. That works out at 1s. 4½d. and 1s. 6d. per ton of fuel produced.

"Briquetting: One machine has an output of at best 40 tons per day, on a wages-bill of £6 per day, or 3s. per ton. Besides costing more for labour, the Union Steam Ship Company charge 1s. per ton more freight on briquettes than they do on eggettes. It is therefore clear that, though we may make a small profit while making eggettes, it is speedily swallowed up when we are put on making briquettes again to meet the demand at the depots. The difference in cost is 1s. 6d. more for manufacture and 1s. more for shipping: total, 2s. 6d.

"To cut the briquette-machines out altogether, as I have previously respectfully suggested, would effect a material saving. Another factor which would very much reduce the cost of production would be the installing of another eggette-machine alongside of the existing one, in place of the briquette-machine at present there. This would mean doubling the output for a cost of £1 10s. more for labour. With 160-ton output we would have £7 wages-bill, or 10½d. per ton.

"From another standpoint the eggette-machine is the best: breakages are much more frequent with briquette-machines. Such has been our experience, but our machines are weak in construction. Every breakdown means loss of time and labour, also cost of repair.

"I understand that Mr. Reed, Inspecting Engineer, recommended that steel-mould rollers be supplied instead of the existing cast-iron ones now used. This I have suggested continually, and I feel convinced that it would reduce the expense of tear-and-wear. At present, when working, we wear out one pair of these rolls in less than six months. If made of steel I believe they would last for two years at least.

"I have often calculated out as to whether any advantage would be gained if we were to work three shifts instead of one. I am of opinion that it would not be much of a saving. We could get more out of the plant and probably wear it out in one-third of the time, and therefore be ready for newer and better machines as they came on the market, and I feel sure they will come in the near future. Otherwise I do not see that much saving could be effected.

"Thirdly, to run these works with any hope of success they must be kept going continually. In the past they have been run most intermittently. I do not refer to a stoppage like the present—that is preferable to running two or three days per week, as we have often done in the past for months. The want of trucks, shipping deranged, and other causes necessitated stoppage. I assert that the more continuously these works are kept going so much better the chance of success.

"Lastly, I am strongly of opinion, after studying conditions obtaining here—shipping in particular—that Wellington is the best site for briquette-works. Seeing that our principal consumers are the Railway Department, we could then load into their trucks, thereby saving two handlings of the fuel and a proportionate percentage of breakage. I doubt not that if such a step were taken eggettes would become a favourite household fuel as well.

"I have &c.,

"T. D. MILNE,

"Engineer in Charge, Briquette-works.

"H. J. H. Blow, Esq., Under-Secretary, Mines Department, Wellington."

22. Do you consider it would be cheaper to ship the slack to Wellington and manufacture the briquettes there?—Yes, I believe so. At the same time I think the Mines Department might have considered the advisability of shipping the run-of-the-mine coal and screening it in Wellington. You would also save a percentage of your lumpy coal that way.

23. From your experience at the briquette-works they were run at a loss?—I understand so from the annual balance-sheet, but otherwise I knew nothing of the finances.

24. Well, you cannot give us any idea of the cost of production at the works?—No; the Department has that information.

25. In regard to the pitch, how do you account for the difference in the quoted price and the freight given you, and the actual cost price here? It has been given in evidence that it cost from £5 5s. to £5 15s. a ton landed here, but from your inquiries you found it was quoted much lower, and the freight quoted to you would not bring it up to anything like the actual landed cost?—Well, my authority as to the quotation for freight is the Vice-Consul for Norway here. He told me that freight-price of £1 a ton. Of course, that would be by sailing-vessel.

26. You cannot suggest any material saving in the way of labour with the present machinery?—The only saving I know of I have suggested in that report. Of course, you could duplicate the plant, and only raise your wages-bill from £5 10s. to £7.

27. But to make that pay you would require an increased market?—Yes.

28. While you were manager did you have any local demand to supply?—Only a very small one.

29. Did the orders go from you to the office, or did you deal with them yourself?—Mr. Wilson dealt with that part of the business. Of course, we filled the bags or whatever came along. The people sent their own carters.

30. Can you give us any idea of the satisfaction given to the users of the briquettes or eggettes?—Yes, a good many people were very fond of them.

31. Once they started to use them they continued to do so?—Yes; I know of people who have used them for the past four years, and will use nothing else.

32. *Mr. Reed.*] If the briquettes are so popular, how is it that the sales are so small?—I did not say they were popular. I said very few people have used them regularly.

33. Are you aware that during the year ended the 31st March, 1911, there was a considerable decline in the sales to private customers at the depots?—No, I have had no idea of that; but you must understand that, as you cannot make good sausages out of bad meat, you cannot make good briquettes from bad coal.

34. Would you not call it a good briquetting-coal?—Not without being washed.

35. Would washing not add to the cost?—Yes, perhaps 6d. or 1s. a ton.

36. As regards the number of men employed at the works during your time and at present, do you think that number could be reduced?—No, I do not think so, or I would have effected a reduction myself.

37. Do you think, by an expenditure of £10 or £15 on a mechanical alteration, one man could be dispensed with without throwing extra work on the other workmen?—There is one place where an alteration could be effected perhaps, and that is in the distribution of the briquettes in the bin.

38. Would that save one man?—Yes. It would mean a very small saving in the cost. If you take the output at 75 to 80 tons, and the wages of the man at 10s. a day, that would only mean a saving of 2d. a ton, which would not go far to make up the present deficiency.

39. Now, as to the residuum of the oil as a binder, I suppose you are aware that our oilfields have not been discovered yet?—Well, they are looking fairly well at Kotuku.

40. But have they struck oil?—There has been oil flowing down there for years.

41. But only surface indications?—It has not gushed out of the bore, but it has been coming out of it for some time.

42. What is the residuum?—Mostly asphalt left in the oil.

43. Or otherwise pitch. You stated that in America they use 4 per cent. of residuum?—Yes. Of course, it is a different quality of pitch. At the St. Louis Exposition they could not make good briquettes without 7 or 8 per cent. of coal-tar pitch.

44. In the Taranaki petroleum the residuum was only 3 per cent.: what sort of oilfield would be necessary to obtain enough pitch for your purpose at that proportion?—But you never know the extent of it. A good many geological gentlemen have told me that from examinations made New Zealand ought to be one of the best oil-producing countries in the world.

45. Are you aware that there is very little residuum in our petroleum?—I do not know.

46. *The Chairman.*] Can you say what amount of residuum would give you something to work on?—Well, it would depend upon the output.

47. Even at 3 per cent.?—Yes, if the output were sufficient.

48. You quoted in your report to Mr. Blow that those figures were based on the maximum output?—Yes. Of course, there were weeks when we worked four or five days. We have had an average output of 76 tons per day. We had to stop for shipping delays, and so on.

49. You quoted pitch at 8s.: for the last year it was 9s.?—I do not think briquetting will be carried on economically until we can get pitch at from £3 to £3 10s. a ton.

50. Is it not a fact that you require the best-quality pitch?—Well, the best test of pitch is the mouth test.

51. Do you require a high-class pitch, a medium pitch, or a bad pitch?—You do not want too high-class a pitch. You want a pitch with the anthracene oils left in.

52. You want the naphtha taken out?—Yes, a pitch which softens at less than about 98° or 100° Fahr.

53. How do you know that the pitch for which you were quoted a price would be up to the standard required?—I know that all the pitch we have had, even up to the last lot, was not a high-class pitch.

54. How do you know that this pitch you quoted is a good pitch?—I do not know.

55. Are you aware that the Government in buying pitch try to get the high-class pitch?—I have no idea about that.

56. Have you sometimes complained of the pitch supplied?—Yes; the best pitch we got was the bulk pitch we received in the first instance.

57. Do you think you will get good briquettes with 4-per-cent.-residuum pitch?—Well, they found that at the St. Louis Exposition.

58. Do you think you will get a pitch that will go always as far as the present pitch?—Yes, it is quite possible.

59. There is a great difference between 4 per cent. and 9½ per cent.?—I said 7½ per cent. to 9 per cent. We sometimes found it was necessary to use a little more pitch because of the extreme wetness of the coal. I had it tested here, and found that it contained 17·6 per cent. of moisture.

60. You think our coa' is on the wet side?—Not the hydroscopic moisture. It is about 3·7 per cent., I think, but that was added moisture.

61. Have you not complained about the excessive water in the coal?—Yes, and I have recommended an additional drier.

62. Do you still recommend an additional drier?—Yes, that I advised, as in the past.

63. Have you ever studied Dr. Maclaurin's analyses of the coal and briquettes?—No.

64. Would you be surprised to know that the briquette has not the evaporative power of the coal?—Yes, I can quite understand that. It is accounted for by the amount of dirt in it. If the slack was better the analysis would be better.

65. Did you wash it?—No.

66. *Mr. Reed.*] What is your opinion of the plant: is it up to date?—Well, I have never had experience of other plants, but from what I have read I should say it is not up to date. It was supplied by tender, and I think many of the parts ought to have been separate and distinct.

67. Do you think any improvements could be made in the existing plant or in the system of manufacturing briquettes, and, generally, do you think the plant has been run satisfactorily?—Yes, everything has run as well as it could have done. The stoppages through shipping derangements have all tended against the plant.

68. If you could get a plant to work with greater pressure to consolidate this coal, and thereby reduce the percentage of pitch, do you think the product would have as great an evaporative power with less pitch, and be as good a fuel?—No, not quite. You increase the inflammable power of the product with the pitch. But, still, the difference in pitch would not be much; it would only be the difference between the heating property of pitch and that of coal.

69. *The Chairman.*] If you washed the coal?—The heating property of the briquette would be much higher than it has been in the past.

70. *Mr. Reed.*] As regards sales, was there not a large quantity of our slack sold during the Newcastle strike?—Yes, for bunker purposes.

71. Is there not some of it sold now for bunker purposes?—I do not know; it was not in my line to know that.

72. *Mr. Dowgray.*] How do you account for the difference in the figures quoted for the pitch, the £5 15s. per ton and your figures?—Of course, that was the quotation I saw in the financial magazine published at Home. I do not know as to the quality of the pitch, and it was in bulk. It would cost about 10s. more to barrel it. But, still, I cannot account for that vast difference.

73. Do you not think there could be greater economy in the freight?—I do not know. It would have cost more by steamer than by sailing-vessel.

74. So that, if the pitch can be bought at the price quoted by you and your freight is reliable, then it could be run as a financial success?—Yes, if the pitch could be landed here at £3 5s. a ton.

75. *The Chairman.*] Would it require to be as low as £3 5s.?—No, I think it would pay at £3 10s.

76. That is the most you could afford to pay?—Yes, I think so.

77. Do you know what that slack would be sold at?—I remember the Minister saying in the House that he sold any amount of bunker coal at 4s. 6d. a ton.

78. *Mr. Reed.*] That was Greymouth slack?—Westport, I think; but I do not know—it might have been Greymouth. But I do not think much could have been made out of it. There is another matter to be considered: the higher the quality of your coal the higher the price you will get for your briquette. We do not get as much for Seddonville coal as they do for Stockton or Granity coal.

79. As to sending pitch in barrels, we get it in barrels now, do we not?—Yes.

80. Have you any knowledge of what happened when they sent it out in bulk?—I did not advocate that.

81. Did they have to blast it out of the ship's hold?—Yes.

82. What did that cost?—About 2s. a ton. And you would never get another ship to bring it out that way if they knew what happened the last time. The captain nearly lost his ship in the tropics through it.

83. So that that shipping method is not practicable?—I did not suggest that it should be brought out in bulk. You could bring it in barrels in a sailing-vessel.

84. *Mr. Dowgray.*] You said barrel it?—Yes.

85. *Mr. Reed.*] What merchandise is carried to Westport at that price?—I do not know. They would charge a heavy freight for pitch on a general cargo or passenger steamer, I suppose, because it would be treated as combustible. I am positive that a sailing-vessel would bring it out at £1 a ton. Pitch in barrels is a splendid cargo.

86. But that would be more expensive?—It would be £1 17s. 6d. per ton, and £1 for freight—£2 17s. 6d. at Westport Wharf.

87. *Mr. Parry.*] You said that if the industry were kept going continually a saving would be effected?—Yes.

88. But a bigger demand would be required?—Yes.

89. During your term in the briquette-works, was there anybody at all who pushed the sale of briquettes?—I do not know. The sales were managed from Wellington.

90. And if there had been somebody to do that do you think more would have been sold?—Well, I think the eggettes are superior to the screened coal from Seddonville.

91. And you stated that you did not think that briquetting would be a success until the pitc is procured at £3 a ton?—From £3 to £3 10s., I said.

92. What do you base that on—on the prices given for the private company's coal?—On the price at which the coal is supplied from Seddonville, and the price they are supposed to receive for the produced article. That is evidence I am not supposed to divulge.

93. Do you think the loss is greater because it is a State-owned proposition than it would be if it were privately owned?—I was never a believer in State control myself.

94. *Mr. Dowgray.*] You said that the slack at the State mine was not as good as the slack at Denniston and Millerton?—I do not think so.

95. Have you used any of the slack from those mines?—No; but it is a better coal.

96. There is a great deal in the name?—But they get a better price for their coal than is obtained for the Seddonville coal, and marketing is the best test.

97. Can you give us any idea as to the profitable use for the slack?—Only for coking and briquetting.

NELSON COURTHOUSE.—2ND NOVEMBER, 1911.

ARTHUR D'OYLEY BAYFEILD sworn and examined. (No. 78.)

1. *The Chairman.*] Your name is ?—Arthur D'Oyley Bayfeild.

2. What are you ?—An agent, of Westport.

3. I understand you wish to lay some matters before the Commission regarding briquettes ?—Yes. I should like to explain to the Commission, in the first place, that I was responsible for a resolution being passed by the Westport Chamber of Commerce, asking that your powers as a Commission should be extended to enable you to inquire into the question of the utilization of the soft coals of the Westport district and the lignite coals of Charleston in connection with the briquetting business. My object in moving that resolution was to get the Commissioners to inquire and gather information as to the possibilities of more vigorous action being taken in prosecuting the briquetting and eggetting business, and particularly with a view of pushing the soft coals of the Mokihinui district, in which area there is a very large quantity of soft coal lying dormant to a great extent, and which I cannot help thinking might be utilized. But the matter would have to be approached from a strictly commercial point of view, and the points which I think require inquiry I have made a note of. If I had been in Westport when the Commission was sitting there I would have been glad to have given evidence on this matter. Firstly, there is the question of haulage, which is an important element. It has been established by the parliamentary reports that the briquetting business at Westport has been unsuccessful, and there are points which I shall endeavour to place before the Commissioners to show the cause of that failure—but, of course, not in any hostile spirit—and that in two or three points, at any rate, there are possibilities of improvement. I wish, first, to place the question of haulage before you, and also to ask whether it would not be a good thing for the Government to offer an inducement by way of a bonus for a successful method of dealing with these coals, and bringing them to a commercial success, by (*a*) the improvement of the mode of importing pitch, which is a very great item; (*b*) obtaining a more up-to-date plant; and (*c*) considering whether it would not be more economical to make the briquettes, say, in Wellington—that is, the actual manufacture of them. Going back to the question of haulage, the ordinary rate of haulage on coal from Seddonville to Westport is 3s. 2d. per ton, but I think there is a reduction of 8d. per ton for soft coal, which is railed to Westport for 2s. 6d. per ton. Well, the third point I want to submit is that that 2s. 6d. even is an exorbitant charge for haulage over a distance of thirty-two miles, and I believe that if the Harbour Board could be induced to make a substantial reduction it would pay them in the long-run, because they would haul a greater quantity, and it would be the means of assisting in the utilization of these coals. I say most decidedly that it is an absurdity to charge 2s. 6d. per ton. The rates all along, as a matter of fact, speaking in a general way, are absurd; and it is a matter for the Government to consider whether they should not pass a regulation reducing these rates, particularly those on inferior coals. I do not know that I need say much more on that point. Then I come to the question of offering an inducement as a bonus for briquetting coal to a commercial success. The Commissioners may or may not know that some little time ago attempts were made to find a means of dealing with this class of coal, but so far they have not arrived at a point of commercial success; but, as I had occasion to say before, I submit that the fact of failure so far will not prevent determined men from further endeavouring to overcome the difficulty. In Wellington, I know, the matter is being prosecuted, and I can mention names of gentlemen who are interested in the subject. Mr. Swannell has been; and within the last two or three months he has improved his ideas by establishing the fact that he can produce eggettes at a less cost than previously, so that he is gradually getting much nearer the mark of success. Then, Mr. Bradley, of Westport, has been on the job. The point I wish to make is this: that it would pay the Government well. If I can get you, gentlemen, to view it in that particular way, and impress upon the Government the advisability of giving an inducement to find a means of dealing with these coals I will have achieved my object. Mr. Swannell and Professor Easterfield, of Wellington, have recently found a means of saving 1s. 6d. per ton on the previous cost of making briquettes or eggettes by Mr. Swannell's process.

4. In regard to pitch, do you know of any suggestion you can make in regard to that ?—Yes, most decidedly: it is a most important factor. And here again I ask it to be understood that I am not finding fault in any way; but, as a business man, after making inquiries and looking into this question, I find that, as a matter of fact, pitch can be imported at a very much lower cost than has been paid for it—in fact, an astonishing reduction in the cost can be effected.

5. Can you give us the details—the mere statement is not enough for us to go on ?—A great saving can be made in the freight by direct importation to Westport, say, by sailing-vessels, as against the freight by the ocean steamers *via* Wellington.

6. Where can we get this information in regard to freights ? We want some definite data to work on in order to figure out the freight-saving which can be made ?—As a matter of fact, I could supply it to the Mines Department. I do not know what freight they paid in the first place. I will send a communication to Wellington, and get the freight figures placed before you there.

7. Then, in regard to the up-to-date plant which you said was required ?—I am not an expert upon that point.

8. We have had evidence, and it is admitted that a more up-to-date plant might effect some saving ?—Yes, as a matter of fact the present plant is obsolete. Then, another point I wish to make is that it has been claimed and proved that the manufacture of briquettes can be undertaken more economically in Wellington than in Westport. The Westport district would benefit by having their coal used in the business, and the Harbour Board would benefit by the haulage.

9. What do you suggest would be the saving by manufacturing the briquettes in Wellington ?—That I shall leave to others to deal with. Details will be submitted to you in Wellington by men who are in a position to speak on the matter.

10. *Mr. Cochrane.*] With regard to your suggestion for reducing the railway rates on inferior coals, do you intend that to refer to the Westport district only, or throughout the Dominion?—I am not parochial, but I cannot answer for the rates elsewhere—only for those in our own district.

11. But, you see, if the Westport rates were reduced the other places would make similar applications for reductions?—There is a very distinct difference. The profits from the working of the Westport line are purely a matter for the Westport Harbour Board—they are apart altogether from the general Dominion rates.

12. You said you were astonished to find what a reduction could be made in the cost of pitch: can you give us any idea of what that difference amounts to per ton on the pitch landed in Westport?—A difference of at least £1 7s. 6d. per ton.

13. *The Chairman.*] In connection with the Harbour Board's interest in the haulage-rates, could the Chamber of Commerce not induce the Harbour Board to recommend a reduction in the haulage-rate? Would Westport and the Harbour Board co-operate with the Government to reduce the freight?—We would endeavour to induce the Board to do so, but I should like to see the Government bring pressure to bear on them. I would like the Government to recognize the position—they are the dominant power.

14. *Mr. Dowgray.*] Do you know whether there is any rebate on the haulage-rates on soft coal in other parts of the country?—I do not know.

15. How does the haulage-rate on the Westport line compare, for instance, with that from Huntly to Auckland?—I think it would bear favourable comparison; but I have nothing to put before you on the point.

16. *The Chairman.*] Of course, you know it has been established that up to the present the manufacture of briquettes has been failure?—Yes, and I do not think we should be content with that failure.

WELLINGTON (PARLIAMENT BUILDINGS).—15TH NOVEMBER, 1911.

LOUIS HENRY EILERS sworn and examined. (No. 79.)

1. *The Chairman.*] What are you?—Accountant for State Coal-mines. I have prepared this statement [produced] showing the cost per ton of the various shipments of pitch imported for the manufacture of briquettes. [Exhibit No. 27 put in.]

2. Can you account for the difference in the purchase prices?—Some of it was in bulk. The bulk pitch is always cheaper than that in casks.

3. But even so far as the pitch imported in casks is concerned there is a large difference between £1 17s. 6d. per ton and £2 12s. per ton. Is this f.o.b.?—Yes.

4. *Mr. Reed.*] This is a statement showing the cost of pitch imported since the inception of briquetting at Westport?—Yes.

5. It gives the f.o.b. price at port of shipment?—Yes.

6. What was the cost of the last shipment?—£2 12s. per ton at Liverpool, I think.

7. But we found that the cost at Westport was £5 15s. per ton?—Yes.

8. How do you account for that difference of £3 12s.?—There is freight—about £3 3s. a ton—that would account for a good portion of the difference.

9. Do you mean to say that the cost is £3 3s. per ton from the port of shipment to Westport?—That is what was paid.

10. Do you know as to the specification for the pitch: was it a special quality which was procured?—I am not aware of that—I only deal with the accounts.

11. Do you buy the higher-quality pitch, or only medium quality?—I could not say as to that—the ordering is done by the Mines Department.

12. Have you a statement showing the analysis of the cost of the manufacture of briquettes?—Yes [produced]. [Exhibit No. 27A put in.]

13. Is this for the year ended 31st March last?—It is for the whole period of briquette-manufacture.

14. In your balance-sheets you make certain provisions which are not shown here?—This statement shows simply the cost of production. Then there is the cost of trading to be added.

15. What is the cost of production?—£1 7s. 10·19d. per ton is the total cost of production and trading.

16. What is the average sale price?—£1 1s. 9·16d. per ton.

17. So that the loss on briquettes has been what per ton?—6s. 1·3d. per ton.

18. What capital do you count for depreciation?—That is shown in the balance-sheet—it stands at £13,839 now.

19. Have you a sinking fund, or have you written any of that off?—It is being written off every year. £728 was written off last year—5 per cent.

20. In your cost of £1 7s. 10·19d. per ton how much have you allowed for depreciation and interest?—5 per cent. for depreciation, and 3½ per cent. for interest.

21. As regards the market, are endeavours made to obtain a market for this patent fuel?—I think so.

22. Is it advertised?—No, it has not been advertised recently, because the works have been going so intermittently.

23. Has the trade for briquettes been pushed?—I think so—we had a good sale for them.

24. For the year ended 31st March, 1910, I see that out of a total output of 4,160 tons, the depots took only 871 tons?—I have not the figures with me.

25. For the following year, out of a total output of 8,470 tons, I see that the depots only took 1,129 tons: how do you account for the small amount of this patent fuel taken by the depots?—Well, I think the people prefer the screened coal.

26. So that the public do not like this patent fuel as well as the screened coal?—I would not say that; there are a few people like it.

27. Do you think the demand for this patent fuel could be increased in any way?—It is a question of educating the people to use it.

28. Do you think that could be done?—I think so.

29. But the balance-sheets for the last two years show a decline in the demand. For instance, in the year 1910 the depots took about one-fifth of the total output, whereas in the following year they took only about one-eighth: that shows a decline in the demand?—I do not think so, because the works were closed up for some time.

30. But I am taking the demand in proportion to the output?—I do not think myself that is altogether a good guide.

31. Can you make any suggestion as to how this briquette-manufacture can be carried on profitably?—Well, the only thing that can make it profitable is a great reduction in the cost of the binding-material and also of the labour. Those two items would have to be reduced.

32. Has the supply of eggettes at times been irregular?—Yes, very irregular. The works have been closed up several times.

33. Do you think that by regular supplies and pushing the sales continually the manufacture of briquettes and eggettes could be made a success?—I would not like to say that under the present condition it could be made a profitable concern.

JOHN SPENCE NICOL sworn and examined. (No. 80.)

1. *The Chairman.*] What are you?—An auctioneer, in Wellington.

2. I believe you wish to bring before the Commission some matters relating to briquette-making?—Yes. In the first place, I am representing Mr. Swannell, who is the patentee of a new process for making a special binder for the binding of slack coal. Mr. Swannell, unfortunately, is absent from New Zealand at the present moment, and I have been asked to come along to give what evidence I can which may be of benefit to the Commission in enabling a recommendation to be made to the Government in connection with this process. I will substantiate any statements I may make with regard to this process from reports on the subject. I have here a sample of briquettes made from Paparoa coal [produced]. Earlier in the day I put a couple on the fire to show you how they burn, but I was unable to bring to your attention that they were burning. I have, however, proof here of the fact that they burn remarkably well. My main point is that the difficulty of producing a binder that will enable the manufacture of briquettes and eggettes to be carried on profitably has been solved by this process. The only briquetting system at present in vogue in New Zealand is a pitch process, and, as per the evidence given before the Commission to-day, the pitch costs about £5 15s. per ton at the works. The pitch as part of the binder, I believe, is really the cause of the non-success of the profitable production of briquettes. I understand that the cost of production of these pitch briquettes, including coal and binder, is £1 7s. 10d. per ton—that includes the freight to the place of sale—and the average sale price of the briquettes at present on the market is £1 1s. 9d. per ton, showing a loss of 6s. 1d. per ton. So that, looking through these figures, one can only come to the conclusion that the pitch process is not altogether a success; and I believe that the State is seriously considering the closing-down of this business altogether. As against this we have a process which is new, and is patented and protected here in New Zealand. I will be very pleased indeed if you will allow me to read the report of Professor Easterfield, when he actually made this briquette by this process himself:—

"DEAR SIR,— "Victoria College, Wellington, 7th July, 1911.

"In December last I reported at your request upon Mr. Swannell's process for briquetting coal, and stated that the processes then practised would cost approximately 5s. 6d. per ton for binding-material. Acting upon a suggestion of mine, Mr. Swannell has now modified his process so as to materially reduce the cost of the binder. On the 29th June I supervised the operation of making briquettes in a small hand-press, checking all the weights of the materials employed. The briquettes after three days' keeping were sufficiently firm for commercial purposes, and burnt satisfactorily in an ordinary fireplace. Only 12·5 per cent. of binding-material was used, in the place of 25 per cent. in the older process. The table here given shows the cost of the materials employed in making 100 tons of binder at present wholesale prices:—

	Per Cent	Present Wholesale Prices, per Ton. £ s. d.	Cost per 100 Tons of Binder. £
Flour	7·9	9 0 0	71·00
Tar	7·9	3 2 0	24·49
Lime	1·2	2 10 0	3·00
Water	83·0	0 0 2	0·07
	100·0		98·86

"Say, £99 per 100 tons = 19s. 10d. per ton of binder. Since 12·5 per cent. of binder is employed in actual briquetting, the cost becomes 12·5 per cent. of 19s. 10d. = 2s. 6d. per ton of coal briquetted = 2s. 3d. per ton of briquettes produced.

"The cost of the binder needed for producing a ton of briquettes by Mr. Swannell's former process was about 5s. 6d. There is thus a saving of at least 3s. per ton of briquettes in the binding-material for the new process.

"Yours faithfully,

"Thomas H. Easterfield, M.A., Ph.D., F.I.C., F.C.S.,

"Professor of Chemistry in the Victoria College.

"G. T. Hull, Esq., Paparoa Coal Company (Limited), Wellington."

I have also some other reports which I would like to place before you for your information. One I have from Mr. J. P. Maxwell, managing director of the Paparoa Coal Company, reads as follows :—

" DEAR SIR,— " The Paparoa Coal Company (Limited), Head Office, Wellington, 3rd May, 1911.

" *Re* your patent briquetting process : I have pleasure in complying with the request contained in your letter of the 25th April, 1911. I have seen briquettes manufactured from Paparoa coal by your process, the briquetting-mixture consisting of ordinary gas-tar, flour, lime, and water in certain proportions. The briquettes were pressed in an ordinary hand-press. I have retained some of the finished briquettes for testing, and am of the opinion that they would be very suitable for household and other purposes. I went very closely into the cost of manufacturing, and formed the opinion that with a plant situated in a main centre like Wellington, and even paying present full market prices for small coals, the manufacture of briquettes by your process would prove a commercial success, and produce a handsome profit at a moderate retail price. Separate plants might be installed in the principal cities in New Zealand. " I am, &c.,

" J. P. MAXWELL, M.Inst.C.E.

" C. T. Swannell, Esq., c/o. Messrs. G. T. Hill and Co., Johnston Street, Wellington."

I have another report here, signed by Mr. Gerald Fitzgerald, which is as follows :—

" DEAR SIR,— " Wellington, 11th May, 1911.

" I have examined your statement of costs of briquette-manufacture as submitted to Mr. Maxwell on the 4th April last, and I have seen your pencil-drawings of the factory-arrangement and Professor Easterfield's estimate of production-charge, and upon these particulars I beg to observe that in your statement the provision for labour appears to be excessive. I believe that the whole factory could be managed by two men and one lad if their duties could be arranged as follows : The supervisor and engineer could be one, and the assistant and engineman could be one, and either could at times do any other work required. The lad could tally in supplies if necessary, and deliver goods. The accounting could be done outside with advantage. Upon your design for factory-arrangement I suggest that the flour should be mechanically handled like the coal, in order to cut down to the lowest limit the necessity for manual work, and possible batch-mixing could be arranged so that no supervision would be required for that part of the process, the intent being that the materials should enter at one end of the factory, and the briquettes come out at the other without any intermediate manual interference. Your price for tar is high, being the local charge. If tar can be imported in bulk it ought to be less than half the price now quoted. If your estimate of components is correct (I am unable at present to verify this) the charge of 3s. per ton for binder is not too high, and in view of what I have stated above I believe that it can be reduced. I am not in a position at present to check your estimate of working-costs. " Yours truly,

" GERALD FITZGERALD, M.Inst.C.E.

" Mr. C. T. Swannell, 30 Cuba Street, Wellington."

As to the working-cost of this business, the only and really the best information we could get was obtainable from a firm like Messrs. J. J. Niven and Co., who are large manufacturers, so it is on their figures that I am actually working as to the labour-cost. They write on the subject as follows :—

" DEAR SIR,— " Wellington Branch, Hunter Street, 19th July, 1911.

" With reference to your proposal to erect a briquetting plant, and the probable cost of equipment and operating same : After studying your preliminary plans and the accompanying schedule of estimated cost, I feel that you would do well to increase the cost of plant by at least 10 per cent. The general lay-out of the works is in the direction of manufacturing with a minimum amount of labour. No allowance has been made for carrying plant to deliver the product to merchants, therefore we presume your selling price to be *ex* storage-hopper.

" With reference to the labour question, my estimate is, for an eight-hours day—engine-manager, £5 per week ; clerk, £3 per week ; fireman-greaser, £2 14s. per week ; process labour, £2 14s. per week ; boy, say, £1 per week : total, £14 8s. per week. An output of the full capacity of the plant would mean that all hands would be fully occupied ; therefore, the question of receiving coal must be considered as an extra, and should be taken in with cost of coal delivered at the works. £14 8s. for forty-eight hours = 7s. 2d. per ton, plus 33⅓ per cent. for practical contingencies ; but if the works run sixteen hours per day the cost would be : day shift, £14 8s. ; night shift—engineer, £3 10s. per week ; process labour, £2 14s. per week ; boy, £1 per week : total, £21 12s. per week. £21 12s. per week = £3 12s. per day = 4s. 6d. per hour and 5s. 4d. per ton, showing the advantage of working two shifts per day, plus 33⅓ per cent.

" It must be distinctly understood that the foregoing is on the assumption that the plant could maintain the maximum output without variation, which is practically an impossibility ; therefore, by allowing for stoppages, inability to dispose of output at rate of manufacture, delays in receiving coal, and general contingencies of difference between theory and practice, and to cover such discrepancies, we consider that not less than 33⅓ per cent. should be added to the calculated cost of production. This might be reduced to 25 per cent. when the works have a continuous output approaching the rated output. " Yours faithfully,

" Per pro JAS. J. NIVEN and Co. (LIMITED),

" C. T. SWANNELL, Esq., Wellington. " L. G. JAMES, Branch Manager."

I do not want to go into this question further, except to mention that for forty-eight hours per week the cost for labour would be about 9d. per ton ; but when the factory was able to do double the output the briquettes could be produced at 7d. per ton for labour. We have also been in communication with Messrs. A. D. Riley and Co., of this city, who represent the people at Home who make the plant, and they say, " Replying to yours of the 22nd, *re* briquetting plant, we have, in accordance with

previous inquiries, obtained information from the works; but for a 6-ton-per-hour plant as requested, this would cost you £1,200 c.i.f. Wellington." They also state that only three men are necessary to work the plant, though J. J. Niven and Co. state that it will take five. Inquiries were also made from the State Coal Department as to the selling-price of eggettes and briquettes, in reply to which the following letter was received from Mr. Gasquoine, the General Manager:—

"DEAR SIRS,— "Wellington, 23rd June, 1911.

"*Re* briquettes and eggettes: These works have been closed down for some time, and having a few tons of pitch on hand it has been decided to work this up. When the works will reopen I am unable to say, as the railway-sidings were taken up. When we start operations again I shall then quote you f.o.b. Our price here retail is £1 10s. per ton for eggettes, and as briquettes are sold by the hundred we charge 6s., which runs about the same rate as eggettes by the ton.

"Yours faithfully,

"Messrs. G. T. Hill and Co., Wellington. "W. C. GASQUOINE, General Manager."

No doubt you are aware that there is a great deal of slack coal in New Zealand, not only on the West Coast but also at Kaitangata, and the company there has quoted 1s. 6d. per ton on trucks at Stirling for it. At present it is costing them 1s. per ton to take their dross coal from their mine-mouth. In connection with the other materials that are wanted for this process, they are all available. The tar can be supplied from Australia. As to flour, the flour-millers would be prepared to mill flour at a much cheaper rate than I have quoted, as long as it was not for consumption, so that the cost per ton for binder would be very much less than I have quoted. We would like to see you report to the Government that it is your opinion that something should be done in regard to this matter. They are assisting other processes at the present time, and this will benefit both the people and the producers at the mine, because if we go on for another fifty years in throwing away this waste coal it means that our round coal is getting less and less every year; and if briquetting is gone in for the mines will last very much longer than they will under the present state of things. It will also give employment to a number of men, and also a better return to those who have their money invested in the coal-mines of New Zealand.

3. At what do you consider you can put these briquettes on to the market?—Not being the proprietors of a coal-mine, we cannot say.

4. What could you sell them at?—Well, the difference c.i.f. Wellington between the cost of round coal and dross coal is 10s. per ton—that is, at wholesale rates. If round coal is sold wholesale at £1 2s. per ton you could buy dross coal at 12s., and in many cases, I think, at 10s. per ton—say, 11s., at any rate. I think the best way to work it is to put the actual cost of the binder and labour on to the cost of the dross.

5. That is 3s. per ton, according to you?—Yes. Then that would be 14s.; then add 6d. and another 1s. for depreciation and depot-expenses. If you were doing 10 tons an hour, or 80 tons a day for five days in the week, that would mean 400 tons a week. If you allowed 1s. a ton for these contingencies you would be allowing a very large amount—£20 a week. And you could sell the briquettes at £1 a ton, and show 4s. 6d. a ton profit on it.

6. *Mr. Fletcher.*] Would you prefer having the plant in the cities rather than near the mines?—Well, that is a question which would entirely depend upon circumstances. For instance, if a plant were started in Dunedin, where you could get lignite coal delivered at the works for 6s. a ton, it would be a good thing. It may, however, be stated that the lignite coals are not suitable; but we could buy West Coast coals and mix them with it. There are several things to be taken into consideration. If, for instance, you put your plant near any particular mine, you would be binding yourself to take the coal from that mine.

7. Can you buy Westport slack here at 11s. a ton?—Well, I was managing for Puponga coal, and sold it at 10s. 6d. a ton.

8. Can you guarantee that binder?—Yes, certainly.

9. It requires three days to set?—Yes, if you give it three days it will be better.

10. Is it sufficiently compressed?—Yes. I would like to explain that with the hand-machine we have we can only get a small pressure, whereas with the proposed plant I have been speaking about you could get an enormous pressure. As a matter of fact, there is on the market a Chicago plant.

11. Have you known any difficulty in selling briquettes and eggettes when coal was cheap?—Well, my knowledge of the demand for them is very poor—I cannot say. I only know what the Accountant for State Coal-mines has said in evidence here to-day. He says that the demand can be increased.

12. *Mr. Reed.*] Do you understand briquette-making machines?—No.

13. Do you think you could demonstrate your process at the present Westport briquetting plant?—No; they have a very out-of-date arrangement there.

14. Do you know the type of plant there?—Mr. Swannell has told me that he would "scrap" the lot of it.

15. But you only know that from hearsay?—Yes. He says it would take anything from £2,000 to £3,000 to put it in good order.

16. You have read some testimonials from the Paparoa Company?—Yes.

17. If there is such a great deal in the manufacturing of briquettes by this process, why do not these companies go in for it themselves?—They have not been asked.

18. Can you tell us of one successful briquetting-machine in Australasia to-day?—No.

19. Are you aware that the Western Australian Government have two of these plants?—I know that representations have been made to the Australian Governments, and Mr. Swannell is over there at the present time in connection with the matter. They have paid him to go over the other side.

20. You said that it would cost 15s. 6d. a ton to produce the briquettes in Wellington?—Yes.

WELLINGTON.—17TH NOVEMBER, 1911.

ALFRED LUTHER BEATTIE sworn and examined. (No. 81.)

1. *The Chairman.*] What are you ?—Chief Mechanical Engineer, New Zealand Railways.

2. So far as you are concerned, the object of the Commission's examination this morning is to inquire into the profitable utilization of the soft coals of the Westport district. I understand you use in your locomotives briquettes and eggettes manufactured from these soft coals. We will be pleased to hear what has been your experience in the use of these briquettes and eggettes ?—The Locomotive Department of the Railways has used briquettes and eggettes since 1907 to the amount of some 23,000 tons. Touching the briquettes, these were found unsuitable from a locomotive-fuel point of view.

3. On what account ?—On the ground that there was considerable loss by crumbling on a number of shipments, and therefore an undue percentage of slack coal. Some shipments apparently had been manufactured with an insufficient proportion of binder (pitch).

4. Was that amongst the earlier shipments ?—Yes, some of the earlier shipments crumbled very seriously. The use of briquettes in a locomotive-firebox was unsatisfactory: they tended to burn "dead."

5. There was too much bulk ?—Yes; and the only way to get along with them was to break them up before putting them into the fire. That again produced a very considerable amount of slack. In addition to that, the tendency of the briquettes, and also of the eggettes, is to form slag or clinker on the fire-grate, and they are also more severe on the firebox, firebars, tubes, and brick arches than the ordinary screened coal.

6. To what do you attribute that ?—Well, I can only attribute it to the chemical action of the pitch. It may make a more cutting flame: I should judge it would. Latterly we have not taken any briquettes, but we have been regularly taking eggettes.

7. Since when have you ceased taking briquettes ?—During the last two or three years we have taken little but eggettes.

8. Have you made any comparison between a ton of coal and a ton of briquettes or eggettes ?—They are from 1s. 8d. to 2s. per ton of less value than the screened coal for locomotive fuel.

9. How did the prices compare ?—We were paying for the briquettes and eggettes the same price as for screened Seddonville coal.

10. And at the same price you found them from 1s. 6d. to 2s. per ton less value ?—Yes. Another point I might mention is that briquettes and eggettes prepared with pitch or anything of that nature involve a restricted use as fuel. It is quite out of the question to use them for tunnel-work. The acrid fumes from the pitch affect the men to such an extent that it is not practicable to work heavy trains through tunnels with such fuel as compared with screened coal, so that we never supply eggettes or briquettes to the districts where there are tunnels. For that reason we could not use them on the trains running from Lyttelton to Christchurch without risking the asphyxiation of the men, or, at any rate, severe suffering; similarly, between Upper Hutt and Summit, and between Summit and Cross Creek, to use a fuel prepared with pitch is out of the question.

11. Do you find any advantage in using eggettes as to handling ?—In point of handling, the eggettes do not suffer nearly so much through shipping as the briquettes, nor in handling after they arrive at our coal-yards; and in that respect they are in a more convenient form for our use.

12. Otherwise the same disadvantage applies to eggettes as to briquettes ?—The same disadvantage as regards the fumes and use in tunnels, yes. I might also mention that the men who have to load and unload eggettes and briquettes suffer considerably in their eyes through the dust from the pitch, so that we had to provide respirators for such men.

13. Have you had any experience in the manufacture of them ?—None whatever. I have seen them manufactured at Westport, but I have had no other experience. They were not manufactured usually in the north of England, where I was brought up and served my apprenticeship. We had any quantity of coal in the West Riding of Yorkshire.

14. You know nothing about the price of pitch ?—No, I have no information upon that point.

15. *Mr. Reed.*] Are you aware of briquettes having been used in any other State ?—No.

16. Do you think if they employed another binder, such as lime, tar, and flour, that you would experience the inconvenience that you have now with the pitch ?—I think if you employed a binder which did not cause any objectionable fumes you would very greatly improve them.

17. Would you obtain the same calorific power by the use of lime and flour ?—I am hardly in a position to answer that offhand, because it would require a trial. I should judge that you would lose some calorific power.

18. Do you find a large amount of ash with these briquettes ?—Yes, and also a considerable amount of clinker, and a high proportion of sulphur.

19. As regards the later consignments of eggettes you have received, were they hard or friable ?—They were harder than the earlier shipments.

20. Do they appear to contain more pitch ?—I should judge by the hardness of them that they contain more.

21. Therefore, from your experience, the only deduction that I can make is that unless a different binder can be obtained—a binder giving off less noxious gases and fumes—the utilization of this patent fuel by locomotives is not possible ?—I should certainly take that view.

22. It is a question of the binder ?—Yes, very largely.

23. Are you aware why briquettes were not manufactured from the slack in Yorkshire and Durham ?—I am not aware, except that they had such a superfluity of coal. It would hardly pay them. They had a sale for the slack for factory use. They called the smallest size "smudge," and the next size "slack."

24. Can you express an opinion on eggettes as a household fuel?—No; I have not used them.

25. Would the same ill effects be experienced from their use in a grate as you have experienced with them in a locomotive?—If there was any tendency to down-draft and smoking from the chimney into the room, I should say it would be most objectionable; and in the case of a stove, I should say, they would experience probably what we experience in our tubes—a large deposit of soot.

26. The briquettes which you have used have all been manufactured from a bituminous coal?—Yes, it has all been obtained from Seddonville.

27. Now, if a New Zealand lignite were bound with pitch, do you think you would get the same ill effects from the pitch, and without the compensating advantage of high calorific power?—I should certainly say so. If you had the same percentage of pitch as a binder you would get the same noxious fumes, with, as you say, a much lower calorific power.

28. The present objection would be greater with a lignite briquette?—Yes, I should say so.

29. *Mr. Cochrane.*] I think you told us that you valued the briquettes at 1s. 6d. to 2s. less than coal?—Yes, than lumpy screened coal.

30. Did you take into account the fact that the briquettes had a lot of slack amongst them?—Yes.

31. In that case, what value would you place upon eggettes instead of briquettes, as against coal?—Well, their relative values might be stated in this way: Briquettes are not within 2s. per ton of the value of coal, while eggettes are not within 1s. 6d. per ton—that is, eggettes are 6d. per ton better than briquettes.

32. Now, supposing they could be manufactured and sold to you at 3s. a ton less than screened coal, would you consider the use of them?—So long as we could get rid of the objectionable fumes, I think we could probably use them at 3s. a ton less, as compared with screened coal.

33. Then I think you said there were ash and clinker in the briquettes?—Yes.

34. And you find more ash than with the Seddonville coal?—Yes.

35. Do you not think that points to the poor class of coal used?—Yes, very likely.

36. *Mr. Fletcher.*] Could you tell us what proportion of sulphur the briquettes and eggettes contain?—The total sulphur in the briquettes is from 3·6 to 3·74 per cent.

37. *Mr. Dowgray.*] For the purpose of comparison, what proportion does the coal contain?—Slightly under 5 per cent.—that is, according to the analyses of two different samples of coal, one from Chasm Creek Bridge and the other from Grant's Face; but it does not necessarily follow that the small coal used for manufacturing the briquettes was taken from those particular places.

38. You make an objection to the sulphur in the briquettes, while on analysis it is shown that there is more sulphur in the coal than in the briquettes?—I think I have been misunderstood: my objection was to the poisonous fumes of the pitch. I also pointed out that there was a large percentage of sulphur in the briquettes.

39. In regard to the ash and clinker, do you not get a large amount also from the round coal?—Not to the same extent as from the briquettes and eggettes. I might add that the pitch would absorb and account for a certain diminution of the sulphur-percentage as found in the briquettes and eggettes.

40. Has the Railway Department declined to purchase briquettes or eggettes on account of their unsuitability?—We have declined to purchase briquettes for the last two or three years.

41. Have you declined also to purchase eggettes?—No, we have taken the eggettes in all cases, unless it appeared that some particular lot was going to overload us; but we have systematically purchased eggettes from the State Coal-mines Department. We have not in any way debarred them.

GOLD.

THAMES COURTHOUSE, 14TH AUGUST, 1911.

BOYD BENNIE examined.

1. *The Chairman.*] You are Inspector of Mines for this district, Mr. Bennie?—Yes.

2. I understand you produce certain data regarding the principal mines here obtained by you during your inspections?—Yes; this data extends over the year 1910, and has reference to the principal mines between what we call the Karaka and Shellback Creeks. [Exhibits Nos. 1 and 2.] If similar data respecting any of the other mines is required I can give it.

3. Have you the data taken at the examination of the Deep Levels made by the Commission on Saturday last?—Yes. [Exhibit No. 3.]

FRANK TREBILCOCK sworn and examined. (No. 1.)

1. *The Chairman.*] What are you, Mr. Trebilcock?—A miner.

2. For how many years have you been mining?—About eighteen years, twelve of which were spent underground.

3. Where?—Thames and Karangahake.

4. In what capacity?—As a miner only.

5. Have you had any experience in the taking of temperatures with instruments?—No.

6. You do not understand the taking of temperatures with either wet- or dry-bulb thermometers?—No.

7. Now, what is it that you wish to lay before the Commission?—I desire to give evidence respecting ventilation and the cause of accidents.

8. The subjects in regard to which the Commission has to inquire are sanitation, ventilation, accidents, and bath-houses. Have you any opinion to offer as regards sanitation?—No. In the mines in which I have worked the sanitary arrangements have been fair, and I have no complaint to make as far as they are concerned.

9. Have you any suggestion to make in regard to the necessity for change and bath houses?—Yes.

10. *Mr. Dowgray.*] What mine are you working in at present?—The Waitangi.

11. Is the ventilation fairly good there?—Yes.

12. Have there been any complaints from the men?—No.

13. In regard to accidents, I understand you are working in a drive there: what distance is that drive in?—About 2,200 ft.

14. Is there any provision for a man getting out of the way when firing shots?—No, you have got to run back.

15. *The Chairman.*] What suggestion have you to make?—A chamber or manhole should be put in about 150 ft. or 200 ft. from the face for a man to take shelter in. Sometimes we fire fifteen shots at a time, and there should be places where the men could get out of the way of the stone.

16. *Mr. Dowgray.*] How many men work in that drive?—Ten men; four men on a day shift.

17. *The Chairman.*] How many men would want to use the chamber at once?—Three men.

18. *Mr. Dowgray.*] What distance should these chambers or manholes be apart?—About 500 ft.

19. *The Chairman.*] How far, on an average, have you known the stones to carry down the drive after shots?—Pretty well 200 ft.

20. How far do the men have to retire at the present—it will probably depend on the length of your fuse?—About 500 ft. to be reasonably safe.

21. How far, then, back from the face would it be safe to have these chambers, or how close should they be kept to the face?—About 200 ft.

22. *Mr. Dowgray.*] In connection with shot-firing, will you give us your opinion on the use of batteries?—I have had experience of them in the Crown and Waiotahi mines, and I prefer the battery to the fuse.

23. *The Chairman.*] Have you manipulated the battery yourself?—Yes.

24. *Mr. Dowgray.*] Have you found any difficulty in getting your shot off?—I have never worked in a drive with a battery—only in a shaft. The battery is safer when five holes or more have to be fired at once. You cannot always depend on the fuse.

25. Have you ever done any work with windlasses in driving a winze?—No; but there should be cogs and pawl on all windlasses to prevent them breaking away and injuring the men who work them. I have known of such accidents.

26. *The Chairman.*] Recently?—Yes, about four months ago.

27. Are there any windlasses with cogs and pawl in use in the mines about here?—No, I have not seen any about the Thames.

28. *Mr. Parry.*] You stated to the Chairman, in answer to his question, that you have not had any experience with the thermometer?—That is so.

29. Has the manager ever taken the temperature while you have been working in the face?—I have never seen him do so.

30. Has the Inspector of Mines done so?—I have not known him to do so.

31. So that you have never seen the temperature taken in any place where you have been working?—No.

32. You have had a good deal of experience in working in hot places?—Yes.

33. What effect has that had upon you?—I have noticed that it has made me very sick, and when one comes home in the evening one cannot eat so well. One also comes out in a sort of "itch," and feels as if one could tear one's-self to pieces. I do not know the temperature, but we have often had to take off our flannels and wring them out. It has been so hot that I have perspired even when standing still.

34. You think a standard temperature should be fixed for a six-hour place?—Yes; in some places even four hours is long enough.

35. Do you suffer from indigestion at all working underground?—No.

36. Have you ever worked on the surface in hot climates?—Yes.

37. Would you sooner work on the surface than underground in the same heat?—I would prefer the surface any time.

38. According to your experience underground, do you think it is advisable to have sanitary appliances below?—Yes, certainly. At the Waiotahi we did have places for the men to go to.

39. *The Chairman.*] Were they used regularly by the miners?—Yes. There was an oil-drum kept in a dead end of the drive for the purpose, and when it was full it was sent to the surface.

40. Only when it was full?—Yes, when it required emptying. Another thing I wish to say is that the manager there provided a box to throw waste crib in.

41. Would you make it compulsory for the miners to use these conveniences?—I do not think you could do so.

42. If a miner wants an advantage there is a corresponding onus on him to use it. Do you not think it should be made compulsory?—Yes, if it is provided.

43. *Mr. Parry.*] You have worked a good deal on the night shift underground?—I have not done much during the last three years.

44. You feel better for not having done so?—Certainly.

45. What effect does it have on your health?—I do not like turning out to start work on Sunday nights, I admit.

46. When are mine-accidents most liable to happen—at what time in the twenty-four hours?—That I cannot say, though I have noticed that more ground has fallen away between 12 and 8 o'clock than at any other time.

47. *The Chairman.*] Have you any suggestion to make in regard to precautions which should be taken between 12 and 8 o'clock?—No, because I think if the night shift were done away with in a place like Waihi there would be a number of men thrown out of employment.

48. *Mr. Parry.*] In what way, Mr. Trebilcock?—Well, take the battery, for instance. Working two shifts they could not cope with the output from the mine without putting up more stampers. The night shift is better than no shift at all.

49. In regard to change-houses, do you think it is necessary to have them on the surface?—Yes.

50. They have them in these mines at the Thames?—Yes, but I have not seen any baths.

51. No hot and cold water?—No.

52. Do you think they are desirable for the workers?—Yes.

53. Have you ever done any inspecting at all for the workmen as a workmen's inspector?—No.

54. Have you ever complained about the bad ventilation?—Well, I have told the boss that it was asking a man to commit suicide to work where I was.

55. Was the ventilation remedied?—Sometimes you could not remedy it. We generally came out of the place till the atmosphere improved. The gas is the trouble here.

56. Do many accidents happen in the mines at the Thames?—There are very few serious accidents, but several minor ones have occurred, such as broken ribs, poisoned fingers, &c.

57. They cannot be compared in number with those in Waihi and Karangahake?—No, there is no comparison at all.

58. What do you attribute that to?—To the contract system, under which there is too much rushing.

59. Has there been any dispute between the management and the workers in connection with wet or hot places, as to what constitutes a six-hour place?—No, I do not think there has. The manager would say, "This is a wet place, and you are to work a six-hour shift here."

60. *Mr. Molineaux.*] I understand you have been accustomed to handling explosives for the last eighteen years?—Yes.

61. Are the explosives always provided in good condition, thawed ready for use?—Yes.

62. Do you have many misfires?—At times, several.

63. On what average?—As many as three in a day; but I have gone a month without any.

64. *The Chairman.*] Three in a day out of how many shots?—Eight.

65. You put in your own fuse and cap?—Yes.

66. You prepare and grease your own charges?—Yes.

67. *Mr. Molineaux.*] You have an average of three misfires out of eight shots?—No.

68. What is the average?—About 1 per cent.

69. What is the usual cause of those misfires?—Sometimes bad fuse; at other times water or sawdust getting into the cap.

70. Do you consider the fuse is more often defective than the detonator—what is the most frequent cause of a misfire?—Bad fuse.

71. *The Chairman.*] What do you use for tamping?—Clay.

72. Do you draw your shot to investigate the cause of the misfire?—I have done so. I have seen the fuse burn within 3 in. of the cap.

73. *Mr. Molineaux.*] Do you ever test your fuse?—Yes, I do if I have any doubt.

74. If it is defective, what course do you take?—I tell the boss about it, and it is sent back to the store, and we get another one supplied.

75. In the course of your experience, what is the longest period which a charge has hung fire?—Ten minutes is the longest I have known.

76. *The Chairman.*] What is the average time that you remain out?—It all depends. If you are working on wages you might wait an hour before you go back, but if on contract it would probably be between fifteen and twenty minutes.

77. *Mr. Molineaux.*] Have you had any misfires with the electrical battery?—Yes. That has been when we were firing a number of holes—say, thirty—and perhaps sixteen would go off. On one occasion we inquired of the manager for the reason, and he said we should have used extra wire.

78. *The Chairman.*] They were not misfires—the trouble was simply that they did not light?—No, they did not light.

79. *Mr. Molineaux.*] On all occasions would you prefer electrical firing as being safer than the hand-fuse?—Yes, I consider the battery is far safer than the hand-fuse.

80. Do you consider that it would be conducive to the health of the miners if all mines were equipped with bath-houses and it was compulsory for the men to use them?—I would make it optional for the men to use them.

81. *The Chairman.*] How many men would you suggest per bath?—One bath for each six men.

82. *Mr. Molineaux.*] I notice that you complained that as the result of working in hot places you suffered from "itch"?—Yes.

83. Do you think if you had had a bath every day after leaving your work you would have suffered in that way?—Possibly not.

84. Do you think that the mine-managers have done all they reasonably could to render the mine-workings healthy?—As far as it is in their power to do so.

85. Do you think that the miners themselves take every available precaution to render mine-workings healthy?—Yes, as far as I am aware.

86. In the mine in which you are working are the places objectionable?—Well, we have the water spray, and the only time it is objectionable is when we are firing, and then we put the water on it and cool it down.

87. When drilling by hand what precaution do you take?—With a down-hole we put the water in, but with the up-holes we take no precaution at all.

88. *The Chairman.*] Do you suggest that there are precautions which the miners could take, but of which they do not avail themselves?—Well, with the up-holes you could not put the water in.

89. Could you not have a fine spray?—I cannot see how it could act; it would be very awkward.

90. It would be no more awkward than the other?—With a hand-drilled hole it would be 2 ft., and with a machine-drilled hole it would be 5 ft. or 6 ft.

91. Could you not have a fine spray playing round the mouth of the hole on to the dust as it falls out?—I think it would be interfering with the drill, but perhaps you could.

92. Would it retard the work to any considerable extent?—It would be somewhat inconvenient to the man who was boring if he were working single-handed.

93. Would it be a feasible plan?—No, I do not think it would. The ordinary miners do not bother about using water unless in a down-hole.

94. *Mr. Molineaux.*] You have not felt any injurious effects from the dust?—So far I have not, but that will probably come later on.

95. You have not considered it worth while to prevent the bad effect?—No, only with rock-drilling.

96. *Mr. Cochrane.*] In sinking winzes and shafts you recommended that cogs and pawls be put on windlasses: would you have them on every windlass or only when certain depths were reached?—On every windlass over a winze or shaft.

97. Without regard to depth, would you have it supposing you were going to sink only 10 ft.?—Yes.

98. You stated that the air was very bad where you were working?—Yes; from December to April it is very bad in the Waiotahi.

99. Is it a struggling mine or a prosperous one?—It was prosperous once, but it is not now.

100. How would you deal with such bad ventilation?—I do not know that anything could be done. There are two shafts, downcast. Ten feet away from the current of air you will find any amount of CO_2 in the summer-time.

101. *The Chairman.*] Do you suggest that better circulation would help to remedy it?—I hardly know. With gold-mining it is different from what I understand it is in coal-mines, where you are working all on the one level.

102. *Mr. Cochrane.*] Were you referring to winzes?—Well, I have seen winzes full up to the collar with gas.

103. As to the baths, you suggested one for every six men: do you mean plunges or showers?—Both—one shower for every six men.

104. *Mr. Reed.*] At the Waiotahi Mine have the men asked the Inspector for manholes to be put in a drive?—No, not that I am aware of.

105. If it is dangerous, why have you not asked the Inspector, as you are empowered to do by section 263 of the Act?—I have been there only five weeks contracting, and I did not give it a thought until this Commission was coming round, though I considered it was not right.

106. You did not think it was sufficiently dangerous to make a complaint about under the Mining Act?—I had intended to do so before long.

107. How many sets of timber are there in that drive?—I cannot say; it is a big order.

108. How far are they apart?—4 ft. 6 in.; but there is considerable space where there is no timber.

109. What are the dimensions of the timber?—9 in. by 9 in., rimu legs.

110. Have you suggested either to the mine-manager or to the Inspector that electrical firing should be used?—Not to that mine-manager.

111. You referred to an accident four months ago in the mine at Tairua: was the man badly hurt?—I do not know; I have forgotten.

112. Do the miners at the Waitangi Mine take advantage of the check inspection by the workmen's inspectors?—No; I do not know that check inspectors have ever been through the mine.

113. Why not?—That is a question I cannot answer.

114. Were you aware that such inspections are provided for under the Act?—No, I was not aware that we could have an inspection made unless in case of accident.

115. Is the Waitangi Mine well ventilated?—Yes.

116. You also say that the Inspector of Mines and the mine-manager do not take the temperatures at Waiotahi?—I have not seen them do so.

117. Was there any necessity for that to be done?—I think so, particularly in those hot places.

118. At the mines where you have worked has reasonable attention been given to the removal of the CO_2?—Yes, but I have seen levels banked up where the best air could not go.

119. So that you have found that the CO_2 has issued in such quantities as to be almost unremovable?—Yes, in the muggy weather.

120. *The Chairman.*] Is that applicable to the Thames mines?—Yes, from December to April.

121. Can you tell the Commission what effect carbon-dioxide has upon you?—Yes; it gives you a severe headache and makes your heart thump like a steam-hammer. With 10 per cent. the candle will go out; with about 1 per cent. it will burn very dimly with a bluish flame.

122. Would you detect the presence of this gas by its effects on your candle?—Yes.

123. And you consider that a good test?—Yes; when the candle burns but dimly it is time to get out.

124. Have you had any experience with carbon-monoxide?—No.

125. Have you felt any ill effects from smoke given off after the firing of gelignite or high explosives?—Yes; it gives one a severe headache.

126. A different sensation to what you have observed with carbon-dioxide?—Yes.

127. Have you felt more serious results by smoke from high explosives?—It is far worse with carbon-dioxide than I have felt with carbon-monoxide. One per cent. of carbon-monoxide is fatal.

128. But from the smoke, did you experience worse effects on your health?—As far as I am aware at present I cannot say, but I believe gelignite fumes are bad for any man.

129. You have had no cause to complain of carbon-monoxide?—No, only from the results of going back in the smoke.

130. Does that occur frequently?—Yes.

131. Are you contracting in the Waitangi Mine?—Yes; we go back at our own risk.

132. Do you buy your own explosives?—We tell the manager what we want and he gets it at the store.

133. Is the air at the Waiotahi Mine as good as, or better than, at the other mines at the Thames?—As good as in any mine on the flat—Caledonian, Victoria, or Saxon.

134. Would you regard the Waiotahi air as very good?—In places it is very good, and in other places very bad.

135. *The Chairman.*] Have you any suggestion to offer for dealing with natural gas coming out of the rocks?—No.

136. Do you think the system you have now is as effective as you could get it, or have you anything further to suggest?—No.

137. *Mr. Parry.*] Have you taken every precaution for your own health and safety as far as the appliances have helped you?—Yes, except as regards rushing back after firing a shot.

138. With regard to Mr. Reed's question as regards making complaints respecting the necessity for making manholes, it is not always advisable for the men to make complaints to the manager, is it?—Certainly not.

139. Why?—Well, you will be accused of complaining all the time, and will probably be told that if you do not like it you can get out.

140. In regard to those places where the gas is prevalent, what would you suggest to provide 100 cubic feet of air per man in those places?—It would require several exhausts to pull it out.

141. What tamping do you use generally?—Clay tamping.

142. Is it all clay tamping used on the Thames?—I could not tell you.

143. What effect do you think bag and paper tamping would have on the miners?—It would give more smoke; it is very injurious.

144. *The Chairman.*] In what way?—I have not had any experience of rag tamping.

145. *Mr. Parry.*] As regards Mr. Reed's question respecting your going back at your own risk after firing shots, how is it that you go back so quickly under the contract system?—Well, time is money; the longer you stop away the more money you lose.

146. And I suppose a certain day's wage has to be made?—Yes.

147. Is that the reason you go back quicker after firing?—Yes.

JAMES KIDD sworn and examined. (No. 2.)

1. *The Chairman.*] What are you, Mr. Kidd?—I have been mining for fourteen years, though I am not following it at the present time.

2. How long is it since you ceased?—Six months.

3. What are you now?—A carpenter.

4. Have you been incapacitated from mining?—No, I am simply taking a spell.

5. Where were you mining for those fourteen years?—Reefton, Westport, Waihi, Karangahake, and Thames.

6. Have you had experience at all in taking temperatures by instruments?—No.

7. Now, upon what matters do you wish to inform the Commission?—As to accidents, ventilation, sanitation, and bath-houses and change-houses.

8. *Mr. Dowgray.*] You are not working in the mines just now?—No.

9. Why did you leave the mines?—Under the conditions of the mines I thought it would pay me to leave it for a while and have a spell outside.

10. How does the ventilation of the Thames mines compare with that of the mines where you worked elsewhere?—Very unfavourably.

11. Could you suggest any means whereby they could be improved?—To ventilate them by drawing the air out by artificial means rather than the means they have at present.

12. *The Chairman.*] What means have they?—There are only two mines working by artificial ventilation—the Waitangi and the Deep Levels; the others are all worked by natural ventilation.

13. Do you suggest that the artificial ventilation could be improved upon?—Yes, by putting up a bigger plant than they have and working by exhaust instead of by blower.

14. You suggest that an exhaust should be used instead of natural ventilation?—Yes, the exhaust would be much better in all the mines.

15. Have you had any experience of mines working by exhaust?—Yes, on the West Coast, in the coal-mines at Millerton and Granity. There the air is drawn out of the mine in a stone drive. They had a level bratticed right up the centre, and the fans draw the air out, with the result that they have better ventilation than they have here.

16. *Mr. Dowgray.*] What would be the length of that stone heading?—It was three-quarters of a mile to the layby, and then about 10 chains from that in.

17. In regard to accidents, have you ever had any experience of accidents resulting from misfire shots?—No, but the method of firing could be improved. I would be in favour of using an electric battery for firing more than five shots.

18. Do you consider it is not safe above five?—Yes, it should apply to five and upwards.

19. Have you had any experience of firing with a battery?—Yes.

20. Have you found any difficulty?—No, only in connecting up your wires. I think you have a better chance of safety, because once you throw the battery out of connection there is no possibility of a misfire.

21. You will have heard what the previous witnesses have said in regard to windlasses: what is your opinion respecting the necessity for cogs and pawls?—I have used them in Waihi with cogs and pawls, and consider it a good idea, which should be adopted here.

22. *The Chairman.*] What would it add to the cost of the ordinary windlass?—I cannot say exactly, but it would not be a very big item.

23. Is it any clumsier, or are there any objectionable features?—No, I do not know of any objectionable features at all.

24. *Mr. Parry.*] You have had some experience in working in hot places?—Yes.

25. What effect has it had upon you?—It weakens a man, puts him off his food, and sometimes causes "itch."

26. Do you consider it necessary to have a standard temperature fixed for working underground?—Yes.

27. Could you make any suggestion as to fixing the heat?—No, I am not up in the matter of temperatures.

28. Have you ever worked in a place where the temperature has been taken?—No, not to my knowledge.

29. Have you felt any bad effects from mining at all?—Yes, in the lungs.

30. Do you feel any bad effects in your lungs to-day?—Yes, I have not got over it yet.

31. *The Chairman.*] Have you been under medical treatment?—No, I have not let it go that far.

32. *Mr. Parry.*] What advantage would it be to the miners to have proper change-houses, drying-apparatus, and baths?—Well, in my opinion they would have better health, and a man would not be taking home the dirt and dust from the mine. They should have them in all the mines.

33. Have you known the miners making complaints about the ventilation?—Yes, to the mine-manager.

34. Do the workmen as a rule care about making complaints?—No, they do not.

35. Why?—Because it causes ill feeling between the manager and the men.

36. What is your opinion about the necessity for sanitary appliances?—I think every mine should have sanitary conveniences. In my own experience of Waihi they had them, and I found that the men took full advantage of them.

37. *The Chairman.*] Would you make it compulsory on the men to use them?—Yes, certainly; it would improve their health.

38. *Mr. Parry.*] What is your opinion about the use of bag and paper tamping?—It should never be used at all.

39. *The Chairman.*] Have you had experience of its use?—Yes, with every man using it. They should never be allowed to use it.

40. What is the objection to it?—Well, it causes so much smoke and fumes when used with gelignite that a man does not need much of it to do him harm. The fumes of the smouldering bag are very bad.

41. *Mr. Parry.*] Bagging is used very often?—Yes, they use anything they can get.

42. Does that bagging blow into fine powder and become dust?—Yes.

43. Is tamping supplied at the face?—I have worked in mines where it has been supplied handy, but in others the men have to do the best they can.

44. Under the contract system you have to find your own tamping?—Yes. When I worked in the May Queen Mine they sent the tamping in.

45. Where have you found the most accidents taking place in New Zealand?—In Waihi.

46. To what do you attribute that?—In a way to the contract system, and also because there are more men working there.

47. You have had a good deal of experience in Karangahake, Waihi, and here: will you tell us your opinion as to the height of stopes?—No stopes should go above 10 ft. in the clear.

48. From the filling?—From the filling to the back of the stope.

49. As regards your answer to Mr. Dowgray's question *re* ventilation, is it possible to have natural ventilation in development-work?—No, you want artificial ventilation there.

50. *The Chairman.*] And which form of artificial is the best?—I prefer, myself, the exhaust, to take the air and heat out of the face where the men are working.

51. *Mr. Parry.*] In the course of your experience have you found at what time during the twenty-four hours most accidents take place?—I consider that most of them occur on the 12 o'clock midnight to 8 o'clock in the morning shift.

52. *The Chairman.*] Can you give any reason for that?—No, but it seems a peculiar thing that most ground seems to move during that time. Perhaps the men have not their wits about them as they have on day shift, having missed portion of their sleep; they are thus probably less physically fit for their work.

53. *Mr. Parry.*] How is it, then, that a man is not physically fit at night?—Sometimes a man cannot get any sleep if he is working on the night shift.

54. *Mr. Cochrane.*] You say you favour battery firing: for what number of holes?—For over five holes.

55. In one place at one time?—Yes.

56. *Mr. Reed.*] Have you made a study of the question of fan *versus* blower?—No.

57. Just now you expressed an opinion upon the subject, and I asked you, does not the exhaust draw the air up the drive to the men?—Yes.

58. May not the air in the drive be vitiated by gas issuing in the middle of the drive, and thus by drawing up that air do you not tend to vitiate the drive?—Yes, in that instance.

59. Would the pipe delivering the air at the face not carry vitiated air away?—No; I say that if you drew the air out you would take from the men the gas which hangs back between the face and the chamber.

60. You said that the pipe delivers fresh air to the men: what better could you get than fresh air?—You could not get better than fresh air.

61. Do you think that as much air can be drawn up the pipe as could be forced through it?—I do not know.

62. So really you are not an expert on the subject?—No, I am but a working miner.

63. As regards the falls during certain hours of the night, is that not simply an old miner's superstition?—I do not consider myself superstitious.

64. Have you been able to obtain a good reason from your fellow-miners as to why falls should occur between 12 o'clock and 8 o'clock?—No.

65. Clearly, then, it is more or less a superstition without any reason?—It seems to happen—whether it is superstition or not I do not know.

66. As regards the windlasses, is there any danger of the handle striking the operator when the bucket is descending the winze or shaft?—Yes.

67. As regards Waihi, are you aware that the Mining Inspectors have requested the men to make the backs in the stopes only 8 ft. high?—No.

68. Have you worked there?—Yes.

69. *The Chairman.*] What is the average height of stopes there?—They were working them 15 ft., 18 ft., and 20 ft. high.

70. *Mr. Reed.*] Can you inform us how many there were at that height?—Only one stope I know of.

71. So that you can only speak of one stope?—Yes, but there were others.

72. *Mr. Parry.*] Is there any danger, when pulling the bucket up with the windlass, of its catching when there is no pawl on the windlass?—Yes, it will jerk the handle out of your hand, and you are apt to get a broken nose or a split head; if the pawl were there it would catch it.

73. As regards the blower and the fan, what is your opinion in regard to the blower?—I prefer the exhaust to the blower.

ALBERT JAMIESON sworn and examined. (No. 3.)

1. *The Chairman.*] What are you, Mr. Jamieson?—A miner.

2. For how long have you been mining?—Off and on, for fifteen years.

3. Where?—Mostly in the Tapu district, and also about the Thames.

4. Have you acted as check inspector or underviewer?—No.

5. Have you had any experience in the taking of temperatures with instruments?—No.

6. Upon what matters do you wish to inform the Commission?—As to ventilation and sanitation of mines.

7. Have you anything to say in regard to accidents?—No.

8. Have you any information as to the desirability or otherwise of change-houses and bath-houses?—Well, I think it would be a good thing to have such accommodation.

9. What number of men to a bath would you suggest?—Just one bath to a mine, because all the miners will not use them; the men who live a good way away would go home without baths. One bath to a mine would be sufficient, judging from the number of men I have seen working.

10. *Mr. Dowgray.*] Which mines have you worked in in this district?—The Waiotahi and the Deep Levels.

11. How does the ventilation compare there with that of other mines you have worked in?—They are all much alike.

12. Were you working in the Deep Levels here before this blower was put in?—Yes.

13. How does it compare with the ventilation before the blower was put in?—You can live in it, and that is about all.

14. Are you working in the mines at the present time?—No, I am working outside just now.

15. How long did you work in the Deep Levels?—This last time only nine shifts, and that was long enough.

16. Even with the blower?—Yes.

17. *The Chairman.*] Where were you working?—In the main crosscut.

18. *Mr. Dowgray.*] What length of shift were you working?—Six hours.

19. How is it determined to be a six-hour place?—I do not know, but I think the Drainage Board made it a six-hour place.

20. *The Chairman.*] Who compose the Drainage Board?—It is composed of a committee of mining men in Auckland. It was made a six-hour place in terms of the contract.

21. Do you know why they made it a six-hour place?—Because they wanted to get it finished quickly. I myself consider that four hours is long enough.

22. *Mr. Dowgray.*] Did you make any complaints about the ventilation there?—Yes, I complained to the boss about the heat there.

23. Did you truck in it?—Yes, a little; the trucking was worse than the other work.

24. Can you suggest any remedy in regard to ventilation?—Well, there was a level at Tapu 1,300 ft., and they made an exhaust there which kept the workings clear.

25. *The Chairman.*] At what depth was it?—It was a ground level.

26. *Mr. Dowgray.*] What difference would the exhaust make to the trucking-roads?—It ought to keep the level clear.

27. What method of inspection at the week-ends have they?—When we went on, the blower had just been started. I think it should have been kept going all the time.

28. Do you mean to tell the Commission that when the shift knocks off on Saturday the blower is stopped and started again just before you commence work?—Yes.

29. You have heard a reference to these windlasses: have you had any experience of them?—Yes, I had one mate hurt with one of them. It struck him across the bridge of the nose. If there had been a pawl the accident would not have happened.

30. You think that it should be made compulsory by law to provide them?—Yes.

31. *Mr. Parry.*] Have you worked in any hot places?—Yes, in a few of them.

32. Has it had any bad effect on your health?—Yes.

33. In what way?—Well, I feel my wind affected most. I am very short-winded at the present time.

34. *The Chairman.*] Have you worked in hotter places than this drive about which we were speaking?—No, I think it is the hottest.

35. *Mr. Parry.*] You have had no experience with the thermometer at all?—No.

36. Do you think there should be a standard temperature fixed?—Yes, there ought to be, for a six-hour place.

37. Do you think a shift ought to be reduced in some places to less than six hours?—It would be hardly worth while changing to go down for a shorter shift.

38. What is your opinion of the advantage to be derived from change-houses, baths, and drying-apparatus?—It would be a good thing for the men to have a wash at the mine if they felt inclined to do so, and put on their clean clothes. Otherwise they would take home a lot of dust and filth.

39. How many men, do you think, out of a hundred would refrain from taking advantage of these conveniences for changing in the event of their being provided?—Very few.

40. *The Chairman.*] Have you had any experience of them?—Yes, over at the Hauraki Mine the men use a bath.

41. Was that the only mine with a bath where you have worked?—Yes.

42. You think practically all the men would use it?—Yes.

43. *Mr. Parry.*] What is your opinion about sanitary arrangements below?—I think there ought to be some such conveniences, instead of allowing the men to use the water-drains and other places.

44. Do you consider mining a healthy occupation?—No, not by any means.

45. At what time during the twenty-four hours do you think most of the accidents occur?—Well, I do not know. I have seen as much ground falling by day as by night.

46. *The Chairman.*] You have no record?—No.

47. *Mr. Parry.*] Did you work in Waihi or Karangahake?—No.

48. Have you worked where many accidents have taken place?—No; I have just seen a couple of slight accidents.

49. You have not much experience as far as accidents are concerned?—No.

50. Have you worked in a mine where many men were lowered?—Yes.

51. What is your opinion as regards an assistant engine-driver?—I think one engine-driver is all right, but the tests given to the ropes have been no real tests at all.

52. Where men are being lowered, is it fair for the men to have to intrust their lives to one man?—Well, I think the night shift would be the worst for that, but I have always worked with very good engine-drivers.

53. Do you think the night shift would be the worst?—Yes, because a man is then drowsy.

54. *The Chairman.*] Are not the signals sufficiently loud to wake them?—Yes.

55. *Mr. Parry.*] Do you not think there is a great deal of responsibility placed upon the engine-driver?—Yes, a lot of responsibility.

56. What is your opinion as to bag and paper tamping?—I do not believe in the use of it.

57. Have you worked in places where it has been used?—Yes, not very long ago.

58. What effect did it have?—There is quite enough stench without having to put up with that which comes from bag or paper or rag.

59. Did you ever feel any bad effects from dynamite-smoke where the air has been otherwise good?—Yes, it has given me a bad headache.

60. *Mr. Reed.*] In the 1,300 ft. drive at Tapu, at surface level, are the conditions as regards gas similar to those in the Thames Deep Levels?—No, there was no gas at all.

61. The conditions not being similar, is it a fair test of exhaust *versus* blower?—Well, it was there.

62. But you say the gases were not present?—As far as the air was concerned it was a fair test. When you put the exhaust on you could see out an hour afterwards.

63. But had the gas been there in the middle of the drive, would not the exhaust fan have drawn that gas up to the men?—It would go to the mouth of the pipe, but not any further.

64. But the pipe would deliver fresh air to the men?—Yes, it would draw fresh air down as well as take bad air out.

65. Are you aware that the pipes in the Thames Deep Levels have holes in them to circulate air in the drive as well as in the face?—There are only holes at the chamber.

66. If the pipe delivers fresh air at the face what better can you have?—There are many improvements that could be made.

67. Have you felt any ill effects from the fumes after blasting?—I have.

68. Are you aware what gas causes those ill effects?—No, I do not know what gas you would call it.

69. Has it caused a weakness in the knees?—Not that I know of.

70. You do not feel a weakness in the knees as the result of the smoke?—I have felt weak all over, and it also puts me off my food.

71. Have you made any complaints to the Inspector of Mines about the state of the ventilation?—No.

72. Have you suggested a workmen's inspection of the mine, as provided by the law?—No.

73. I think you stated that during your fifteen years' experience you have not had much to do with accidents?—No.

74. You must have been in a very safe mine?—Yes, and I have taken care of myself.

75. Do you not think that fifteen years' freedom from accidents speaks somewhat well for the safety of the mines?—Yes.

76. *Mr. Dowgray.*] How far is the blowpipe from the face in that Deep Levels drive?—It was close on 100 ft. back from the face.

77. So that the men would not be getting the fresh air?—No.

78. *The Chairman.*] How far would the current carry?—About 30 ft., perhaps—not more.

79. *Mr. Dowgray.*] How many men are working between the chamber and the blowpipe trucking?—Generally, two filling and two trucking.

80. So that even if the pipe is discharging the air it does not follow that all the men are getting the benefit of it?—No, they are in the return practically all the time.

81. And they are getting the whole of those noxious gases?—Yes.

82. Do they do any boring in that tunnel?—Yes.

83. Do you suffer any bad effects from the use of that water for spraying purposes?—Yes. If you have any scratches on you they do not seem to get well. An improvement should be effected in the water.

84. Where do they get this water?—From No. 6.

85. Is there any sanitary accommodation there?—No.

86. Then the excreta would be deposited along the road?—Yes.

87. Do they use the mine for that purpose?—Yes; I can speak personally of one man who used the mine for that purpose right alongside where we were having crib.

88. Where the water flows which supplies the spray?—Yes.

89. *Mr. Parry.*] It is not possible to ventilate by natural means in places of development?—No, I do not see how it is.

90. What is your opinion with regard to the use of both blower and exhaust?—I have never seen both used together.

91. Where gas issues in a long tunnel would it be advisable to use exhaust and blower?—I should say if they could both be used it would be very good.

HUGH FARRELLY sworn and examined. (No. 4.)

1. *The Chairman.*] What are you, Mr. Farrelly?—A miner.

2. How many years have you been mining?—Twenty years, on and off.

3. Where?—Principally Waihi, Karangahake, Thames, and Africa.

4. Have you had any experience of taking the temperatures with instruments?—None whatever.

5. What have you to place before this Commission?—I wish to give evidence respecting sanitary arrangements, accidents, and ventilation.

6. *Mr. Dowgray.*] You are working in the Deep Levels?—Yes.

7. How does the ventilation there compare with that in West Africa?—Very badly.

8. *The Chairman.*] What system of ventilation is adopted in the West African mines?—Mostly natural ventilation; they have no artificial ventilation there at all.

9. *Mr. Dowgray.*] Have you ever complained about the ventilation in the Deep Levels?—Yes.

10. To whom?—Only among my mates.

11. Have you ever complained about the blower being stopped?—Yes.

12. To whom have you complained?—Only among ourselves.

13. By what means do they examine the mine before the men descend the shaft at week-ends?—By candlelight.

14. Do you think that is the best examination that could be made?—No, it could be improved.

15. In what way would you suggest improvement?—It should be examined with a thermometer or some other instrument.

16. What do you examine the mine with a candle for?—For gas. The candle is put in a lamp and lowered down the shaft: if when it is hauled up it is burning the place is all right, but if it has gone out the air is bad.

17. Do you do any trucking?—Yes.

18. *The Chairman.*] Are you a trucker or a miner?—We take turn about.

19. *Mr. Dowgray.*] Which do you prefer, working in the face or trucking?—Working in the face.

20. Do you use the spray in the face?—Yes.

21. *The Chairman.*] Do you use rock-drills?—Yes.

22. *Mr. Dowgray.*] Have you suffered any bad effects from the water used with the spray?—Yes.

23. Where does it come from?—It is the drainage from the mine.

24. How does it affect you?—It will poison you if you have a scratch, and it also interferes with your eyes.

25. What do you attribute that to?—To the mineral in the water.

26. Do you consider that could be remedied?—Yes, by bringing fresh water from the surface.

27. *The Chairman.*] Is the surface water available?—Yes.

28. What quantity of surface water is available?—I could not say.

29. Do they use the water on the surface for any other purpose?—No, it goes down to the foreshore.

30. Has the company any water-rights in connection with its mine?—Yes; there is fresh water laid on at the surface.

31. *Mr. Dowgray.*] Which water do they use to feed the boilers?—I do not know.

32. Where do they get their fresh water?—From the county main or borough supply.

33. Have you had any experience in connection with shot-firing?—Yes. My experience is that the battery is safer than the fuse.

34. Have you used both?—Yes. The battery is safer, more especially in wet places.

35. Have you had any accidents with the fuse?—Yes, I have known men to be killed with it.

36. Such accidents have come under your personal observation?—Yes.

37. Where?—One in Africa and one in Karangahake.

38. Through misshots?—No, through defects in the fuse.

39. *The Chairman.*] Were the men trying to fire more than one hole?—Yes, probably half a dozen.

40. *Mr. Dowgray.*] It is better to use a battery?—Yes, where there are rock-drills or other machinery.

41. You do not experience any difficulty in the use of the battery?—No.

42. Have you had any experience of using windlasses?—No.

43. Are you in a position to give an opinion on the use of pawls on windlasses?—I have seen them used in Waihi.

44. How far are the blowpipes from the face in the tunnel where you are working now?—Within 25 ft.

45. Do you ever test how near you could hold a candle without its being blown out?—Yes, about 3 ft. away.

46. Do your lights ever burn dimly at the face?—Very often, with the blowpipe within 25 ft.

47. Have you had any experience which goes to show whether the exhaust or blowpipe is the better?—I think the blowpipe is very good, but I would like to see the exhaust used with it.

48. *The Chairman.*] Have you had any experience with exhausts?—Yes, in the Waitangi Mine. The exhaust is superior to the blowpipe.

49. *Mr. Parry.*] You say you have had no experience with temperatures taken with the thermometer?—No.

50. How long have you been working in the mine here?—About fifteen weeks.

51. Have you not seen the Inspector or the manager taking temperatures?—No.

52. You have never heard the temperature read either?—No.

53. *The Chairman.*] You do not suggest that it has not been taken?—No; but I have not heard of its being taken.

54. *Mr. Parry.*] Have you had any experience of working in hot places?—Yes.

55. What effect has it had upon you?—It has not a very good effect. A man is never the same after.

56. Do you think it is essential to fix a standard heat for a six-hour place?—Yes.

57. As regards change-houses, and baths, and drying-apparatus, what is your opinion?—I think they ought to provide both baths and showers.

58. Do you think it would have a beneficial effect on the health of the men?—Yes.

59. In the event of a man getting a cut on the hand, is it difficult to wash the dirt out with cold water?—Yes.

60. As regards complaints, you say you have complained amongst yourselves: have you ever made a complaint direct to the management?—No, not that I am aware of.

61. Do you know of any reason why the men do not complain to the management?—They seem to be frightened. If the men make a complaint to the leader of the shift it is his place to carry it to the manager.

62. What is your opinion of the necessity for sanitary appliances underground?—They should be provided in every mine.

63. *The Chairman.*] What is the practice at present?—I can only speak for myself. If there is a chance of going to the surface I do so.

64. Is there any obstacle placed in your way to prevent you from going to the surface?—None whatever.

65. Do you know of your own knowledge that the drives are used for that purpose?—No; I have heard it stated, but I have never seen it myself.

66. *Mr. Parry.*] Working in the Deep Levels, is there always a chance for a man to go to the surface whenever he requires?—Sometimes they cannot get the cages to go to the surface.

67. Would that have an effect on the health of the men?—Yes.

68. If the men used the drive, what inconvenience would be caused to the men working round about?—It would cause a frightful smell, particularly in warm places.

69. Do you consider mining a healthy occupation?—No, it is very unhealthy.

70. As regards stoping, do you think a standard height should be fixed for the stopes?—Yes.

71. What height would you suggest?—About 8 ft.

72. From where?—From the top to the solid.

73. In regard to wide stopes, do you think they are dangerous to work in?—Yes.

74. Would you suggest anything to be done in the case of a wide stope?—I could not suggest anything.

75. *The Chairman.*] Does it not depend upon the country whether it is dangerous or not?—Yes, a lot depends upon the country; but, as a rule, when they are wide they are rotten.

76. You say that working wide stopes in rotten country is dangerous?—Yes.

77. *Mr. Parry.*] Do you have to pay more attention to wide stopes, 50 ft. to 60 ft., appearing to be hard than to narrow stopes?—Yes.

78. *The Chairman.*] Do you know the Waihi stopes?—Yes, I have worked in them. They are as wide as that.

79. What is your opinion as regards the lowering of a considerable number of men in a shaft?—I do not know, but I think there ought to be an assistant driver. In a place like Waihi a driver is liable to faint or slip.

80. Why?—Any man is liable to faint at his post.

81. Is the driver specially liable to faint?—No; but I have heard tell of them slipping.

82. *Mr. Parry.*] You have never heard of an engine-driver fainting? You have never seen such a case in the paper?—No, I do not think so.

83. Do you not consider a risk is being run by the men who are suspended in the shaft?—There is a chance of a big loss of life.

84. *The Chairman.*] Have you ever known of any loss of life resulting from an engine-driver fainting or slipping?—No, I have never heard tell of it.

85. Do you think it is in any way detrimental to a man's health to use paper or bag tamping?—Yes; I have had experience of it. It causes a great deal of smoke and dust, which settles on their chests.

86. You stated that only a battery should be used where machines are working?—Yes.

87. You have had experience in Waihi?—Yes.

88. Are there many shots fired there at a time in the stopes?—Yes.

89. What is the largest number of shots you have seen fired in Waihi at one time?—As many as twenty in a stope.

90. And if you thought it advisable to use a battery where there were machines, would you also consider it advisable to use it there?—Yes, where there was a number of holes.

91. You say that accidents have happened at Karangahake by a hole exploding before the men had time to get away: how many such accidents do you know of?—Three or four. The men's names were Crosbie, Chester, Weyland, and there was also another.

92. Do you think that if a battery had been in use at that time the accident would have happened?—No.

93. *Mr. Molineaux.*] What have you found to be the usual cause of misfires where batteries have been used?—I do not know of many misfires.

94. You have had no misfires by electricity?—No.

95. You said that you considered mining a very unhealthy occupation: will you say why?—By reason of the dynamite-smoke and gas which a miner inhales.

96. Has it affected you seriously during your twenty years' experience?—Yes.

97. Have you been examined by a medical man recently?—Yes.

98. With what result?—My lungs were found to be somewhat tainted.

99. You state that you have seen as many as twenty shots fired at one time in a stope: what was the length of that stope?—30 ft. to 50 ft.

100. *Mr. Cochrane.*] You stated that this Deep Levels compared very unfavourably with other mines that you have had experience of. I wish you to tell us if the mines you speak of were developed mines with different air-shafts, or were you referring to smaller mines with only one shaft?—They were mines in course of development.

101. In the Transvaal?—No, in western Africa.

102. With only one shaft?—Yes.

103. You favour the exhaust system?—Yes.

104. Is that also in case of one shaft, or where there are winzes and rise to the surface?—With one shaft.

105. Then, does it not occur to you that you can get more efficiency by increasing the exhaust's power than by using the two separately?—Yes, I think it would give a better current.

106. Is it not a fact that men will not use the spray where machine drills are working? I want you to tell the Commission your honest opinion on that point?—Well, they always use the spray where we are working. We never bore holes dry.

107. Is it not the case that men in other mines do not use the spray?—I do not know; I prefer to use the water.

108. *Mr. Reed.*] For what purpose do you suggest that surface water should be taken into the Deep Levels at the Thames?—For the benefit of the men.

109. In what respect?—They sometimes swallow the mineral water they are using, and it leaves a nasty taste in the mouth.

110. How do you propose to use this surface water in the Deep Levels?—By taking it down the shaft and using it for boring purposes.

111. You said that the pipes were within 25 ft. of the face: would any special system of ventilation take the air nearer to the face?—No; it is blowing right into the face at present.

112. So for the men working in the face no other system would give better air?—It gives them good air while they are there.

113. If you had exhaust ventilation in the Deep Levels, would it not carry the gas to the men in the face?—It would carry it to the end of the pipe.

114. So that you would dilute the whole course by carrying that air right up the drive to the face?—It would carry all the gas up to the face.

115. So that everybody would get the gas?—I do not think so.

116. How would they escape the gas?—The air would be circulated.

117. But the men would be in the level, and they could not get out of the way of the gas?—Yes, the gas would be there too.

118. With the blower do the men get the gas?—It gets between the face and the chamber.

119. But nobody is safe from the gas?—No.

120. You would like to see both exhaust and blower?—Yes.

121. Would that not cost a good deal of money?—It is a matter of men's lives.

122. Would it not be very expensive to have that luxury?—It would probably cost a good deal of money.

123. It would probably be the means of stopping the works?—I would sooner see it stopped than that the miners should be injured.

124. Why have you not complained to the Inspector?—I have never seen the gentleman.

125. Have you taken advantage of the workmen's inspection section of the Mining Act to examine the Deep Levels and record it in a book?—No, it is not the custom.

126. Where is it not the custom?—Here.

127. Is it the custom at Waihi?—It may be; I could not say.

128. You stated that you preferred natural to artificial ventilation?—Yes.

129. How would you get natural ventilation into the Deep Levels?—By the exhaust.

130. But that would be making it artificial ventilation?—There must be a circuit.

131. Would you call the exhaust natural ventilation?—We would get natural air in the levels.

132. *The Chairman.*] What do you mean by "natural ventilation"?—We would get natural air from the surface.

133. You said the mines in Africa have natural ventilation?—What I meant was natural air.

134. Was it by means of an exhaust?—No, simply by descending through shafts; there was no machinery used.

135. *Mr. Reed.*] You do not quite understand the difference between natural and artificial ventilation?—No, I do not think so.

136. Is it not a fact that the blower is only stopped on Sundays when no miners are at work?—From Saturday night to Sunday night.

137. Is it not a fact that the miners are called out if the blower is stopped for repairs?—No, it has not been so while I have been there.

138. Do you know that the contractors purchase their fuse and explosives from the merchants here?—Yes, I think so.

139. Are you a contractor?—No, I am a wages-man.

140. Do you know the Waitangi Mine?—Yes.

141. Is it a gassy mine?—No.

142. Is the ventilation in the Waitangi Mine very good?—Yes, very good.

143. Do not the managers prohibit the pollution of the Deep Levels crosscut by the men?—So far I have not heard anything from them. I have heard they do, but I do not know it for a fact.

144. Have you ever known an engine-driver fainting while at work?—No.

145. Have you ever heard of one fainting?—No, only slipping.

146. Then, why make a recommendation by which the management would be put to double the expense to prevent accidents which are never likely to occur?—Well, in a mine like the Waihi there is a large number of men travelling in the shafts, and they are likely to meet with an accident at any time.

147. It would simply be an extra precaution, but possibly an unnecessary one, as no accidents have ever happened from that cause?—I have never heard of one.

148. In the Thames-Hauraki shaft is there room for an extra line of pipes, supposing you wanted to duplicate your ventilation?—I have never looked round to see.

149. Supposing there was not room in it, would you suggest that another shaft be sunk to carry down the pipes?—No, I would not.

150. *Mr. Dowgray.*] Do you know that the pressure in the blower has been increased during the last two weeks?—Yes, I think so.

151. Is that done as the result of complaints?—No. I do not know who made the request, but it has been increased.

152. You are not aware, I suppose, that there is a provision in the English Coal-mines Act requiring the appointment of assistants for engine-drivers?—I do not know.

153. Are you not aware that winding accidents have occurred?—No, I do not know.

154. Is there any place in any of the mines here where the fumes are carried up from one section to another, or from one level to another?—Yes.

155. *Mr. Parry.*] Do you think it is necessary till an accident takes place to suggest a remedy?—No.

156. *Mr. Reed.*] Would you suggest a remedy before an accident did occur?—I could not.

157. *The Chairman.*] You mentioned several accidents, and gave us the cause of one: can you give us the cause of the others?—The other accidents were similar, an explosion taking place before the men got away. The fuse sometimes runs.

158. You could not tell after the explosion had occurred whether the fuse has run?—No, you could not tell.

159. Are there not always two men in the face when they are lighting fuses?—Yes, generally.

160. *Mr. Parry.*] During the time you have been working at the Thames have you seen many accidents take place?—Yes, a few minor ones.

161. Have as many accidents taken place here as occur at Karangahake and Waihi?—No.

162. To what do you attribute that?—To the contract system.

163. Why?—Because of the hurry and bustle of the work.

164. *The Chairman.*] Do you never light a fuse with prepared paper?—No, I have never seen that done. You generally spit it with a little jelly.

165. You do not use paper prepared with saltpetre?—No.

HARRY DARE sworn and examined. (No. 5.)

1. *The Chairman.*] What are you, Mr. Dare?—A miner.

2. How long have you been a miner?—Between eight and ten years.

3. Where have you worked?—At the Thames, Waihi, Karangahake, and Tairua.

4. Have you had any outside experience other than on this field?—No, except for a little copper-mining in the Whangaroa district.

5. Do you know anything about taking temperatures or air-measurements with instruments?—No.

6. Do you hold any position in the mine?—No.

7. What is it you wish to submit to the Commission?—I wish to give evidence as to sanitation, ventilation, and accidents.

8. *Mr. Dowgray.*] How long have you been working in the Deep Levels?—Seven or eight months.

9. Was that prior to the installation of the blower?—Yes.

10. Has there been any improvement since the blower was put in?—Yes, in the face, but not in the trucking-road, where the air is getting worse as the tunnel goes further in.

11. Of course, you truck too?—Yes, we take turn about.

12. How does the ventilation compare with that of other mines?—Fairly well.

13. Have you ever worked where there was an exhaust?—In a mine on a small scale it acted very well.

14. Have you had any accidents with these windlasses?—Yes, I have seen one. If there had been a pawl on it the accident could not have occurred.

15. Do you recommend that pawls be attached to all windlasses?—Yes.

16. Have you had experience in the use of batteries or firing shots?—No, not much.

17. Are you in a position to express an opinion on the matter?—No, not at all, though I prefer the battery as being the safer.

18. Have you ever had any accidents with the fuse?—No, but I have seen some very narrow escapes.

19. Have you ever had any experience of fuse going off before its time?—Yes, very often.

20. Have you ever worked in a tunnel 2,250 ft. in without any manholes?—No.

21. *Mr. Parry.*] Have you had any experience of working in hot places?—Yes, a fair amount.

22. What effect has it had upon your health?—It has a very weakening effect I have found, and, as a rule, you come out in an "itch" and cannot eat your food.

23. You are not in a position to suggest a standard temperature for a six-hour place?—No, I am not up in that sort of thing.

24. Do you think it is necessary to have a standard fixed?—I do.

25. In regard to change-houses and baths, what is your opinion?—Baths and showers should be provided.

26. Would they have a tendency to improve the health of the miner?—Yes.

27. You do not think he would catch cold through using them?—No.

28. Have you ever made any complaints in connection with the ventilation, sanitation, or timbering when working in the mines?—In one place where I worked I believe a party did.

29. What is the reason for men not making complaints?—As a rule the result is that an ill feeling springs up between the boss and the men.

30. Is that the reason that complaints are not made?—Yes, it is partly the reason.

31. Do you think mining is a healthy occupation?—No, very unhealthy.

32. Does your health suffer?—I suffer as a rule from indigestion, and feel weak at times.

33. Have you had any experience of mines where the men have used bag or paper tamping? What is your opinion of it?—It is very unhealthy, and should not be used.

34. You have used it yourself. Why?—Because there was no other tamping handy.

35. And you think it is bad for the health of the men?—Yes.

36. What is your opinion about open cages?—I have had very little experience with cages.

37. In the event of a man fainting while coming up from below, what would be the result?—In most shafts there is plenty of room for him to fall out.

38. There is no precaution taken to prevent him from falling out?—None that I know of.

39. What is the difference between the width of the shaft and the size of the cage?—In our shaft it is only 2 in. or 3 in., and in other shafts it might be 6 in. to 8 in., or perhaps a foot.

40. With 4 in. a man could not fall out?—No; but he might get his foot or his leg out.

41. And in the event of a man fainting and falling where there was only a space of 4 in.?—They would find him in the chamber in the bottom.

42. Do you think there should be any precaution taken in regard to these cages?—Yes; in the event of men riding on them there should be.

43. *The Chairman.*] How often does a man go up in a cage by himself?—It all depends; he might go up three or four times on a shift if he wanted anything on the surface.

44. *Mr. Parry.*] But even if there were four or six men on the cage, would there not be as much chance of his falling?—Yes.

45. In the case of a big man?—Yes; a man named Berryman fell out of the cage.

46. *The Chairman.*] Do you know of an accident happening as the result of a man fainting while being lowered?—No, I cannot say that I do.

47. *Mr. Parry.*] Did you ever see or hear of a man fainting in a cage?—Yes, I have heard of such a case.

48. You have heard other witnesses examined regarding the necessity for having assistants for engine-drivers: what is your opinion on the subject?—I believe that where there is a lot of men being wound up and down the shaft it would be a very good idea, but not for a small mine.

49. How many men ride in this cage here?—Four.
50. You mean four men down and four men up?—Yes; eight men when they are changing a shift.
51. Do you think eight men are sufficient to warrant the appointment of an assistant to the engine-driver?—I should hardly think so, but in a case like Waihi it would be a good idea.
52. *The Chairman.*] It might be a good idea, but would it be necessary? What are the chances of an engine-driver taking a fit?—He has as much chance as anybody else.
53. What is the average chance?—It would be very small.
54. Did you ever know of an engine-driver taking a fit or slipping so as to lose control of his engine?—No.
55. *Mr. Parry.*] Have you had much experience here with accidents?—Very little.
56. Anything like as many as at Waihi and Karangahake?—No, there is no comparison.
57. Do you think there is any reason for that?—Well, there are very many more miners there than here, and it may also be the result of working night shift.
58. Have you had any experience of exhaust and blower combined?—No; simply with the exhaust by itself on a small scale.
59. Did it act very well?—Yes; we had a current in 800 ft.
60. Did you ever work where a diversity of opinion arose as to what constituted a wet or a hot place?—Yes.
61. And you think that a man working in a hot place cannot do justice to himself?—I am certain of it.
62. *The Chairman.*] What do you call a hot place?—I should say a hot place was where a man felt unwell and sick while he was at his work.
63. Where are you working in the Deep Levels?—Down at the crosscut in the main face.
64. Do you call that a hot place?—No, not in the face, but it is hot back in the level.
65. For what distance do you call it hot?—The really hot place is a good way back, nearly 100 ft. behind the blower.
66. Where do you get out of the hot place?—It is right to the chamber. You would not be able to stop in the chamber except for the holes in the pipe.
67. *Mr. Parry.*] Do you think a man could do justice to himself working for six hours in that place?—Well, I think it is too much.
68. But in the face?—No, not there either, on account of the gas and mineral water.
69. Working in the face as it is at the present time, with a good current of air, would you consider it a six-hour place because of the water alone?—Yes, very much so.
70. *Mr. Reed.*] Would you prefer it to be a four-hour place?—No; I think six hours is a reasonable shift, but I believe the air could be improved with a stronger current.
71. Do you regard the Thames Deep Levels as being rather exceptional for gas?—Yes.
72. More difficult to ventilate than an ordinary mine?—Not a great deal.
73. Do you think a very reasonable attempt has been made to ventilate it?—Yes, to ventilate the face, but not the level.
74. Do you know the Deep Levels pumping-shaft?—Yes.
75. Do you think it is large enough to take another air-pump down?—Yes, they could make it so.
76. Which compartment?—The pumping-compartment.
77. An air-pump as large as the one at present in the mine?—I would not say that.
78. You stated that you do not care to make complaints to the management?—It is not the usual thing about here.
79. If there were serious reasons would you make complaints?—Yes.
80. Therefore there have been no serious reasons?—Yes, I have one.
81. Do you recommend gates for winding-cages?—Yes, when they are for winding men.
82. How would you open those gates, in or out?—I would suggest a gate with a couple of bars which could be taken off and laid aside.
83. Might not these bars themselves be dangerous?—No; you could have them worked on a slide.
84. Have you ever thought of having the workmen's inspections made as provided by law?—No, I cannot say that I have looked it up.
85. Were you aware that the Act made that provision?—No, I was not.
86. In the Deep Levels crosscut was there a flow of water cut last week?—Yes.
87. Have the air conditions become worse since the flow of water?—Yes.
88. *The Chairman.*] How long is it likely that this flow of water will last?—Not for a great while, but it tends to make the level worse.
89. Does the gas continue to come?—I suppose the greater quantity of it comes out, or else you would not be able to live there.
90. Does the first cut practically exhaust the gas?—Yes, practically; but it is coming out all the time.
91. *Mr. Reed.*] As the water diminishes, does the gas decrease also?—I could not say that.
92. Do you know the Exchange reef?—Yes.
93. When the water declined there, was not the air free from gas?—No, not altogether.
94. Was it a little?—Yes.
95. Then the gas declined to a certain extent?—Yes, to a certain extent.
96. So that the gas is irregular—it comes and it goes?—You get it in bigger quantities, but as you cut the gas the level behind is getting worse all the time.
97. What sized pipes would you suggest for the exhaust system?—A 9 in. pipe.
98. Do you think a pipe will draw as much air out as can be forced in through it?—No, I do not say it would, but I think it would clear the mine of all the smell.

99. Do you think that that 22 in. pipe in the Deep Levels could be utilized to draw in as much air as you could force into it?—I believe it could.

100. Your idea, then, is to duplicate it?—Yes.

101. Do you not think it would be very costly?—Not very much so; but something will have to be done.

102. *Mr. Dowgray.*] In reply to a question by Mr. Parry you said you were not up in matters of temperature. Now, if I tell you that the place you are working in at present registers 80° would you be able to tell me what temperature should be fixed for a six-hour place?—Possibly.

103. Are you, then, in a position to say what should be fixed as a maximum temperature for a six-hour place?—About half that—40°.

104. *Mr. Reed.*] So you consider it should be fixed at 40°?—Yes, if that is half the temperature we are working in. It could be fixed at from 40° to 50°.

105. *Mr Parry.*] You stated, though, that you are not in a position to speak regarding the standard owing to not having sufficient experience?—No, not to make a suggestion.

JAMES FLEMING sworn and examined. (No. 6.)

1. *Mr. Chairman.*] What is your occupation, Mr. Fleming?—I am greasing, and assisting in shaft-work as required.

2. Have you ever done any mining?—Yes, for about twenty-five years.

3. How long is it since you ceased?—About two years last June.

4. Why did you give it up?—Because I thought I saw a better place offering.

5. It was not on account of ill health?—No.

6. What particular matter do you wish to refer to?—The whole category.

7. Have you had any experience of taking temperatures?—Yes, a general experience. I have been in charge of mines.

8. Do you hold a mine-manager's certificate?—Yes, I hold a first-class coal-mine-manager's certificate of competency.

9. What mines have you managed?—Mokau and Mokihinui.

10. For how long?—About two years in the two places.

11. How long ago?—About three years and four months since I was last at Mokau.

12 *Mr. Dowgray.*] What experience have you had in connection with the ventilation of mines?—I have had experience in all capacities, from trapper-boy up to mine-manager, in the West of Scotland, New South Wales, Otago, West Coast, and the North Island.

13. When would you consider a mine properly ventilated?—When a man working in it could get what was practically atmospheric air.

14. What has been your experience in the ventilation of mines since you came here?—My experience has been that sometimes you get fair ventilation and sometimes you do not.

15. What is your opinion in connection with blower and exhaust?—My work has sometimes taken me through the chamber, and the conditions I found there were beyond description, as compared with the ventilation in other mines where I have worked.

16 *The Chairman.*] Can you be more definite?—Well, it is actually dangerous to life.

17. *Mr. Dowgray.*] In what way have you tested it?—By breathing it. I am sure I would not live long in it.

18. Can you suggest a remedy?—The proper means of ventilation is by an exhaust.

19. *The Chairman.*] In addition to force?—The force is no way; it should not be there at all. The exhaust would be quite sufficient without the force.

20. *Mr. Dowgray.*] Is it possible to ventilate the mine?—By dividing your drive you could get a uniform air-course.

21. *The Chairman.*] What width of drive?—It could be done with the present drive.

22. *Mr. Dowgray.*] Have you had any experience in measuring air-currents?—Yes.

23. In measuring the air, where would you consider the proper place with this blower?—If I could not get a circulation in the return airway I should not think there was a proper course.

24. If the anemometer did not register?—It would not then be a proper place for men to work in. I would test it 50 ft. or 100 ft. from the chamber. The pipes are the intake, and the return is the drive.

25. *The Chairman.*] Do you consider you would get the worst air?—Certainly; because it is gathering behind, and there is nothing to drive it up.

26. *Mr. Dowgray.*] Have you had any experience of accidents?—I have seen a few, and I have heard of many more.

27. Have you had any experience of shot-firing by means of the battery?—I have had a short one, and would prefer not to express an opinion.

28. In connection with gates on cages, you have heard the evidence of previous witnesses: do you think precautions should be taken by putting gates on cages?—I do. In one mine I worked in we had a scheme whereby we could take the horses up the shaft.

29. Do you think the method we have here of testing cages is an effective one?—No, I do not.

30. Are they tested?—Yes, they are tested empty.

31. Do you consider they should be tested otherwise?—Yes, with a weight on.

32. Would you recommend that that should be carried out?—Yes, I think it is a more adequate test.

33. Do they examine the ropes about the mine-top here?—Yes. I have been present at the examination, but I do not know how frequently it is done.

34. Do you think they should be examined more frequently?—They should be tested every week-end.

35. Has the water here any effect on the ropes?—I believe it has; it makes them hard, and crystallizes them.

36. *Mr. Parry.*] You have had a fair experience of warm places underground?—No; I have had more experience of cool places, though I have seen one or two hot places.

37. What is your opinion as to the fixing of the maximum temperature for a six-hour place?—I should say it should be 80°.

38. *The Chairman.*] That is for heat alone?—Yes.

39. *Mr. Parry.*] You have had something to do with taking temperatures with the wet and dry bulbs?—No, I have only taken dry temperatures.

40. *The Chairman.*] Do you understand it thoroughly?—I do not understand it thoroughly.

41. *Mr. Parry.*] You fixed the maximum at 80°: was that wet or dry?—80° moist atmosphere.

42. What is your opinion as to change-houses?—I cannot say, because I have not had much experience. We had one where I was, but it was very filthy; we had to clean it ourselves in our own time. We had no stove for drying our clothes.

43. Do you think it is necessary to have change-houses and drying-apparatus?—Yes; and they should be kept thoroughly clean and tidy, so that the men's clothes are kept free from insects.

44. What is your opinion of sanitary appliances underground?—It should be made compulsory to have them.

45. Do you consider mining a healthy occupation?—Well, you cannot say it is very healthy, though in some places where I have been it has not been unhealthy.

46. What is your opinion of paper tamping: is it detrimental?—Of course, anything that will pollute the atmosphere is detrimental.

47. As to the appointment of assistant engine-drivers, what is your opinion on that matter?—I think it is going a bit too far. I am of opinion that where a great many men are employed there should be an assistant, but, on the other hand, where a man is not overworked he ought to be able to keep from sleeping.

48. Then, do I understand that you would advocate an assistant where a man was always engaged at his post?—Where I considered a man was absolutely hardworked I would engage an assistant to give him a change.

49. What would you call hardworked?—Where he could scarcely leave the handle because of so many cages coming up and going down.

50. Have you heard of an engine-driver fainting?—No, not at the handle of his engine.

51. If you think an assistant would be necessary at one mine, would it not be equally so in the smaller mine?—No; the responsibility is not quite the same, because in the smaller mines there is not a large amount of work to attend to, though certainly a man's life is as good to him at the smaller mines as it is at the larger mines.

52. What is your opinion as to the necessity for manholes in drives and long tunnels for the men to take refuge when firing?—I consider it is a good idea. In old mines where I have been we have always had manholes, and in a drive like this it is a very good thing in case of shots going off very quickly.

53. Of course, you are aware that provision is made for that in the Mining Act?—I am not very conversant with the Mining Act.

54. Have you had any experience in regard to wide stopes?—Only in the Waihi Mine, where I worked for a short time. It was too hot for me, and I got out quickly.

55. Do you think a certain height should be laid down in the Mining Act for stopes?—I do.

56. What would you suggest should be the height?—Never out of the reach of a man's control, so that if a stone is showing loose overhead he can get at it—that is, up to 8 ft.

57. *Mr. Cochrane.*] With regard to temperature, you say that you would have nothing more than 80° moist; by that did you mean completely saturated air?—Yes.

58. Then you said you would suggest a method for preventing men falling out of cages?—Yes, with two bars placed across the cage, making it impossible for a man to fall out. A method I have seen adopted was worked by means of hinges.

59. That would be very much against quick travelling?—Yes.

60. Have you anything practical to suggest?—I have never seen anything practical in operation, but I would suggest the two bars, so that a fainting man could not possibly be pushed out.

61. As to ventilation, would you exhaust from the levels with the present pipes?—No, I would have nothing to do with pipes at all.

62. How would you take your air in?—By dividing the air-course under a brattice system; but I would use timber.

63. But would that not require the enlargement of the drive?—No, not at all.

64. And what would your arrangements be on the surface?—You could have an exhaust fan, furnace, steam-jet, or various kinds of fan. The Guibal fan is a very good one.

65. You would not do it with a blower?—No; I have had one experience with a blower, and that is enough for me.

66. *Mr. Reed.*] As regards your knowledge of ventilation, has your experience been gained at quartz-mines?—At both quartz and coal mines.

67. Do you understand what is a water-gauge in connection with fans?—I think so.

68. Do you think an exhaust fan could work against a water-gauge of 17 in. pressure?—I certainly do. [The witness states he understood the question to be a 7 in. water-gauge.]

69. Can you tell me of any place in the world where an exhaust fan is working against 7 in.?—No, I cannot tell you.

70. Are you aware that Root's blowers are working against 27 in.?—I do not know what the blowers are doing in New South Wales.

71. With exhaust ventilation what would become of the gas given off in the intake side of the brattice?—It would be diluted to such an extent that it would be harmless.

72. Would that gas be carried right up the whole length past the men trucking to the face *via* the intake side of the brattice?—Yes; but it would be diluted—gas and air combined. I would have to carry it right up round the brattice and back by the return.

73. How many cubic feet of air per minute would you consider necessary to dilute that gas in the crosscut in the manner you propose?—I cannot say what amount of air would be required.

74. If I were to inform you that there was 1,695 cubic feet coming out of the air-pipe on Saturday within 25 ft. of the face for only four men per shift, amounting to 424 cubic feet per man per minute at the face, would you consider that adequate?—Yes, I would consider it adequate under ordinary circumstances, but as we have extraordinary circumstances here at the Thames nothing can be considered adequate unless you have ventilation with air as nearly pure as possible; therefore I do not think it is a fair question. Sometimes there are men working in the return airway who require the air good from surface to surface.

75. *The Chairman.*] There might be good air at the surface, but not everywhere?—It has to be good in all places when men have to travel or work.

76. *Mr. Reed.*] What percentage of carbon-dioxide would you admit?—From 0·15 to 1 per cent.

77. Is that by weight or volume?—By volume.

78. Would you suggest also an oxygen standard?—I would suggest a purely atmospheric standard.

79. With how much oxygen?—I have forgotten the composition of atmospheric air for the moment.

80. So you recommend quality test rather than a quantity test?—Both quality and quantity.

JAMES FLEMING re-examined.

81. *The Chairman.*] What is it you wish to add to your previous evidence, Mr. Fleming?—Well, sir, a suggestion has been made to a witness that the speed of the blower was increased since the last flow of water and gas. Now, I have authentic evidence here to prove that the speed of the blower was increased seven days previous to this outburst of water.

82. *Mr. Dowgray.*] Are we to understand that on the 3rd August the speed was increased?—Yes, from 100 to 120 revolutions per minute, with a gauge of 3¾ in. The speed of the pump began to change on the 10th August from 9 to 10, and then right up to 13·4.

83. *Mr. Reed.*] What was the relative heights of the water-gauge on those occasions?—I have only the water-gauge when the blower was travelling at 120 revolutions. It was 3⅞.

84. Where did you get these figures?—I am not prepared to say.

85. Is this information second-hand?—It is taken from the diary.

86. From the diary—the official diary?—They are quoted from the official diary.

ROBERT W. WILSON sworn and examined. (No. 7.)

1. *The Chairman.*] What are you, Mr. Wilson?—A miner.

2. For how long have you been mining?—Twenty to twenty-five years.

3. Where have you mined?—Moanataiari, Thames, Waihi, and Whangarei. I might state I have been out of the mines four years.

4. Have you had any experience of heat or air tests with instruments?—No.

5. What are you doing now?—Labouring in the foundry.

6. Why did you leave the mines?—I had had enough of it; I had a nasty cough.

7. Were you under a medical man?—No.

8. On what matters do you wish to inform the Commission?—Ventilation, sanitation, and accidents.

9. *Mr. Dowgray.*] In regard to ventilation, have you had any experience of blower and exhaust?—No.

10. What method of ventilation has been in use in the mines where you have worked?—Natural ventilation.

11. In regard to accidents, have you had any experience of shot-firing?—I had a man killed alongside of me in that way.

12. Have you worked with a battery?—No.

13. Have you had experience in regard to windlasses?—Yes.

14. Have they had pawls on them?—No, none at all.

15. Do you consider it would be a safeguard to have them?—Yes.

16. *The Chairman.*] How would you do with landing buckets at the shaft?—There are always three men, as a rule, and each man lands one bucket. You would have to throw the pawl on.

17. What protection would it give you? Is not there a danger of the man with the bucket slipping?—No, not if he has a proper hold of the handle.

18. Would you not want three hands?—No; you could pull your bucket up to the top of the winze and get it that way.

19. Do you think it would work satisfactorily?—Yes, if a man were careful. The pawl would be a safeguard.

20. Do you think it would be inconvenient to the man?—No, not at all.

21. *Mr. Parry.*] Have you had any experience of these cages here?—Yes. I do not believe the method of testing them is satisfactory. I have not seen a cage tested with a truck on. Further, I do not believe in the cages standing at the shaft all night in cold weather; the chains are liable to snap with cold weather.

22. In regard to ropes, are they examined at all?—They do not give them half enough grease. They may be greased once in two years, but it should be done oftener.

23. You have heard what other witnesses have said regarding bars on cages: have you any suggestion to offer?—I think something in the nature of a slip-bar as suggested would be the best.

24. Have you ever seen anything of the kind?—No.

25. Do you consider that they should be attached to all cages?—Yes.

26. Have you had any experience of working in hot places?—Yes.

27. What effect does it have on you?—It made me very weak and sickly. I have had to take off my flannels and wring them.

28. Do you think that a proper standard of temperature should be fixed?—Yes.

29. As regards bath-houses, change-houses, and drying-apparatus, what is your opinion?—I think that every mine should have proper change-houses and baths, so that the miners could go home clean.

30. What is your opinion as to the necessity of sanitary arrangements?—Well, in most of the mines where I have worked the sanitation has been very bad. I have seen men using the drain.

31. Was that here at the Thames?—Yes, in the Saxon and Moanataiari Mines; and when the drain has got blocked we have had to go and clean it out ourselves. The smell was very offensive.

32. Do you think that appliances should be made and provided?—Yes.

33. You are not in a position to suggest a standard temperature on account of your inexperience in such matters?—No.

34. Do you say you have suffered from the effects of mining?—Yes, I was in the hospital for eight or nine days. I have been boring under several hundred pounds of compressed air in the Saxon Mine. I have seen the truckers unable to carry a light in the shaft, and they had to go 1,200 ft. in the dark: that was sixteen or seventeen years ago.

35. Why did you cease following mining?—Because I was unwell and could not enjoy my meals.

36. You have heard a suggestion as to the necessity of employing an assistant to the engine-driver?—Yes; it should be done in all cases where there are a great many men employed, as at Waihi. The engine-driver might take a fit.

37. As regards having manholes in tunnels and drives for the men to take refuge in, do you think that is advisable?—Yes.

38. What would you suggest?—They should be put in every hundred feet. A miner is not able to run far when shots are being fired, as he is short-winded.

39. What is the cause of their being short-winded?—It is caused by the fumes and dust from the explosives.

40. Have you worked in Waihi?—Yes.

41. What is your opinion of the use of electrical batteries?—I have never used them at all, but I think they would be better than fuse for more than five holes.

42. You have worked in the stopes at Waihi: what is the largest number of shots you have seen fired there at one time?—From fifteen to twenty.

43. Do you consider there is any danger by plastering in those stopes—that is, putting dynamite on the rock and covering it with mud?—I have done it myself, but I do not know that it is dangerous. I was very careful.

44. Have you ever returned after firing shots and found some not exploded?—Yes.

45. Did you ever find your dynamite lying on the stones?—Yes. I have put a pick into it almost myself.

46. Do you not think it would be safer to use a battery?—Yes, because the shots would all go off.

47. What is your opinion about the height of stopes?—There should be a standard fixed at 7 ft. or 8 ft.

48. Do you think a man should examine his stope every morning?—He will if he is a careful miner.

49. Is he in a position to secure the back of his stope if it is too high?—No.

50. Under those circumstances, do you not think it is for the safety of the men to have a standard height for stopes?—Yes; they should not be higher than 8 ft.

51. Is it usual for men at the Thames to make complaints to the manager?—No; they make their complaints to the shift boss.

52. Is there any reason why the men do not care about making complaints?—Yes; they might be blackballed and have to go out.

53. *The Chairman.*] Do you know of any such instances?—No.

54. As to tamping, do you believe that bag and paper should be prohibited?—Yes; I believe only clay and water should be used.

55. *Mr. Molineaux.*] Do you consider 10 ft. is too high for stopes?—Yes.

56. *Mr. Cochrane.*] You stated that you were not satisfied with the method of testing the cages or ropes: did you mean the strength of the rope?—I was referring to the method of testing the cages empty before the men go down in the morning.

57. Then, you are referring to the safety of cages. What do you propose?—That they be tested with a full truck on, equal to the weight of five or six men.

58. What is the average weight that is taken up in trucks?—They are half-ton trucks now, but in my time they weighed five to a load, which is a little over a ton.

59. You say that a cage should be tested with a full half-ton truck on?—Yes.

60. *Mr. Reed.*] Is it not four years ago since you worked?—Yes.

61. So that you are speaking about what are now matters of ancient history?—No, I am not; there is no difference between the mines then and now.

62. How do you know: you are not working in them?—But I go on what my workmates say, and what I have seen when I was there.

63. So that you really do not know anything about the present working conditions except from hearsay?—That is so.

64. You referred to electrical firing as being safer than firing by fuse: do you know whether hangfires and misfires may occur with electrical firing?—I do not know anything about it.

65. Would you be surprised to hear that both do occur?—I would not be surprised at all.

66. *The Chairman.*] What have you learned by hearsay? To what conditions did your statement relate?—To the whole evidence as to cages and ropes.

67. To anything else?—No, nothing else.

68. What is the testing of the cage?—The testing of the safety appliances to see if they would act.

69. You suggest that ropes should be tested in the same way?—The cage should be tested with the average weight, and the ropes should be tested with twice the ordinary load.

70. But you would not test the rope with the breaking-strain. Do you know that ropes and chains have to be tested with double the carrying-weight under the Mining Act?—Yes, that would be a fair test.

WILLIAM BIRD sworn and examined. (No. 8.)

1. *The Chairman.*] What are you, Mr. Bird?—A miner.

2. How long have you been mining?—For forty-two years on this field. I was mining in Africa before I came here.

3. In what capacity have you worked?—I have been manager for a little while in a small way.

4. What sort of a mine were you managing?—A quartz-mine with six or eight men employed.

5. Were you working from a shaft?—No, from adit levels.

6. Have you had any experience in taking temperatures?—No.

7. On what matters do you wish to inform the Commission?—I wish to say that I am suffering from miner's complaint, and I thought, if by giving evidence in regard to the matter, I would be rendering a service to the younger men, who are working under better conditions than I did in the early days, I should feel I am leaving the world better than I found it. In my days mining inspection was a farce, but it is better now. We had no supervision, no mining inspector, and no union to look after us.

8. How long have you been suffering from that complaint?—For twenty years or more.

9. How long is it since you ceased work?—About four years since I earned any money.

10. Are you under medical treatment?—Yes.

11. By which doctor?—Dr. Walshe, the hospital doctor. He tells me that no man in the world can do me any good.

12. Have you any objection to the doctor giving us the history of your case?—I would only be too pleased.

13. *Mr. Dowgray.*] Mr. Chairman, I do not purpose examining this witness at any length, as I consider that to get the medical testimony will be sufficient. Although, Mr. Bird, as you say, the conditions have improved since you were mining in the early days, do you consider there is still room for improvement?—Yes, I am sure there is.

14. Could you suggest any improvements that could be made even now?—No, I do not think so.

15. You have never had any experience with blowers or exhaust?—No, I know nothing of them. I understand a little of natural ventilation.

16. *The Chairman.*] Have you had any experience of artificial ventilation?—Yes, but very little. I worked with the old hand-fan, with a little boy turning it all the time; but I have no experience of up-to-date appliances.

17. What is your experience of the dust nuisance? Can you offer any suggestions in regard to it?—Well, all I know is that a wet place is preferable to a dry place. You are not so susceptible when working in wet places.

18. *Mr. Parry.*] Have you had any experience of working in hot places?—Yes, I have worked for years in hot places.

19. What effect has it had upon you?—It is the sudden changes which have caused this disease. I have been in "Siberia" one moment, in "boiling-down" another, only a few feet away.

20. You think you have contracted this disease coming from a hot place into a cold place?—Yes; the sudden changes, together with dust, have caused the complaint

21. When the temperature rises to a certain point do you think the shift should be reduced to six hours?—In some of the places where I have been I would not like to work for even six hours.

22. Most of your work was in dry places?—Yes.

23. Do you think, Mr. Bird, in the event of a place being very hot, that the hours should be reduced to six?—Yes, certainly.

24. Of course, you think that every effort should be made to better the conditions of the miners and prevent the spread of such a disease as yours?—Yes; I would like to leave the world better than I found it.

25. *Mr. Cochrane.*] Have you done any work with rock-drills, Mr. Bird?—No, sir.

26. *Mr. Reed.*] You have not worked for the last four years?—Yes, tributing in the Moanataiari Mine.

27. Are the conditions objectionable there now?—No; the place is good enough where I worked.

28. Have you any complaints to make about the conditions in the Moanataiari Mine?—None whatever.

THAMES COURTHOUSE.—16TH AUGUST, 1911.

ALEXANDER WHITLEY sworn and examined. (No. 9.)

1. *The Chairman.*] What are you, Mr. Whitley?—My present occupation is that of a farmer. I was, however, Inspector of Mines for the West Coast, Nelson, and Marlborough Districts for three years up till the end of May last.

2. What mining experience have you had? Over how many years does your mining experience extend?—Twenty-six years.

3. What certificates do you hold?—A first-class gold-mine manager's certificate.

4. What working experience have you had in addition to your term as Inspector of Mines?—I gained my experience in Queensland, Western Australia, and New Zealand.

5. Which New Zealand mines have you worked in?—At the Thames, in the Kuranui-Caledonian, Waiotahi, Moanataiari, Scandinavian (which is not working at present), and the Waitangi; the Martha at Waihi; and also at Preservation Inlet and Collingwood.

6. Upon which matters do you wish to inform the Commission?—I am prepared to answer any question which may be put to me.

7. With regard to ventilation, Mr. Whitley, what is your opinion of natural as against artificial ventilation, and which kind of artificial ventilation do you prefer?—Natural ventilation is very satisfactory in some places; where you have two outlets you can get very good results. Sometimes, however, you require to assist it with mechanical ventilation.

8. Where you have to use artificial ventilation, which do you prefer?—Where you have but one outlet I prefer to use a blower. Where you have two outlets the exhaust is the better, in my opinion. Where you have to force the air through the workings with a high pressure the blower is the best, as you can only work the exhaust fan with a limited pressure without injuring it.

9. What are the relative costs of the two methods, both for installing and for working?—That would depend on the quantity of air required to be delivered at the working-faces. Where you have two outlets to the surface you could work the exhaust cheaper than the blower.

10. Have you any information as to the use of both methods together?—Of course, one would assist the other; but I think the better way would be to work with a sufficiently high pressure to deliver the required quantity of air by one method.

11. You think an efficient blower would be better than using both together?—Yes, provided it was large enough.

12. What is your opinion in regard to sanitary arrangements—in regard to the necessity for sanitary arrangements in mines?—I think all mines working any distance from the surface should have sanitary appliances installed.

13. And for their use to be made compulsory?—Yes, it should be compulsory upon the men to use them, to assist the management and keep the mines clean. Some men are naturally careless, and will not assist to improve their conditions unless it is made compulsory.

14. With regard to baths and change-houses, what is your experience?—I have seen baths installed at the West Coast gold-mines, but they are very seldom used.

15. And in coal-mines?—It would be advisable to have them, because the work is dirtier than in gold-mines.

16. Have you had any experience of accidents?—Yes, of winding accidents, and also those caused by explosions and falls of ground.

17. Have you anything to suggest with a view to minimizing the risk of accidents or reducing their number?—To prevent accidents from falls of ground there should always be plenty of timber available for the men, but a great deal depends upon the men themselves; they should be made to take great care always and see that their working-places are quite safe.

18. And what is your opinion in regard to firing?—Where machines are being used for boring the face, men should not be permitted to fire more than six holes by hand. If any more require to be fired a battery should be used. If they were fired by hand probably the shot in the first hole spitted would go off before the others were spitted.

19. Have you any information as to the necessity for manholes in which the men could take refuge when blasting?—It would be desirable to have them in long, straight tunnels.

20. What distance from the face would you fix as a maximum?—Say, not more than 500 ft. A man could get back that distance.

21. Would you also fix a minimum?—About 200 ft.

22. *Mr. Cochrane.*] With regard to the question of blowers and exhaust fans, you have had experience of these, Mr. Whitley?—Yes.

23. Then, if you had an exhaust fan, with good airways, and altered your arrangements to use a blower, can you tell us if there would be much difference in the total circulation?—I think you would have to work at a higher pressure to get the same result.

24. Would there be much difference in the total circulation of air?—Not a great deal of difference.

25. Can a blower work at a very much higher pressure than an exhaust fan?—Yes.

26. Do you think the quantity of air at present prescribed by statute is sufficient?—It depends on the amount of noxious gases given off; it might be sufficient for some places, but insufficient in others.

27. In that case would you favour a percentage standard of oxygen as the minimum for a working-face?—Yes.

28. What should that be?—Not less than 19 per cent.

29. Then, as to vitiated air, what would you favour as a standard for carbonic dioxide?—Not more than 1·25 per cent.

30. Would you also favour a wet-bulb maximum temperature?—I think the temperature should be kept within reasonable limits. It would hardly be practicable, however, to fix a wet-bulb temperature.

31. Why?—You might have some considerable trouble with it. Suppose you had a work that would only take a limited time, and you were pushing it on, it would hardly be necessary to fix the temperature. I have known cases like that.

32. With a high underground temperature where ventilation could not be maintained except at enormous expense?—Yes.

33. How would you meet such cases?—It should be left to the discretion of the Inspector.

34. Then, you favour the exhaust system by winzes?—Yes; where there are two outlets to the surface the exhaust is the best.

35. Would you make it compulsory to have two winzes for that purpose?—Yes, where the air was very bad—at the Thames, for instance, where a good deal of gas is given off.

36. In such cases as the Thames Deep Levels would you favour a connection by another shaft?—Yes.

37. Do you know of any practical means of carrying that out?—Well, the first connection I would make would be with the Saxon shaft. That work should be pushed on.

38. The distance between the workings is about 500 ft., is it not?—Yes; that connection should be made as soon as possible. The crosscut is the principal undertaking in hand at the present time, and should be pushed on. If the air is vitiated in the level all other works should be stopped until the crosscut is finished.

39. Now, we have to deal with the practical side of the question. I know nothing as to the finance of these companies, but if the Saxon Company have no means of deepening the shaft how should it be done?—They must find the means to do it; it has to be done, and should be done as quickly as possible.

40. Do you think it falls within the domain of the Government subsidy?—I do not know. The Government might assist them in this matter, as it would benefit the whole community, and the Government indirectly, as well as the different companies.

41. How would you provide for the ventilation—for practically outside ventilation?—You would require to have doors and brattice.

42. There are places that are beyond the active circulation of the air-current: would you have any provision made for ventilating those places?—Yes, they should be ventilated by doors and brattice.

43. Then, as to ventilation of the rises, are they usually badly ventilated or well ventilated?—They are generally warmer than the levels—in fact, the worst places in the mine.

44. What would you recommend in regard to them?—They should be centred in some way.

45. Would you have the box system, or the logging in the middle?—I have seen both ways used, and they have been satisfactory.

46. Would you recommend that centring be made compulsory?—Yes.

47. Would you start centring as soon as they started rising?—Yes, that should be made compulsory.

48. In regard to ends, would you have them a given distance ahead of the air-current?—The pipes should be kept up as close as possible to the face.

49. But if there are no pipes?—They should have some means of conveying the air into the face.

50. Would you fix the distance beyond which they should not go without having pipes?—I would not state any distance.

51. Then, as to blasting by means of batteries, do you recommend that?—Where they are firing in the face there should be batteries used if more than six holes are to be fired.

52. In all cases?—Yes.

53. You consider the present method of testing the cages sufficient?—I do not know exactly what method they are using here now, but all cages should be tested at regular intervals with loaded trucks.

54. I suppose you have frequently seen sprays used with rock-drills?—Yes.

55. Have you found any difficulty in getting the men to use them?—Yes, at times. Some of the men seem to be very careless, and do not like the water. I have found when they have been rising that they complained that it made things greasy, and there was a danger of them falling down the rise. They would sooner bore dry.

56. *Mr. Reed.*] In either Queensland or West Australia have you found as many ventilating-fans in operation as there are in New Zealand?—No, not when I was working there; but I do not know what the conditions are now.

57. Of late years has the number of fans in quartz-mines greatly increased in New Zealand?—Not to a very great extent.

58. Are you aware of any countries in which a fixed standard of temperature is in force?—Yes, in Victoria and Western Australia.

59. Do you remember the standard temperature in Victoria?—83° by the wet-bulb thermometer.

60. May that temperature be exceeded at any time?—Yes, in certain cases, on the recommendation of the Inspector of Mines. It is left to him.

61. On such occasions do you know what the Inspector may have the power to do in the way of reducing the hours of labour?—Yes, he could reduce the hours to whatever he thought reasonable.

62. In the State of Western Australia what is the fixed standard?—87° dry and 80° wet.

63. Is there any time after blasting in which that temperature may be exceeded?—Yes, thirty minutes after blasting.

64. In the case of a test for air which is considered to be suitable for men to work in under ordinary conditions, what standard would you prefer?—I would prefer that laid down by the Royal Commission on Mines in their report, where they state that the air should not contain less than 19 per cent. of oxygen or more than 1·25 per cent. of CO_2. [Witness quoted from page 76 of Royal Commission on Mines' Second Report, dated July, 1909, as follows: "We also think that any air found by analysis to contain less than 19 per cent. of oxygen, or more than $1\frac{1}{4}$ per cent. of carbon-dioxide, should be regarded as below this standard. Such a standard would rightly be regarded as unduly lax if the impurities in the air were derived largely from respiration, or lights, or blasting, and were thus liable to be accompanied by other vitiation of a serious kind. The available evidence shows, however, that in collieries and other mines in Great Britain the impurities are derived almost solely from mineral sources. There thus seems to be no good reason for a stricter standard, and we believe that the standard which we recommend is one which would generally be regarded as reasonable by those familiar with mining conditions in this country. We think that this standard should apply in the same way, and be subject to the same exceptions as the standard for firedamp. In connection with the subject of ventilation we have also considered the question whether any standard should be prescribed as regards the temperature at which ordinary work may be carried on. The influence of high temperatures on men is intimately dependent on the moisture in the air, and also on its motion; for the greater the dryness of air, and the greater its motion, the more rapidly does warm air carry off the heat of the body and thus neutralize the ill effect of the heat. The existing evidence indicates that in still and saturated air continuous hard work is practically impossible at temperatures exceeding about 80° Fahr., even when men are stripped to the waist, and that when the air-temperature is higher than this the result is the same if the wet-bulb temperature rises above 80°. A temperature of 100° or 110°, with the air so dry that the wet-bulb temperature is only 80°, is thus no worse than air completely saturated with moisture at 80°. In other words, it is the wet-bulb temperature, and not the actual temperatures of the air, that matters to a man when the air-temperature is high. In moving air, however, a somewhat higher wet-bulb temperature can be borne than in still air. At wet-bulb temperatures exceeding about 80° the amount of continuous work which a man is capable of doing without serious rise of body temperature rapidly falls off, and becomes practically nothing at 90° wet bulb. The available information seems to indicate that where the heat in a mine is excessive miners readily adapt themselves to the adverse condition by either doing less work or by only working intermittently, with periods of rest in cooler air. The rate of pay has, of course, to be correspondingly adjusted. Cases of heat-stroke or other actual injury from heat seem to be almost unknown among miners. The only case which has been brought to our notice is that of the Yorkshire miner, John Welsby, who, while wearing a rescue apparatus, was disabled by heat-stroke, and lost his life in a brave attempt to reach a number of men who had been cut off in the recent fire at Hamstead Colliery. On the whole, we do not think that any good object would be served by prescribing a limit of wet-bulb temperature for the carrying-on of work in mines. We wish, however, to take this opportunity of pointing out the great importance of studying the causes of excessive heat and moisture in mines, and so arranging the ventilation as to keep the wet-bulb temperature within reasonable limits and ensure a good air-current at the working-face." That report is signed by Monkswell, Lindsay Wood, Henry Cunynghame, W. Abraham, Fred. L. Davis, Enoch Edwards, Thomas Ratcliffe Ellis, J. S. Haldane, Robt. Smillie.]

65. *The Chairman.*] You say you agree with that opinion?—Yes.

66. *Mr. Reed.*] In making your inspections of mines would you consider it necessary to take samples of the air in bottles?—Yes.

67. For the purpose of determining the quality?—Yes.

68. Would you consider a fixed quantity, such as 100 or 150 cubic feet of air per man per minute, somewhat of a rule-of-thumb standard?—Yes; it would not be enough in some cases, and too much in others.

69. *The Chairman.*] Can you suggest a more reliable standard?—You would have to be guided by the analysis of the air.

70. Yes, but for working purposes?—No, I could not suggest any standard which would be satisfactory always.

71. *Mr. Reed.*] Are you aware that the standard of temperature fixed in the coal-mines of Australia was determined for the removal of firedamp and not for the removal of carbon-dioxide?—Yes, it is so.

72. Does firedamp exist in these metalliferous mines?—Not at the Thames, but at Reefton it has been known to exist.

73. You stated that under exceptional circumstances, such as dead-ends or with hot rocks such as are found here, and where a short distance has to be driven, you thought a fixed standard of temperature would be unfair?—Yes, I think it should be left to the Inspector to decide in those cases.

74. Do you know the Queen of Beauty shaft here?—Yes.

75. Are you aware that there are two compartments in which the cages operate?—Yes.

76. If it were proposed to use one of these compartments as a downcast, and the other as an upcast, would you regard such a proposal as ridiculous?—I certainly think it would not be a good idea; the working-cages would interfere considerably with the ventilation.

77. Supposing you put a fan at the top of one of these compartments, and brattice along the whole length to the Deep Level crosscut, do you think you could get adequate ventilation with the winding-shaft blocked with cages?—No, I do not think so.

78. Do you think it is possible to put another air-pipe of adequate dimensions down the Queen of Beauty shaft?—I do not know. All the room may be taken up by the present air-pipe and pumping-apparatus.

79. In driving the deep-level crosscut is it reasonable to suppose that the carbon-dixode will appear mostly in the face?—Yes.

80. Is it, then, not good practice to blow strong pure air on that face to remove the noxious gas?—That would be my opinion.

81. Which is the best method for putting pure air into the face?—The blower.

82. Would an exhaust fan drag carbon-dioxide up to the men at the face?—Yes, it would have that effect.

83. Under the existing conditions of the Deep Level crosscut, with one shaft only, do you think the system of ventilation by a blower at present adopted can be improved?—No, the system is the best.

84. *The Chairman.*] How do you propose, then, Mr. Whitley, to get more air?—By driving the blower at a greater speed—by working it to its full capacity

85. *Mr. Reed.*] Can you tell us approximately to what water-gauge a blower can be driven?—About 5 in.; but I am not sure.

86. You had an extensive experience on the Inangahua Goldfields?—Yes.

87. Have you had occasion to complain of the men neglecting to use the sanitary arrangements provided there?—Yes, on several occasions.

88. Are suitable baths provided at the Reefton mines?—Yes, by the Blackwater Company; but many of the men do not use them.

89. Who bears the cost of those baths?—The company, entirely.

90. As regards winding-engine drivers when they are preparing for their certificates, do you think it is fair to the men to permit these uncertificated learners to practice winding while men are in the cage?—No, I do not think they should be allowed to do it.

91. Have you known of any fatal accidents occurring as the result of that practice?—Yes, one occurred at Reefton while I was there.

92. How would you suggest that these learners should practice?—By hoisting material, bailing water, and so on.

93. In the case of an Inspector prosecuting a manager or employee of the mine, what is the present tribunal?—The Warden and two assessors, who must be first-class certificated mine-managers, appointed by the Warden.

94. In Western Australia, are you aware that the Warden has power to summarily deal with such cases?—Yes.

95. Now, as an ex-Inspector, manager, and miner, which do you think the justest tribunal for the men?—I think it should be left to the Warden himself.

96. With summary jurisdiction?—Yes.

97. *The Chairman.*] Do you mean that you would alter the tribunal from a Warden and assessors to a Warden only, with summary jurisdiction to determine the question himself?—Yes.

98. *Mr. Reed.*] Are you aware that uncertificated men are practically managing several mines in New Zealand?—Yes, that is so.

99. Are you aware that the Mining Act provides that a mine of certain magnitude shall be managed only by a first-class certificated man?—Yes.

100. Both surface and underground operations?—The whole of the mine and surface equipment should be under the control of a certificated mine-manager.

101. But is it not a fact that the battery superintendent controls the battery-work under the direction of the mine-manager?—They generally work together.

102. Are you aware of cases where these certificated managers, when under a superintendent, have little or nothing to do with the surface arrangement at all?—Yes, I do know of such cases.

103. Do you consider that this system, while technically complying with the requirements of the Act, is practically and substantially an exasion of the law?—Yes, I do, because the manager has to do as he is told, otherwise he would have to leave.

104. So that he is practically a dummy?—Yes, that is so.

105. In connection with a misfire in a face, what is the statutory time which must be allowed to elapse before a man may return?—Three hours.

106. Do you consider that time excessive?—No, it is not excessive.

107. What is the longest time for which you have known a shot to hang fire and then explode?—I cannot say; but not that length of time.

108. Have you heard of one hanging fire for half an hour?—No, they do not, as a rule.

109. Would it not be reasonable to limit it to one hour instead of three?—I believe they should take every precaution. It might be reduced a little, but I believe in giving shots plenty of time. I would not send a man back to the hole under the prescribed time.

110. In connection with these small mines at the Thames, worked from adit levels where natural ventilation is employed and a large current of air may be detected by the anemometer, and where the air is reasonably good, would you in these cases compel such small mines to install mechanical ventilation?—If the air was not up to the standard I would.

111. Would that result in shutting up a number of these mines?—It may do so, but it would be better for the men employed if they were closed.

112. While Inspector of Mines at Reefton did you have many complaints as to bad ventilation from the men?—Not from the men themselves, but at times from the workmen's inspectors. There were not a great many complaints on the West Coast, as the air is fairly good there.

113. Did you have any complaints about the non-provision of sanitary arrangements?—Yes, from the workmen's inspectors.

114. And as regards the non-provision of bath-houses?—No.

115. Did you take immediate action to have the complaints you referred to remedied?—Yes, in every case where I found the complaint to be well grounded.

116. Did you at times take legal proceedings against the management in regard to them?—No, not against the management; but I took action against the engine-driver when a man was killed.

117. Then you got the managers to comply with your requests without taking legal proceedings?—Yes, they were always willing to do so.

118. Was the action against the engine-driver heard before assessors and a Magistrate?—Yes.

119. Although the man was killed you failed to get a conviction?—Yes.

120. *The Chairman.*] I notice, in looking at the Act, that the time fixed for misfires is three hours: you said four?—Is that so? I thought it was four.

121. What do you say as regards reducing it below three?—I would keep it at three.

122. *Mr. Dowgray.*] Have you had any experience of mining in the Old Country?—No, none at all.

123. So you are not in a position to judge, from the evidence and recommendation of that report, whether the standard would be applicable to the mines in this country?—It would be, I think.

124. But you had no experience in those mines?—No.

125. Does it not strike you that the recommendation in that report of the Royal Commission on mines in the Old Country was made with the idea of preventing the mines from closing down?—No.

126. *The Chairman.*] Does it show that reason in the report?—No, I do not think so; I do not know what the idea was.

127. *Mr Dowgray.*] Can you say, Mr. Whitley, whether that report conveys to you, in its recommendation to reduce the number of hours, that their idea was to prevent the mines from closing down?—It may have been so.

128. Does it not refer to men working in high temperatures only intermittently?—Yes.

129. *The Chairman.*] What do you infer from that?—Probably the idea was not to close down the mines.

130. *Mr. Dowgray.*] On reviewing that portion of the report you think that may be so?—I would not say it was their idea, but you might infer it from that.

131. In connection with 100 cubic feet of air per man per minute required in gold-mines, that means a minimum?—Yes.

132. In answer to Mr. Reed you did not say that there should be a minimum, but that it should be left to the Inspector?—No, I did not say that. I think that they should have not less than 100 cubic feet of air per man per minute. It ought to be up to that standard.

133. The reason, then, I take it, that coal-mines are required to have 50 cubic feet more than gold-mines is on account of the presence of firedamp?—Yes.

134. In reply to Mr. Reed's question in connection with the Queen of Beauty shaft you said that in your opinion it was not practicable to utilize a shaft with a cage in it as an upcast?—The cages working in the shaft would affect the ventilation. It would not give satisfactory results.

135. There are two compartments in the shaft, one with a cage going down and the other with the cage coming up. If they were bratticed down the centre would that not serve as an effective method?—For the shaft, but not for the drive. It would not be as good as two shafts to the surface.

136. But there would be two outlets?—Still, they would not be as good as two independent shafts.

137. Would they be too close together?—That would not be the trouble. The cages would be interfering with the ventilation.

138. But would your exhaust road from the fan not be below the surface?—Yes, of course it would.

139. There is a pumping-shaft in the Queen of Beauty: could it not be utilized for ventilation purposes by means of bratticing?—Well, it might be blocked with columns, and you might not be able to get much air. If there were sufficient air it could be worked.

140. Would it be better than the blower?—No, I believe in the blower.

141. *The Chairman.*] Mr. Reed said that the blower is putting the air into the face better than an exhaust. Would it ventilate the whole mine better than an exhaust?—Yes, if it had sufficient capacity to dilute the gas that was given off.

142. *Mr. Dowgray.*] When would you consider a mine adequately ventilated?—There would require to be sufficient good air in every working-face, trucking-road, and every other part of the mine. It would have to be up to the standard.

143. Otherwise it would not be properly ventilated?—No.

144. Supposing the air became fouled in the return by sudden outbursts of gas, how would the men get from the face?—They would have to stop there until that gas was diluted.

145. Where the return air was so vitiated it would not be properly ventilated?—No.

146. Mr. Reed informed you that the water-pressure in the Queen of Beauty shaft was $3\frac{3}{4}$ in., and you said they could work it up to 5 in.?—Yes.

147. When you were at Reefton were there sprays used in all the mines there?—No, not when I went there, but they were before I left.

148. Did you compel the companies, on your own initiative, to provide sprays?—Yes.

149. In connection with the dry bulb and the quality of the air in the working-face, what should be the difference between the wet and dry bulb?—I would get as big a difference as I could.

150. But if there is no difference?—When the wet bulb exceeds 80° and the air is saturated the men should not be asked to work there all the time—only intermittently.

151. *Mr. Parry.*] Have you had a good deal of experience in testing temperatures?—Yes.

152. You say that it is necessary to have change-houses and baths?—Yes, it is necessary for the men to use them if they want to.

153. Do you think it would be more healthy for the men?—Yes, if they would use them.

154. You also think it necessary to have sanitary appliances?—Yes, where they are working any distance from the surface.

155. You have worked in Waihi?—Yes, a good many years ago.

156. What is your opinion as to the fixing of a standard height for stopes?—They should not be more than 8 ft.

157. Are you of opinion that that should be provided in the Act?—Yes.

158. What is your opinion of open cages?—There should be a gate provided on all cages which are used by the men—a movable gate which could be taken off for trucks. For use when men are travelling they have a drop-bar in most of the Reefton mines. I think that is necessary.

159. Do you think men are running a risk in riding on open cages?—Yes, in a frame-set shaft.

160. Do you think the men are running a great risk in descending a shaft with only one engine-driver and no assistant?—No, I have never heard of any accident happening in that way—not through sickness or fainting.

161. Have you ever heard of any such accident occurring in the Old Country?—I have never read of one.

162. Did it ever occur to you that the men were running a risk?—No.

163. With eight men in the cage, do you not think that is a great deal to be trusted in one man's hands?—I do not know. If an engine-driver is reliable and healthy I do not think there is any risk.

164. Do you think that engine-drivers should submit themselves to examinations for eyesight and health periodically?—Yes, it would be a good thing.

165. But it would not solve the whole problem?—A man might be in good health to-day and unfit to-morrow.

166. At the Reefton mines, is it not a fact that the workmen's inspector called the men out from their work?—No, he did not.

167. Do you say it is not true?—It is not true. I stopped the men from working, if that is what you are alluding to.

168 You say that on the West Coast the men do not use the bath-houses?—Yes, only a few of them do.

169. That is near Reefton?—Yes, at the Blackwater Mine.

170. At what distance are they living from the mine?—At no great distance. They would sooner go home than change at the mine.

171. Have they hot water there?—Yes.

172. And drying-apparatus?—Yes, hot pipes.

173. In regard to accidents, you say that plenty of good timber should be supplied by the companies?—Yes, it should always be available.

174. Have you ever heard complaints from the workmen that there was a shortage of timber when the company has considered that the men did not require the timber?—No; at Reefton there was plenty of timber.

175. Did they work stoping on wages or contract?—All stoping is on wages. Driving, sinking, and rising is on contract principally.

176. You say that you favour the quality standard for air rather than the quantity one?—Yes.

177. Do you not think that would cause confusion between the men and the company?—I do not think so.

178. Seeing that the Mining Inspector is not stationed at every mining place, who is going to redress the matter?—Well, the Inspector makes periodical tests, and if there was any dispute he would be always willing to go.

179. *The Chairman.*] Supposing he is not available, the conditions change very rapidly?—Well, I think the workmen's inspector and the manager could take samples together, and that would get over the difficulty. The samples could be sent along to the Government Analyst, but if they wanted them done quickly the analysis could be made at the local school of mines.

180. *Mr. Parry.*] And you consider that the men should continue to work till the result was known?—If the air was very bad—if the candle burnt dimly—the men should be taken out of the mine.

181. *The Chairman.*] But perhaps the air might clear before you got the samples?—The workmen's inspector is always handy.

182. *Mr. Parry.*] Do you believe in the idea of having workmen's inspectors?—Yes, they often hear of matters which require attention, but of which the Inspector of Mines would not hear. He advises the Inspector of Mines of the complaint, and it is the Inspector's duty to see the matter put right if the complaint is well grounded.

183. You say that the manager and the workmen's inspector should take the sample?—Yes.

184. Would that not put the workmen to a great deal of expense to be called away at any time for the purpose?—No, the workmen's inspector is always about.

185. Seeing that he inspects the mines once a month, and that the men have to pay him for making that inspection, is it not hard on them, besides putting more work on the workmen's inspector?—I do not think he is overworked at the present time. It should be part of his duties.

186. But it is the payment we are considering: do you not think it would be hard on the men?—No, I think the workmen should contribute towards the payment of their own inspectors.

187. The whole sum?—Yes.

188. You do not think that would cause confusion between the workmen and the employers?—I do not think there would be any confusion about it.

189. And you also approve of the recommendation in the report of the British Commission on Mines?—Yes.

190. The whole of that recommendation?—Yes.

191. And you do not think that, as the report says, any good would be done by fixing a standard temperature?—No, I think it should be left to the Inspector of Mines.

192. Would that not also cause confusion if the Inspector were not stationed at that particular place?—Well, the temperatures are not likely to go up in such a short period that the Inspector could not get there to take them.

193. Supposing the Mining Inspector were away at Hikurangi, and he was required at Huntly, how long would the men be working under those conditions before he could get there?—I do not think the temperature would rise so rapidly.

194. I suppose you are conversant with the temperature in the mines here?—I do not know that I am.

195. Would you be surprised to hear that the temperature exceeded 80° in the drive here?—Perhaps it does, but it has not risen so quickly. It might take a week. Efforts should be made by the management to reduce the temperature. The better the conditions are for the men the better the results the company will receive from the men.

196. Do you think that where development-work is being carried on it is almost impossible to get efficient ventilation?—They could get sufficient ventilation if they had the appliances.

197. Do you think it is not so easy to get ventilation?—No, it is not.

198. That report which you quoted also says that miners readily adapt themselves to the heat?—That is so.

199. What does that mean?—It means that the men require to have a spell. They cannot work continuously in places where high temperatures are found.

200. Have the men themselves the right to regulate that time?—Well, the management have the regulation of the time, but I think the management give way to a certain extent in regard to these hot places. They do not expect the men to do as much.

201. Do you think that is done?—I think it is done in some cases.

202. Would you provide for those cases where it is not done?—The only way would be to limit the number of hours for hot places.

203. Under these conditions, then, you think that a standard should be fixed?—The hours should be limited where the temperature exceeds 80° by the wet bulb.

204. You said, in answer to Mr. Reed, that the mine-managers are under the control of the superintendents, and if they do not do what is required of them they have to get out of it?—Yes.

205. And you think that the manager should be protected by law in this matter?—Yes, I think he should.

206. And do you not also think it is reasonable to ask that the men should be protected by law in the matter of temperature?—Certainly, they should not be asked to work long shifts in these very hot places.

207. You have not been down the Deep Levels shaft?—No.

208. The temperature is 76° by both bulbs at the discharge, and at the intake on the surface it is 51·55°: can you tell us what is the cause of it going up so high in transmission?—I do not know where it is getting the moisture; it should not be as high as that.

209. Can you give us any reason why both bulbs should read the same? The air increases by 25° in transmission?—It may become heated in the pipes. The temperature gets greater as you go down, but I do not know where it would get that moisture. If there is any moisture in the pipe that would account for it.

210. Have you taken the temperature of rock?—No.

211. In the event of a rock-temperature being 76°, would you also expect the air to register 76°?—Yes, I should think it would have that effect.

212. Is it likely that the air should have the same temperature as the rock?—Well, the rock would have the effect of heating the air and bringing it up to the same temperature.

213. In the event of the rock-temperature being 90° and the temperature of the air 90° also, with 5,000 cubic feet of air per minute, would it be necessary then to reduce the air-temperature?—Do you mean that the air delivered at the end of the pipe was 90°?

214. What would be necessary to reduce the temperature of that air?—I do not know, unless you have water or ice put down for cooling the air.

215. Therefore it would remain heated with even 5,000 ft. of air?—Yes, it would be heated to the same temperature as the rock if there was no circulation. If there were plenty of air coming out and plenty of circulation the rock would not heat it. By increasing the circulation the heat would be overcome.

216. If there were 10,000 ft. of air there?—If you were pumping in 10,000 ft. of air of low temperature the air would not be heated.

217. Seeing that the rock-temperature plays an important part in the temperature of the air-current, then the only hope you have of reducing the air is by a larger current?—Yes.

218. Well, in those hot places where it is impossible to get a large current of air to reduce the temperature, then you would suggest that a standard temperature be fixed?—I would not suggest any standard temperature. It would depend on how long the work was likely to take. If it was an urgent work they should be allowed to work shorter hours until it was carried through.

219. Is that the only impediment to the fixing of a standard heat?—Yes; in cases like that they should be allowed to work on six-hour shifts at a higher temperature.

220. And there should be a standard heat fixed for the work?—I think, when both bulbs are reading 80°, then it should be a six-hour place.

221. Therefore you would suggest that a standard temperature be fixed for a six-hour place?—Yes; it should not exceed 80°.

222. You say the temperature increases as you go down?—Yes.

223. Would you be surprised to hear that there is a difference in the temperature of 14½° in a tunnel on the surface?—Yes, but you find that here in the Moanataiari tunnel.

224. So that it is not altogether certain that the air does increase in temperature with depth?—Well, you have the same conditions in that tunnel as in a drive as to depth—you are going into the hill.

225. *The Chairman.*] You have the ground overhead?—Yes, that is so.

226. *Mr. Parry.*] Of course, the temperature taken outside is the temperature of the air, but the temperature inside is the rock-temperature: therefore that proves that the rocks play an important part in heating the air?—Yes.

227. What do you think is the cause of less accidents happening here at the Thames as compared with the number at Waihi and other places?—Possibly more care is exercised here; perhaps, too, they are not carrying their stopes so high.

228. What is the necessity, in your opinion, for having pawls and cogs on windlasses?—I think they should be all provided with pawls and cogs. There have been several accidents because of the absence of pawls when pulling up a bucket.

229. Do you consider mining a healthy occupation?—No, it is not healthy under the best conditions.

230. It is far healthier working on the surface?—Yes.

231. In your experience have you heard many complaints as to the condition of the workmen?—Yes.

232. What is the most important complaint you have heard from the men?—Well, they generally get very short in the wind—their lungs get affected.

233. And do they complain of indigestion?—Yes, they sometimes get attacks of indigestion.

234. What is your opinion, Mr. Whitley, about the use of bag or paper tamping?—I am not in favour of it.

235. *The Chairman.*] Do you think it should be prohibited?—Yes.

236. *Mr. Cochrane.*] There is a point I wish to clear up as to misfires. The present Act provides for an absence from a misfire of how many hours?—Three.

237. Do you think that conduces to the Act being broken? Do you think that a shorter period would afford sufficient safety?—I think they should give it the three hours.

238. Then, as to the blower in the low level, I think you said that you preferred it to the exhaust fan?—Yes, where there is only one outlet.

239. But if there were a connection with the Saxon shaft would you prefer an exhaust?—Yes.

240. Then, as to superintendents interfering with the managers, do you think that should be prevented by law?—Yes.

241. Would you also make similar provision to prevent the interference by boards of directors?—Yes, I think so. For the safety of the miners the mine should be under the sole control of the certificated manager.

242. *The Chairman.*] Do you go so far as to say that the manager should go where he likes in his mining operations?—No.

243. *Mr. Cochrane.*] But as to the safety and health of the miners?—Yes.

244. *Mr. Reed.*] As regards the water-gauge at the Queen of Beauty blower, do you know for certain the maximum to which the gauge could work?—No.

245. You stated 5 in.: was that simply a guess?—Yes, it might be worked to more than that.

246. If you were informed that it could work to 17 in. would you think that very much higher than would be obtainable with a fan?—Very much higher.

247. As regards the test for impure places, would the candle burning dimly be sufficient guide for the workmen's inspector and the management that the air in that place was vitiated?—Yes, that would be sufficient indication that the air was vitiated.

248. So that, pending the result of the analysis of the air, would you consider a dimly burning candle a reasonable test upon which to withdraw the men?—Yes.

249. Under these circumstances, would there be any unnecessary delay to the workmen waiting for the results of the analysis?—No; they could be employed in another place where there was good air.

250. As regards temperature, would you regard 80° wet and 86° dry as a six-hour place?—No, the air would be much drier there.

251. Then, it is a matter of saturation purely?—Yes.

252. As regards the pipe leading from the surface down to the 1,000 ft. level at the Queen of Beauty, would you think it likely that condensation would occur outside the cold pipe in the shaft?—It probably would.

253. The air being cooler in the pipe than outside?—Yes.

254. So that if the cold air coming into the mine through the pipe were to pass through a portion of the drive with hot air it would be condensed?—Yes, it would have that effect.

255. Would that condensation affect the wet-bulb temperature of the air outside the pipe?—Yes.

256. Consequently, then, would it be unreasonable to suppose that 76° wet and dry could be regarded as the temperature of the air issuing from the pipe?—Yes.

257. *The Chairman.*] Where those conditions obtained, would it be an effective system of ventilation if the pipe has to pass through air that raises the temperature to such an extent?—Well, you would be delivering air at a fairly low temperature, but it would be saturated.

258. Is the air so discharged effective over the whole of the mine?—That is the only way you can ventilate it.

259. *Mr. Reed.*] To overcome that saturation from condensation would you increase the quantity of air passing through the pipe?—Yes, that would be the best way of overcoming it.

260. By running the blower faster?—Yes.

261. *The Chairman.*] Would you consider it necessary to increase the quantity of air so as to alter that condition?—Yes.

262. *Mr. Reed.*] Mr. Parry has referred to a number of mines having a temperature exceeding 80° dry, but no wet-bulb temperature was stated. Would you regard a mine having a temperature exceeding 80° dry as inadequately ventilated?—No; 80° dry is not an excessive temperature, but 80° wet would be excessive.

263. For the safety of the men you would recommend that all winding-engine drivers should be periodically and frequently examined for defective eyesight and to determine whether they are subject to fits?—Yes.

264. Should they be required to obtain a medical certificate?—Yes.

265. At whose expense?—At the companies' expense.

266. Would you like to see such a provision put into the regulations?—Yes, it would be a safeguard.

267. *Mr. Parry.*] As regards the temperature, you say it is a matter of saturation only. Would you sooner work in a temperature of 84°, say, on the surface or at the same temperature underground?—It depends upon the wet-bulb reading.

268. We will take the dry-bulb reading: would you sooner work in the same temperature dry on the surface?—If I had the same quantity of air there would be no difference.

269. I ask you, Mr. Whitley, would you prefer to work underground at the same temperature?—I always prefer working on the surface if I can do so—any man would.

270. Because it is more healthy?—Yes.

271. Have you ever had complaints from men working in hot places as to their condition when the temperature has been a dry one but high?—No; the temperatures have generally been humid when complaints have been made.

272. In the event of the temperature being 82° wet and 86° dry, would you consider that a six-hour place?—No, I would not pass that as a six-hour place.

273. And you really think there should be no limit to the dry-bulb temperature?—Yes.

274. *The Chairman.*] To what extent would you permit the dry-bulb temperature to go?—I would follow the English Royal Commission report, which says that a temperature of 100° or 110° with the air so dry that the wet-bulb temperature is only 80° is no worse than air completely saturated with moisture at 80°. With air as bad as that it should be a six-hour place.

275. *Mr. Parry.*] In the event of the wet-bulb temperature not reaching 80° and the dry-bulb going up to 100°, would you still consider it an eight-hour place?—Yes.

276. Do you think that some provision should be made for a six-hour place where the wet bulb showed between 86° and 90° and the dry bulb, say, only 70°?—No, I do not think that would warrant its being made a six-hour place. It should only be done when the two bulbs read high.

277. You say that you would sooner work in a temperature of 70° dry than in one of 90° wet?—No, I did not say that.

278. In the event of your being a wages-man, Mr. Whitley, and having the pick of places, which would you prefer, 70° dry or 90° wet?—I would take the place at 70° dry. You could work better there.

279. Would you prefer that place for the reason simply that you could work better there—because you could do more work for the company?—Yes.

280. *The Chairman.*] Would it be more unhealthy to work underground in a high temperature than on the surface?—Yes.

281. *Mr. Parry.*] Have you ever suffered any ill effects from working in a high temperature on the surface, as regards sleeping or taking your meals?—No.

282. What difference could be made in those hot places?—They should cool them down.

283. What provision should be made if they could not cool them down?—The men should work shorter hours.

284. *Mr. Dowgray.*] There is one point, Mr. Whitley, which is not quite clear. In reply to Mr. Reed and Mr. Parry you dealt with the question as to whether the candle is a good guide to show when a man should quit his working-place. Will you tell the Commission what is the percentage of CO_2 in which a candle would burn?—At 15 per cent. it would go out.

285. And with what percentage is it dangerous to human life?—It would not kill a man at 15 per cent.

286. Would it be dangerous at 15 per cent.?—Yes.

287. Is 3 per cent. not dangerous to life?—It might be in time.

288. And, according to you, a candle would burn brightly with 3 per cent.?—Yes. In my opinion it should not exceed 1¼ per cent.

289. At what percentage would a candle be affected so as to show signs of the presence of the gas?—In answer to that question I will quote to you Dr. Haldane's "Report on the Causes of Death in Colliery Explosions and Underground Fires" (1896). He gives the effect of CO_2 as this:—

Percentage present.	Effect on Man.	Effect on Lights.
3·5	Breathing deeper	Still burns.
6	Marked panting	,,
10	Severe distress	,,
15	Partial loss of consciousness	Extinguished.
25	Final death	,,

290. Does that indicate when a man would be affected?—It would be at something over 10 per cent. before a man would feel it, but 15 per cent. before the candle would be extinguished.

291. At what percentage would the difference in the burning of the candle be first noticed?—You would notice it at 3 per cent.

292. Even according to that report the candle is not a reliable guide as to when a man should quit?—I think it is a very good guide, unless he can get an analysis of the air made.

293. Still, you admit that with even 3 per cent. it is dangerous to human life and yet the candle will still burn?—Yes.

294. Could you not suggest any other test?—No, it is the only one I know of for CO_2.

295. Do you consider a mine affected by carbon-dioxide gas should have a barometer?—Yes, they ought to be compelled to have a barometer.

296. In quoting the effects of saturated air from that report do you agree with those opinions? Is that your own experience?—It is my own personal experience. I have noticed it myself.

297. As to the effect of 80° wet and 86° dry?—Yes.

298. Is it not a fact that when the temperature is high it is dustier?—Yes.

299. In a dry temperature, then, is the effect not the same as the wet temperature would have?—Well, it would have a bad effect upon their lungs.

300. Is that not one of the reasons for fixing a dry temperature also?—Yes.

301. In connection with a blower, what is the maximum amount of air you could have delivered at a working-place by a blower as compared with an exhaust fan?—You will get far more from a blower, because you can work it at a higher pressure.

302. *Mr. Parry.*] Do you think that a man working in a hot place is a better judge of the effects of the temperature than a person who analysed the air would be?—The men themselves are the best judges.

303. *Mr. Reed.*] Do you think the men themselves could tell the percentage of gas?—No, the men could not tell the amount of gas present.

304. Are you positive as to the lowest percentage of carbon-dioxide that would be indicated on the flame?—No, but I think it is 3.

305. Do you think 1¼ per cent. would have a noticeable effect?—It would not be noticed very much.

306. With a given horse-power and a pipe of fixed dimensions, would a blower give as good ventilation as an exhaust fan?—The blower would be the better.

307. Under any conditions, with a given pressure?—Yes, where you have only one outlet to the surface.

ALFRED W. SAWYER sworn and examined. (No. 10.)

1. *The Chairman.*] What are you, Mr. Sawyer?—A miner.

2. How long have you been mining?—Forty years or thereabouts.

3. Where have you gained your experience?—Practically all at the Thames. I am working generally contracting and tributing, but am working my own claim at the present time.

4. Have you had any experience of taking temperatures or testing air by instruments?—None whatever.

5. What is your working rule for detecting the presence of gas?—We principally use the candle-light, and trust to our own experience in the matter of breathing.

6. Do you notice the effect on the candle first or on your heart?—On the heart.

7. Do you consider that the average miner of experience can tell by these two indications?—Well, we have done so for many years.

8. Do you think you have a reasonable and reliable workable rule in these two tests?—Yes, a workable rule so far as our experience goes.

9. Have you any other matters you wish to lay before the Commission?—Yes, in regard to sanitation, ventilation, and accidents.

10. What is your general opinion as to natural ventilation as compared with artificial, and as to the different kinds of artificial ventilation?—Natural ventilation, when you can get it, is the best; but if it is not available I prefer to use a fan. I have also used it driving a blower, but found that it did not work at all. It drove the air a certain distance from the face, and there met a wall, which was not dispersed for months. Instead of turning the water into the mine I connected up a pipe at each end and drew the water out, and, greatly to my surprise, I could then see the men working inside the tunnel. I had created an exhaust. I tried the same thing in the Dauntless, with a similar result.

11. So that you prefer the exhaust principle?—I think the exhaust is far preferable to forcing the air in.

12. Have you had any experience of ventilating deep shafts?—No, I have not worked in shafts for twenty-two years. I met with an accident in one, and have not worked in a shaft since.

13. As to accidents?—The only accident of any importance of which I have had experience, apart from knocks and bruises, happened in the Caledonian shaft. It was in a very bad state of repair, and on one occasion some of the slabs slipped out into the shaft. The result was that the cage struck the rotten slab, and they broke away. The engine-driver, not noticing what had happened, the cage fell, and I nearly got my hand cut off.

14. Then the accident was the result of rotten timber?—Yes, it had been neglected by the manager.

15. Have you seen any accidents which were caused by misfires?—No, but I have seen some narrow escapes.

16. Do you know anything about firing by electricity?—No.

17. How many shots can a man safely fire by means of a fuse?—He can reasonably attend to six holes. It greatly depends whether the holes are put in by machinery or hand-steel. You necessarily use more length of fuse, and have more time to get away.

18. Have you had any experience in regard to sanitary matters ?—During the last twenty years I have had no experience in regard to it.

19. *Mr. Dowgray.*] In connection with the detection of gas by means of a candle, do you think that is a proper test for the safety of the men ?—It is the only test we had.

20. Can it be improved on ?—Yes.

21. You were present when witnesses were giving evidence as to the necessity for pawls on windlasses : what is your opinion on that point ?—Most decidedly they are necessary.

22. *Mr. Parry.*] You have heard the evidence given by previous witnesses in regard to sanitary appliances, baths, and change-houses, also as to the fixing of a standard temperature for a six-hour place. Do you corroborate the evidence already given in regard to those matters ?—Yes, to a certain extent.

23. Is there anything else that you would like to bring before the Commission on those points ?—Yes ; that in the event of the present state of things being continued in the Deep Levels the blower should be kept going all the time, and not stopped on Saturday nights and only started again shortly before the shift goes below.

24. Is it stopped, then, on Saturday night ?—I have been given to understand that it is stopped when the men come off shift on Saturday, but it is not known at what time it is started again. The air is not so pure as it would be if the blower were kept going constantly.

25. *Mr. Reed.*] Are the conditions under which you observed the exhaust to be preferable to the blower to be compared with the Deep Levels ?—I am not in a position to say.

26. Have you known men's health to suffer through not having bath-houses at the mines ?—No ; but in my opinion one bath would be sufficient for a thousand men.

27. In these struggling mines at the Thames, would you insist upon every working-place being supplied with pure air ?—Yes ; that is, where common-sense could provide it, but not where it would involve the mine-owners in greater expense than they would be able to bear.

28. So you would consider the question of expense when deciding as to these small mines in the matter of bath-houses. In regard to ventilation, would you give them some latitude similarly ?—Yes, in the event of the men and officials being satisfied with the conditions.

29. You would not be sacrificing the safety of the men ?—No. I am not a faddist on that point, and believe in reasonable conditions.

30. Would you consider the burning of a candle as a test of the presence of gas to be a reasonable condition ?—It is a satisfactory guide. I have used it always.

31. Is it admitted by the experienced miners all over the world ?—I do not know ; but the practical miner is satisfied with it.

32. *The Chairman.*] Have you known accidents happen through ignorance of that test ?—Yes. In the Caledonian tunnel two men were smothered. There was a way of escape, but by some means the trap-door had been covered over. When they found the gases rising they went up a rise, but were unable to lift the trap-door, and were overcome by the gas and smothered.

33. Does every miner know of the test by the candle ?—Yes.

34. Have you ever known of an accident happening as the result of men remaining underground despite the effect of the gas on the candle ?—No ; such men had no business underground.

35. Could any test be simpler than a candle test ?—No, there is nothing simpler.

36. *Mr. Cochrane.*] You also spoke, Mr. Sawyer, of the effect of the gas on the beating of the heart, and then the candle burning dimly—that is, in a general way, you meant, and not as a scientific test ?—Yes.

37. Why ?—I suppose the gases cause the heart to beat louder owing to there not being sufficient air.

38. Does it have a different effect on different individuals ?—No ; as a rule I find that where the gas is mixed with the air to an appreciable extent it makes any man's heart affected.

39. *Mr. Molineaux.*] You refer to a cage accident where a man was injured : how long ago was that ?—About twenty-two years.

40. There were no safety-catches on the cages in those days ?—No ; that was the cause of the safety-catches being installed all through Australasia, and also the starting of the payment of compensation for accidents.

41. *Mr. Dowgray.*] I understand there is a better method for deciding the amount of gas : there is a lamp which detects 1½ per cent. of gas ?—But is 1½ per cent. dangerous to human life ?

42. If your candle will only tell when 7 per cent. is present, is it not much better to have a quicker test ?—Well, I do not know. You see, the miner always has his candle with him.

43. *The Chairman.*] Do you know of the existence of a lamp which shows the presence of 1½ per cent. of gas ?—No, I have never seen such a thing.

44. If there were such a lamp would you advocate its use as opposed to the candle ?—No, I do not think it is necessary. It is what I call splitting hairs.

WILLIAM HENRY LUCAS sworn and examined. (No. 11.)

1. *The Chairman.*] What are you, Mr. Lucas, a miner ?—Yes ; but I have not done any mining during the last four or five years. Up till that time I had been mining for between thirty and forty years.

2. Do you hold office in the Thames Miners' Union ?—Yes, I am secretary.

3. Have you had any experience of testing the temperature of air by instruments ?—No, I have only a smattering of it. I have had no experience.

4. What is your opinion of the candle test for ascertaining the presence of noxious gases ?—Well from experience I know the candle test to be an infallible one for indicating the presence of gas in sufficient quantity to do any real harm to a man. Before it would cause death the candle would go out. Most old miners would feel the effect of it in their system before the candle would show any indication of its presence. I know I can myself; but there was a time when I was not able to feel the effect of the gas before the candle went out. The effect on the system is not infallible.

5. Is the candle infallible ?—Yes.

6. Do you know anything of this lamp which detects the gas when only 1½ per cent. is present ?—No, I have never heard of it.

7. Have you any information as to the ventilation, natural or artificial, and what is your opinion of the different systems of ventilation by artificial means ?—I hold the same opinion as the previous witnesses whose evidence you have heard—that is, that natural ventilation is preferable to artificial. There are occasions, however, when it is necessary to use artificial means, and in some cases the ventilation by exhaust is better and sometimes the blower is the better.

8. What is the determining factor ?—I could hardly say; it would depend on the circumstances of the case. In a case like the Hauraki pump there is no doubt that a blower is required to put the air into the face, but it certainly does not remove the bad air and fumes from the men who are working in the level, and in that sense it is not effective. There should be some means of putting more air in with the blower to cause some exhaust that would draw the bad air out.

9. Are you in a position to say, Mr. Lucas, whether a powerful exhaust in place of the blower would give as good ventilation as the blower ?—I think, sir, the suggestion of Mr. Whitley is the most practicable one that I have heard—namely, that the section shaft should be connected as quickly as possible. With the blower from one shaft and the exhaust from the other there would be no difficulty at all. It was originally intended that this connection should be made.

10. Have you any opinion on the sanitary question ?—Yes; I think, sir, better sanitary arrangements are necessary in all the mines, and their use should be made compulsory in all cases.

11. What is your opinion on the subject of baths ?—I think that baths ought to be provided. Some of the mines are very dirty to work in, and when the men come to the surface they are in such condition that they require a warm bath.

12. Have you had any experience of accidents and their causes ?—Well, as secretary of the union, I have had an opportunity of learning the causes of many accidents from reports, but for some years we have had no serious accidents on this field excepting blasting accidents.

13. What opinion do you hold as to how many shots should be fired with a fuse ?—I agree with previous speakers that where more than four or five holes have to be fired electricity should be used. I think four or five holes are quite enough to fire at once by the old method.

14. As secretary of the union, have you any knowledge regarding the prevalence of miners' disease ?—Yes, we have had a good deal of it at the Thames. There are a good many old members of the union incapacitated through it to-day who will never work again; also some comparatively young men.

15. Have you a system of lodge doctors under the union ?—No; but we have a doctor for special examinations. The hospital doctor has had the most experience here with regard to miners' complaint.

16. *Mr. Dowgray.*] You accompanied the Commission, Mr. Lucas, on its visit to the Deep Levels on Saturday last ?—Yes.

17. Do you consider the test of the air that was made on that occasion an efficient one ?—Of course, I am not experienced in regard to air-tests. As I said before, I have only a smattering of that sort of thing; but I consider, in a general way, they were fair tests, with one or two exceptions. I think the test which was made in the May Queen Mine was scarcely a fair one from a practical point of view.

18. *The Chairman.*] Did you ask any member of the Commission to make a test at any point where you considered it desirable ?—No; the test should have been taken in the stopes instead of in the lower level.

19. *Mr. Dowgray.*] You have heard a complaint made with regard to the water used in the spray: is there any difficulty, do you think, in getting fresh water for that purpose from the surface ?—No, because the county main is running close alongside the shaft, and that water could be used for the sprays. It is used at present in the boilers.

20. Have you heard any complaints as to the effect the water at present used for the sprays has upon men ?—Yes, but only recently. The water has the effect of poisoning the men's hands if they have cuts or bruises.

21. What do you attribute that to ?—The water comes from the old level and is mineralized.

22. Do you think that it should be brought from the surface ?—Yes, it should be fresh water wherever it is likely to come into contact with the men's hands or faces.

23. *Mr. Parry.*] You have heard the evidence given by previous witnesses, Mr. Lucas: is there anything different you would like to place before the Commission as to fixing a standard temperature for a six-hour place ?—I certainly think it is reasonable for a standard temperature to be fixed for a six-hour place. It would be simpler than having to get the Mining Inspector to arrange the matter.

24. What is your opinion, as a practical man, as to whether the man who is compelled to work in such places is not in a better position to decide what is a six-hour place than the man who would consider the matter from a purely scientific point of view ?—The man who is working in a place should know; but, still, I think the scientific point of view should be taken into consideration.

25. Do you think the miner is better able to tell the effect which the hot place has upon him than the man who judges by the constituents of the air ?—Yes, the workman is the best judge of the effect it has upon him.

26. Would that not apply differently to the men ?—Yes, some men could stand more heat than others.

27. *The Chairman.*] Have you any suggestion to offer as to what the standard should be ?—No, I should scarcely like to do that, because I do not presume to be an expert on theoretical temperatures.

28. *Mr. Parry.*] You were in the face when that temperature of 80° fully saturated was taken in the Deep Levels on Saturday ?—Yes, and I think that should be fully the limit for a six-hour place—in fact, I think it should be less than that.

29. You have heard several witnesses giving evidence in regard to the necessity for having pawls attached to windlasses to prevent accidents ?—Yes, and I think it is a very reasonable thing as well as a very wise suggestion, because I have known a considerable number of such accidents occurring. The witnesses have referred to a man being struck with a windlass-handle, but they have omitted to make reference to the danger of a man being injured by the full bucket.

30. In regard to a standard of air, do you not think it should be fixed so that a workman should have some protection by law, and so that the matter should not be left to the Inspector of Mines to decide ?—Yes; and I think the Inspector would prefer that himself, and the mine-manager also.

31. *Mr. Cochrane.*] You said, Mr. Lucas, that the connection with the Saxon shaft was the best means of ventilating the low levels ?—Yes.

32. Do you know of any mining objections to that ?—No.

33. As to baths, would you recommend that they should be installed at mines where only two or three men are employed ?—No, I would not go that length, but only where more than half a dozen men are working.

34. From your long experience of the general health of miners have you observed many cases of miners' phthisis ?—Yes, very many. We have a great number of men now who are just able to walk about the street, and who are not able to do anything.

35. Then, without a medical examination, you cannot tell whether these men are suffering from miners' phthisis ?—They have been under examination by the hospital doctor before they stopped work.

36. Then you cannot tell whether it is miners' phthisis or tuberculosis ?—The doctors have always said it was miners' complaint.

37. When it reaches the stage of being tuberculosis, so that such a man would be apt to communicate it to other men, would you exclude such men from the mine ?—I am not in a position to say.

38. If the doctor says it has reached the stage of being highly infectious, what would you say as to the necessity for preventing the men from working in a mine ?—Yes, certainly, I would exclude them if the doctor gave a certificate to that effect.

39. Would you be in favour of excluding from a mine any person suffering from consumption or any disease of that kind ?—Yes, I think if any man has an infectious disease he should be excluded.

40. Do you think the conditions underground aggravate the trouble ?—Yes, I think so.

41. Then, I think you said something about the testing of the air in the May Queen Mine: would you be satisfied with the test of the air taken from the stope as a sample ?—I would say that if you wish to find the quantity of air which the men get you should test it in the stopes where the men are working, and in the working-face. In other mines you tested at the working-face, but in that mine you did not.

42. Do you consider analysing a sample of the air in the stopes a test ?—Yes, certainly.

43. *Mr. Molineaux.*] I understand that you object to men suffering from contagious disease working in a mine ?—No, I do not know that I objected. The question was whether a man should be allowed to work underground, and I said, "No"; it is a matter I have not considered.

44. You consider that a manager should have a right to insist upon the medical inspection of any doubtful case in regard to contagious disease ?—I do not know. I am hardly prepared to answer that question.

45. How else could you find out if a man were suffering from such a disease ?—Of course, if a man had the disease he would be under a doctor. I do not think that would require consideration.

GEORGE WARNE sworn and examined. (No. 12.)

1. *The Chairman.*] What are you, Mr. Warne ?—Mine-manager of the Waiotahi Mine.

2. What certificate do you hold ?—First-class mine-manager's certificate.

3. How long have you been mine-manager ?—About twelve years.

4. And your total experience of mining ?—Thirty-five years.

5. Where have you gained your experience ?—Principally in New Zealand, but also in the Old Country as a youth.

6. Have you any opinion to offer to the Commission in regard to the question of ventilation ?—Yes, I should like to go into that matter a little. After the Thames Deep Level crosscut had been started we were called together as an advisory committee to make a recommendation as to the method to be adopted for ventilating the crosscut. We went into almost every conceivable scheme, and we came to the conclusion that the best and really the only possible means of ventilation under the existing conditions was by way of a powerful blower. I might say that this blower is capable of delivering about 12,000 cubic feet of air per minute. The engine is about 50 horse-power, and, although at a short distance it would deliver that quantity of air, it would not do so at the end of a long line of pipes.

7. What would you call a short distance ?—Say, 500 ft.

8. What would it deliver at the present face ?—About 2,500 or 3,000 cubic feet per minute; but it can easily be increased to deliver 6,000 cubic feet if that were required. As far as the working of the blower is concerned, the men have only to ask and they would be given more air. The blower sends in a stream of cold air, and for that reason they keep the pipes as far back as possible.

9. What is your opinion of ventilation by the blower as compared with the exhaust method? You have heard the evidence about the air in that return airway?—You would have to combine the whole. The Queen of Beauty shaft has 1½ in. and in some places only 1 in. clearance from the side of the cage, and, therefore, when the cages are in the shaft there is practically a block. It would be impossible to make a clear passage for air.

10. Is it not a fact, Mr. Warne, that the effect of the blower is to send the vitiated air along the drive, so that the truckers have to work in vitiated air?—That is so; but in the event of the exhaust system being tried you would collect the vitiated air from all the workings, you would take it up one side where all the gas is filtering out of the rock, and you would make the conditions unbearable. It would gather carbonic-acid gas.

11. What is your opinion as to sanitary arrangements in these mines worked from shafts?—I think that all mines should be compelled to have sanitary arrangements installed, and during the course of my experience I have always insisted upon the mine being kept in a sanitary state, but it is greatly abused by the men. A few are very cleanly, but some are very filthy. We have made it a matter of dismissal as a penalty for committing a nuisance in any part of the mine.

12. Are you in favour of the provision of reasonable sanitary arrangements, and that their use should be made compulsory?—Yes.

13. What is your opinion as to baths and change-houses?—My experience has been that men when coming off shift are in such a hurry to get away that they have not sufficient time to even lace their boots; there would not be many out of five hundred who would take a bath. I notice it has been said that baths should be provided on the basis of one bath for every six men. Let us suppose, sir, that it took fifteen minutes for a man to undress, bath, and re-dress himself; it would take an hour and a quarter before the last of six men could go in. My idea of baths at mines is that if they are provided for the men it should also be made compulsory for the miners to use them. It is unfair to compel a company to erect baths, and then for the men to be in a position to snap their fingers and go away unwashed. I am quite in favour of it if the men are compelled to take a bath, otherwise I am not.

14. As to accidents, have you had much experience as to their cause?—I have had a few accidents myself.

15. What would you define as the main causes, apart, of course, from the inevitable accidents which must occur?—With regard to falling ground, I think that constant care should be taken and a sharp lookout kept if accidents from falling stone are to be avoided. I have often gone through the mine and drawn the attention of the men to the necessity for timbering. They sometimes argue the point, but I insist upon the timber being put in. As a result I have not had any serious accidents with falling ground. There have, of course, been trifling accidents, such as would be caused by a lump of stone falling on a man's toe, but in a mine of any size such accidents are to be expected. I have had two men injured by explosions, but that was practically their own fault, because, instead of removing the loose gravel where they were drilling their shot, they had left an unexploded charge, and the first tap of the hammer set the charge off. One was blinded, and the other also injured. Apart from cut fingers, I have only had one man injured. The unfortunate man became entangled in the belt and was killed; but the fault, to a very great extent, lay with himself.

16. What is your opinion as to shot-firing: how many shots is it safe to fire by fuse, and do you consider it desirable to use a battery?—I think it is advisable to use a battery where you are firing a round of holes.

17. Have you any opinion to offer as to the danger where there is only one man in charge of an engine?—I cannot say, sir, that I am in favour of appointing an assistant engine-driver. If there were two men appointed to look after a certain winding-engine, and one were occupied in driving the engine continually, there would be a certain amount of jealousy and squabbling as to who should drive the engine. If the manager saw the spare man doing nothing he might consider he was not required. I have heard of one case where there were two engine-drivers, and when one came on to relieve the other they had an actual fight while the engine was in motion, and it resulted in the cage being pulled over the top of the poppet-heads.

18. Would it be advisable, when men are being lowered and raised, for the incoming engineer to be at his post, say, a quarter of an hour earlier, so that there would be two men always present? Could that be arranged, so that when the main danger was on the two engine-drivers should be present?—That is so in a great measure now, when we have three shifts going. It often happens that the man is there half an hour before taking charge.

19. Would it entail any inconvenience or conflict of any kind for the two men to be there?—They would require an increase of pay, because they would have to put in extra time.

20. How long does it take to change the shift?—It all depends. Half an hour extra would cover the whole thing.

21. If the engineer were to have half an hour put on to his shift in the engine-room, would that be a workable scheme?—It might work where you are employing three shifts, but there is only the May Queen and the Queen of Beauty doing that. The Waiotahi Company is only working one shift. I do not see how it would work. You could not ask a man to come for half an hour. For that reason I think the idea would be unworkable.

22. Is there any other matter you wish to refer to?—No, I do not think so.

23. *Mr. Reed.*] Are you aware, Mr. Warne, that colliery shafts are round?—Yes, though I have never worked in a colliery.

24. In a round shaft, with cages working in it, there would be space for air to get in?—Yes.

25. Are you aware that collieries are nearly always ventilated by exhaust ventilation?—Yes.

26. In the Queen of Beauty you stated there was barely 2 in. clearance round the cage ?—Yes, and in many places only 1 in.

27. So that the conditions in ventilating a colliery and ventilating a gold-mine are not similar ?—No, they cannot be.

28. It is practically impossible to send air down a lined compartment which is almost blocked ?—Yes ; that is, immediately the cages leave the surface or bottom the shaft is closed.

29. Do those conditions exist in the Queen of Beauty winding-compartment ?—Yes.

30. Is there any space in the Queen of Beauty shaft to put another 22 in. pipe ?—No, we had some difficulty in getting the present pipes down.

31. Could you well get air down a pumping-compartment in a large column by any method ?—No, I do not think you could. You would have to overcome the natural inclination of the air by exhausting it.

32. Do you think it is necessary to bring water from the surface for drilling purposes ?—No. Some time ago we had a request that clean water should be taken to the bottom of the shaft for drinking purposes, but not for drilling purposes.

33. Should they not have it for drinking purposes ?—They can easily provide for that by taking it down in cans.

34. Have the men ever complained to you of the unsuitability of the water for drilling purposes ?—No, not for drilling purposes, other than as to the pressure.

35. Not because the water coming in poisoned their hands ?—As a matter of fact, all our water is poisonous.

36. The men have not complained about the water used for drilling purposes ?—No.

37. *The Chairman.*] Do they not inhale the moisture from the water, which perhaps you would not care to drink ?—No, I do not think so.

38. If a man were working in damp air, and that dampness is caused by this water, will he not inhale into his system moisture from water that he would not drink ?—The water that would be coming out of that level would be very little different from the water coming out of the face.

39. The point is that the water is used for spraying purposes at the face. If that water has to pass through the mine where men are perhaps using the roads for depositing excreta, and the same water is sprayed about the face, are they not breathing moisture from water which they would not drink ?—Yes, there would be a certain amount of saturation present.

40. When the water is falling out of the face it is pure, but after it comes through the mine and down the drive it is liable to have become polluted by outside impurities. Would not the men's condition be improved if they got pure water ?—I do not know that there is much objection to their getting fresh water. When they made a request to us for fresh water for drinking purposes they got it. If they now want it for drilling purposes, and it is shown that the water at present supplied is injurious to their health, we would have no objection to comply with their request.

41. It might not be actually injurious to their health ?—The spray caused by the water-jet is really pushed into the rock-drill hole, so that really no spray takes place till they pull it out. I am quite willing to suggest that they be given pure water from the surface, but I wish it to be understood that when they made their previous request it was for water for drinking purposes.

42. *Mr. Reed.*] The depth of the shaft is 1,000 ft. : would the pressure at the bottom represent 430 lb. to the square inch in the rubber hose ?—Yes.

43. Could you work a spray with that pressure ? — No ordinary pipes are made to stand such a pressure.

44. Do you know what is the cause of the impurity of the water which issues from a face ? Is there sulphuric acid in the water ?—It is in a great measure due to the decomposition of iron-pyrites. It is well known that water at a temperature of 60° will absorb its own bulk of carbonic-acid gas.

45. So that the water issuing from the newly cut face would contain a greater proportion of sulphuric acid than the water in the water-table ?—Yes.

46. You have worked many years on this field, Mr. Warne ?—Yes.

47. Have you suffered from the acid water while drilling ?—The only effect it has upon me is to make my hands look untidy.

48. As regards testing ropes and catches, will you kindly give the Commission a short description of the method which you adopt when conducting the test of the safety-catch, overwinding hook, rope, and cage chains ?—Every twenty-four hours either the manager or some person appointed by him—in our case the engine-driver, who is a qualified man—enters in a book what he considers their condition each day. Then once a week I test the catches for their gripping-capacity ; every three months I test them with double the ordinary load, and make a careful examination after every test, entering the result in a book, which is open at all times for inspection by any man working in the mine.

49. In your capacity as manager of the Waiotahi and other mines, has the Inspector paid constant attention to your mines ?—Yes, I might say that he has always been very sharp in looking after us.

50. And you have complied with his requests ?—Yes, I have always endeavoured to do so in every respect.

51. As regards workmen's inspections, have the men carried out their inspections as they are empowered to do by the Act ?—No, they have never done so to my knowledge.

52. Have they neglected to carry out their inspections ?—Evidently so. I have never seen any workmen's inspections made.

53. For what purpose is the provision of workmen's inspectors made by the law ?—To further safeguard the men.

54. So that they seem to have neglected to safeguard themselves ?—Precisely.

55. Would you be in favour of engine-drivers being periodically examined by a doctor as to their eyesight and liability to fits ?—Well, that is rather a difficult question to answer. I certainly would if I detected any defects in a man's eyesight or subjection to fits ; I would take steps to remove him, and to compel him to undergo a medical examination. There might not be any objection to the proposal.

56. Have you made a specialty of mine-temperatures ?—No, I have not made a specialty of the subject, but I have taken temperatures.

57. Would you consider yourself to be conversant with the theory of mine-temperatures—that is, sufficiently so as to set yourself up as an authority on the matter ?—No.

58. Are you of the opinion that exhaust ventilation would prejudicially affect the air in the crosscut for the truckers more than the blower does ?—Yes, I believe it would, because it would certainly gather up carbonic acid in the intake and also in the outlet.

59. As regards infectious diseases, would you be in favour of newcomers to a district being examined by a doctor to prohibit their entering a mine in case of infecting their fellow-workmen ?—It is perhaps a rather delicate subject, but in the interests of the men working in the mine I have often felt that some such provision should be made. I have worked with consumptive men, and I can assure the Commission that I felt none too comfortable under the circumstances.

60. *Mr. Cochrane.*] I think you told us, Mr. Warne, that after due consideration you decided on a blower as the best means for ventilating the low level ?—Yes.

61. And so you got one ?—Yes.

62. A new one ?—No, it was a second-hand one, but practically new. I do not think it had done twenty-four hours' work.

63. Then, supposing that the blower becomes insufficient to deal with the quantity of gas coming into the low level, what would you propose ?—I propose to connect at once with the Saxon shaft, and put up an exhaust fan.

64. As to baths, I understand you are against burdening the smaller mines with the expense of erecting them ?—Yes ; in fact, I am not in favour of baths at all unless it is made compulsory for the men to use them, because of the companies being put to such expense.

65. Not even for the larger mines ?—No.

66. If a medical authority were to tell you that it was most beneficial for men suffering from miners' phthisis to have baths, would you be in favour of it ?—My opinion is that the men would not use them unless they were compelled to do so, and it would not be practicable to make the men use them.

67. In regard to electrical shot-firing and the use of a battery for a round of holes, how many holes could the fuse safely be used for ?—I think not more than six shots should be fired with a fuse. Sometimes accidents are caused by short and defective fuse.

68. I understand you test your safety-catches every week ?—Yes.

69. What is the length of the drop ?—About 1½ in. ; that is, measuring before dropping, and after it has dropped.

70. Do you test them at the surface or flat sheets ?—At the surface.

71. Do you put beams underneath to prevent them from falling down the shaft ?—Sometimes, if we have doubts as to their gripping efficiency, we do so.

72. How much slack rope do you allow ?—4 ft. or 5 ft. ; often the whole length of the chain.

73. *Mr. Dowgray.*] When would you consider, Mr. Warne, that a mine was adequately ventilated ?—When a man could work in comfort.

74. From the chamber to the face ?—Yes.

75. Do you consider the Deep Level Mine is in that condition now ?—It should be if the ventilator were kept going as it should be.

76. You stated that the blower was capable of delivering 12,000 cubic feet of air per minute ?—Yes, at a short distance.

77. It is not capable of delivering that quantity at the face ?—No, I would not say that.

78. When we took the measurement on Saturday it was over 8,000 ft. ?—No, not going at 120 revolutions.

79. But those are our figures ?—About 3,000 ft. is the actual amount being delivered at the present time.

80. You were present and heard the other witnesses refer to a complaint as to the stoppage of the blower ?—Yes. It is started at 4 o'clock on Sunday afternoon and stopped at 8 o'clock on Saturday evening, but if the men made a request to have it started earlier it would be complied with. I have never been asked to start the blower earlier.

81. And you have never had any complaints about the trucking-roads being in such a bad state ?—No ; from the face to the shaft I know the road is none too good, but we have done everything we could to improve matters.

82. You admit that it is bad ?—I do not admit that it is bad ; I have worked in worse places.

83. Why is this blower not driven at greater speed ?—They have not requested it. If the men had asked they could have had more ventilation.

84. You have heard a witness quote figures from a diary showing that the speed of the blower was increased from 100 to 120 revolutions per minute ?—You will understand that I am not in charge of that work. We are only an advisory committee. There is another man in charge of that work.

85. In connection with the ladder from No. 6 section to No. 9, have you ever travelled that way ?—Not through the May Queen shaft.

86. *Mr. Parry.*] Does the May Queen come within your scope ?—No, I have nothing to do with the May Queen ; it is quite distinct from the mine of which I have charge.

87. You stated that you would be quite willing to agree to the erection of bath and change houses if they were made compulsory ?—Yes, if it is made compulsory on the men to use them.

88. You say that not one in five hundred men would use them ?—I referred to the men in the metal-mines ; that might not apply to coal-miners.

89. Are you aware that approximately there are not twenty men out of five hundred who do not use them in Waihi ?—I am not aware of that. Do they use them when coming off shift ?

90. You stated that one bath would be sufficient for six men ?—Yes.

91. How long wou'd you consider it would take one man to have a shower-bath ?—It all depends on the man himself.

92. But, as a rule ? Men do not monopolize a bath when they know others are waiting ?—They are very kind to one another in that respect. They would stop there half an hour if only to keep Jimmy Jones out.

93. Were those men whom you stated were injured by an explosion working on wages or on contract ?—On wages.

94. In reply to a question put by the Chairman you said that the appointment of an assistant to the engine-driver would cause squabbles ?—That would all depend on the fighting proclivities and temperaments of the men, and the disposition of the one to tolerate the other sitting doing nothing while he did all the work.

95. Apart from the question of squabbles, do you think there is sufficient risk to warrant the appointment of an assistant ?—I have never in all my experience found a man to faint or be unfit while at his engine at any time. If he were unfit I would immediately take steps to send him home, and put another in his place. I would not allow an unfit man to stay at his engine. It is the manager's duty to remove him.

96. Do you think it is necessary to wait until such time as an accident occurs in order to justify a remedy ?—Perhaps not ; but I would like to see reasonable grounds before taking such steps, or some sound arguments for suggesting it. At present I see no grounds to necessitate such a provision.

97. Do you know that it is compulsory in the Old Country ?—I am not aware of that. It probably cou'd be worked, and I would have no objection to raise provided it were shown that it is for the safety of the men.

98. You say, Mr. Warne, that you have no objection to providing fresh water for boring purposes ? —No, if a proper request is made for it. The only request we received was for drinking purposes. I do not think we misunderstood them at all.

99. Do you believe in the provision for workmen's inspection ?—Yes, full provision is made, but it is not availed of.

100. What is the reason that it has not been taken advantage of ?—Indifference.

101. Is it not a fact that the men will not carry out the inspections owing to its being detrimental to their interests ?—If they were properly appointed men from the miners' union I would have no objection to them.

102. I am asking you, is it not a fact that a man does not care about that position because he is not going to curry favour with the manager ?—No, I do not see any such reason. They are quite welcome to inspect if they wish to do so.

103. What is the depth of your well-hole in the Deep Levels ?—As far as I know it is only 7 ft.

104. Do you think that well-hole is sufficiently deep ?—No ; I would like to sink it 50 ft., but the material was not available for putting it in that depth.

105. Do you think there is any danger being incurred through that well-hole not being deeper ?—Only in the event of a sudden inrush of water.

106. Do you not think it would be advisable to make it deeper ?—No, I would not say that, because every foot the tunnel advances it makes more water-room, and it would be equivalent to the sinking of a shaft. In the first place I would have preferred to have sunk it 50 ft. deep.

107. In the event of a big inrush of water from that place or the other drives off the main crosscut, what chance would a man have of getting out ?—Well, I do not think there would be such an awful danger i the other men were prompt in warning them of the danger, because there is so much water-room, and it is ever increasing. I do not think there would be much difficulty in that respect.

108. Do you think there should be some method of communication with the men who are some distance from the crosscut ?—Yes, we have thought of it ourselves. It would be advisable to have some signal apparatus for apprising men long distances away of intending danger.

109. What is your opinion, Mr. Warne, about the fixing of a standard temperature for a six-hour working-day ?—Well, I do not think it would work very well, because what would be a good working-place even if the temperature were high would not be a good working-place in another way. You must take into consideration the moisture and other matters. You might be able to stand working in a fairly high temperature if it were dry, while in a moist atmosphere of the same temperature you would be ill.

110. Do you not think there would be less confusion between the manager and the men if a standard of heat were fixed—both parties would know what to do ?—I think it would affect the miner in this way : the moment the temperature rose he would be discharged if he refused to work for eight hours. The company would decide to stop the work.

111. In your opinion, is that the only impediment to fixing a standard ?—Working by a standard here at the Thames would be very difficult, because we get hot places ; and under the Arbitration Act it is provided that the Inspector shall decide what is a six-hour place—a hot and gassy place.

112. Is it not a fact that the Inspector of Mines would sooner have a temperature fixed, so that he would know what to do when dealing with such matters ?—I have not heard any Inspector express himself in that way.

113. Do you think a man can do justice to himself working in a place with a high temperature ?—No, they cannot, and they do not work as hard ; they do not attempt to do so.

114. Who determines how hard they shall work ?—Themselves, principally, nowadays.

115. At all times ?—Very frequently.

116. And you do not think any good would be served by fixing a standard temperature ?—No. In the event of the temperature rising so high we are sufficiently human to say, " Well, boys, it is too hot. We will stop this place." I have made such a remark myself and stopped the work.

117. Why are you working six-hour shifts in that face ?—To push on the work, principally. I deemed that a wet and gassy place.

118. But not a hot place ?—No, not at the face, because sometimes we get the temperature down there as low as on the surface.

119. When did you do that ?—Some time ago.

120. Would you be surprised to know that on Friday there was a difference of between 51° and 76° moist temperature ?—That might be possible. You might possibly go down to-day and find that temperature, while to-morrow totally different conditions would prevail.

121. You say that you are working six-hour shifts to push the work on ?—That is the principal object, as far as the companies are concerned.

122. You think more work would be done by four six-hour shifts than by three eight-hour shifts ?—Yes.

123. Then, it is better for the company to have six-hour shifts than eight-hour shifts ?—Yes.

124. Still, you would not suggest that a standard be fixed ?—No, I think we are sufficiently human nowadays to make them six-hour places if it is necessary.

125. You yourself, Mr. Warne, might be sufficiently human, but other managers may not: in the interests of all, would it not be better to have a six-hour standard ?—No, because it would be made to apply to any place where there was no real necessity for it.

126. Would you sooner work in a cool place below than in a hot place ?—I would rather work in a cool place, of course.

127. Therefore there is an advantage in working in a cool place ?—Yes, certainly.

128. What effect has working in a hot place on a man ?—It has a bad effect: you are extremely fatigued after the day's work is over.

129. Can you take your food as well ?—Yes, I could always take my food as well after working in a hot place as after working in a cool place.

130. Seeing that you have admitted these matters, do you not think that it is better to have a standard fixed by law, and so cause less confusion between employers and men ?—No, I do not think so. I am not in favour of a fixed standard. We would have such a state of affairs that the men would refuse to work unless they had six-hour shifts.

131. Would you sooner work on the surface at a temperature of 100° or at a temperature of 80° ?—It would be much more pleasant working with a temperature of 80°.

132. Therefore you would sooner work in a cool place either on the surface or underground ?—I would rather work in a cool place underground, say, at 70°, than at 100° on the surface.

133. Do you think that a high temperature is fatiguing both underground and on the surface ?—Yes.

134. Do you think the same temperature is as fatiguing on the surface as underground ?—I submit that if you take a miner from underground, and put him working on the surface on a hot summer's day, that man is far more fatigued than he would be if he were working underground.

135. Compare a man working underground at 90° and another working on the surface at 80°: would the underground man be a great deal more fatigued ?—Yes, that might be so.

136. In the development-work of a mine do you realize that there are many places which are difficult to ventilate ?—Yes, they are the worst mines in any part of the world.

137. Seeing that it is difficult to ventilate those places, how would you make provision for the men working there ?—The means that we adopt is by exhausting and forcing the air ; but as to laying down a general rule that the exhaust system would be the more satisfactory, I say that it would not be possible to carry the necessary air to the faces by that means. It would be almost impossible without both systems. You must have both processes in the mine.

138. Under those circumstances, what would you suggest where it was almost a matter of impossibility to get the ventilation which you would like to get ?—I would put in a fan where a forcing-blast was found necessary, and I would put in large exhaust fans. It is no use talking about 8 in. and 6 in. pipes.

139. Supposing you had 20 ft. to go to prove a reef, and the air bad and the temperature dry, what would you suggest in order to get that work done ?—I would not do the work at all if it were purely a prospecting matter and you did not know that there was something of value there.

140. And you think that every company or manager would look at it from that point of view ?—I think so. If it were only a matter of 20 ft. it becomes purely a prospecting question, and we would not go to much trouble to try the reef. You cannot depend on our reefs—they may be worth 1s. a ton to-day and £5 a ton to-morrow.

141. In the event of your wishing to push the work on, you would work four shifts instead of three ?—If the conditions were unfavourable to the men I would.

142. If you could not get air it would be unfavourable ?—It is not only a matter of air, there is also the heat to be considered.

143. If the prospects were good enough to warrant your going on, would you suggest som reduction in the hours of labour to be worked ?—Undoubtedly.

144. You have heard the evidence regarding the attachment of this patent to the windlasses. do you approve of it ?—In some respects I do, but in others I do not. I want to know first how a man is going to land his bucket and also trip his pawl.

145. It is a very easy thing to do: he pulls his bucket, stops his machine running on the cog, and when the windlass is stopped he lands his bucket easily enough ?—I do not object to the idea. It is a thing I have never seen used.

146. You think it would be a safeguard ?—Yes, undoubtedly.

147. Have you never worked in the Waihi or Karangahake Mines ?—I have worked in Karangahake for a time.

148. What do you think about fixing a standard height for stopes ?—Well, a great deal depends upon the ground in which you are working. If the ground will not stand a fair height, and there is danger, they should be kept down.

149. Do you think that in any ground the stopes should be a reasonable height to enable the men to sound them every morning ?—Where the ground is likely to come away that should be done. But in many metal-mines throughout the world you could take them up 80 ft. high without danger.

150. And the walls would be perfectly safe ?—Yes, particularly in such as tin-mines, where there is granite rock.

151. Do you consider mining an unhealthy occupation ?—Certainly, as a general rule, it is unhealthy. I would not put a son of mine into the mines.

152. During your experience have you heard many complaints made by men suffering from different kinds of sickness ?—Miners' complaint; that is prevalent at the Thames, but it originated several years ago when conditions were much worse than they are now.

153. As regards superintendents interfering with the manager, have you had any experience of that sort of thing ?—I do not think it is desirable at all. A man who is acting in the capacity of manager should be in full charge of the mine, and should not be dictated to by any other man on matters involving the safety of the men.

154. He should be protected by law from that kind of thing ?—Yes.

155. *The Chairman.*] He should have full control and be fully responsible ?—Yes, which they are now. Men working under supervisors are only dummies. The supervisors have no certificates at all, and consequently have nothing to lose. The man who would go to prison would be the mine-manager.

156. *Mr. Parry.*] You say that superintendents should not have any control over the managers ?—So far as the prevention of accidents is concerned.

157. And the working of the mine in general ?—No, not as to where he shall work: that should be left to the supervisor.

158. What protection have the workmen if the law does not make any provision ?—I would make the same provision in the law as there is in the Arbitration Act, whereby in hot and gassy places men may work six-hour shifts.

159. But in the event of the Inspector of Mines not being stationed near where the difficulty arises, how is it going to be fixed ?—By the workmen's inspector and the manager.

160. And in the event of the manager and the workmen's inspector not agreeing ?—I think they would agree. There would not be much opposition. You might find it now and then, but not as a rule.

161. Under those circumstances, do you not think it is necessary to have something laid down by law to stop any confusion between the management and the workers ?—No; I think it would be a very difficult matter to lay down a standard, and even more difficult to keep to it.

162. An Inspector of Mines is not stationed near all the big mines ?—No; but if this provision is made you will find that nearly every working-place will be a six-hour place.

163. In order to overcome that, what would you suggest so that it would not apply to every working-place ?—I would not suggest any standard temperature.

164. Simply because it would apply to every working-place ?—It would be made to apply unduly to nearly every working-place.

165. Supposing the standard were fixed at 80°, and it was found that that would apply to every place, whose fault would that be ?—I do not think it would be anybody's fault: I fail to see how it could. We may have 100° in our Deep Levels.

166. And you think the men should work eight hours there ?—No, I do not think they should work in it at all.

167. Yet you would not suggest a standard temperature ?—I would suggest anything about 80°: that might be hot enough for any man to work in.

168. *Mr. Reed.*] Then, you have changed your opinion ?—I do not wish for a standard; I do not suggest it. But as the question was pressed so much I perhaps unwittingly made that statement. At the same time, I would not make a statutory standard temperature.

169. *Mr. Fletcher.*] Mr. Warne, do you encourage the workmen to make their inspections—workmen's inspections ?—I have never had any request for such inspections.

170. Do you encourage the workmen to make inspections ?—We certainly do try to insist upon their seeing that they are safe themselves, but they will not do it.

171. *Mr. Dowgray.*] You know the use of the barometer in connection with mining: in a mine like the Deep Levels, where there have been sudden outbursts of gases, are the readings duly reported ?—Such particulars are not required by the Act in gold-mines, but in collieries it is a necessary and usual precaution.

GEORGE WILLIAM HORN sworn and examined. (No. 13.)

1. *The Chairman.*] What are you, Mr. Horn?—Mine-manager of the Kuranui-Caledonian Mine.

2. What certificates do you hold?—A first-class mine-manager's certificate by examination.

3. How long is it since you obtained your certificate?—I think it was in 1891.

4. What experience had you had prior to that?—Principally in battery and mining work for about ten years. I have had thirty years' experience altogether, mainly in this district.

5. Have you a decided opinion on the matter of ventilation?—I might say that I am also a member of the advisory board with Mr. Warne, and it was principally on our suggestion that the present system of ventilation was adopted for the Deep Levels. After very careful consideration we came to the conclusion that it was the best method to adopt.

6. So far as the relative expense of installing and working, how do the blower and the exhaust compare?—The exhaust could not be adapted for that place.

7. You made full inquiries as to their relative suitability?—Yes, in my opinion it requires two shafts to work the exhaust satisfactorily.

8. Have you any opinion to express on the question of sanitation: are you in favour of sanitary appliances being provided, and their use being made compulsory?—Yes, I think it would be advisable to have sanitary conveniences and that sort of thing where there are a great number of men employed, and where they are working some distance from the surface. Otherwise it is not necessary, particularly in the smaller mines.

9. What is your opinion in regard to the necessity for change and bath houses?—In some mines it might be advisable to have them, but generally the men are in such a hurry to get home after coming off shift that the bath-houses and change-houses, if provided, would not be used.

10. Have you any opinion to offer as to the cause of accidents?—No, sir, I have not had any accidents of consequence in any of the mines I have been connected with.

11. What is your opinion as to the number of shots which could be fired safely with the fuse?—Where the men are working with the hand-steel, I think that six or seven shots are quite sufficient to discharge at once by that means.

12. Where more than that number are being fired do you think electrical appliances should be adopted?—Yes, I think it would not be unreasonable to ask that.

13. Have you any opinion to offer as to the necessity for a second engine-driver being present when men are being lowered?—I do not think that is necessary. I think that engine-drivers, if they were feeling unfit for duty, would say so. I have never known of a case of an engine-driver fainting while on his shift.

14. Have you any opinion to offer as to a standard temperature?—I do not think, myself, that a standard temperature would work very well on a changeable field of this kind. The Thames field is perhaps an exception to any other mines in the world, and you cannot work them by the same rules as others, because the conditions vary so much. We are troubled more with gas than about the heat. The gas is really the bugbear of the mine-managers on this field.

15. *Mr. Cochrane.*] You heard Mr. Warne give his evidence?—Yes.

16. Do you corroborate it in all respects in regard to the Deep Levels?—Yes, I do; but I would like to add a little more. I was rather surprised to hear some of the statements made the day before yesterday. It is only fair and loyal to the managers, when the men have complaints to make, that they should be made to the management. If they thought that the blower was not ventilating the Deep Levels sufficiently they would be warranted in approaching the manager on the subject. It is simply a matter of increasing the capacity of the blower, which can be easily done.

17. Is it a matter of expense which causes you to run the blower at less than its full capacity?—No, we do not consider the matter of expense, but only whether a greater quantity of air is required. That can be provided if necessary. I would like to point out that at 120 revolutions per minute the blower is forcing in about 3,000 cubic feet of air. The maker's catalogue states that a blower of 24 in. can be run to force air in at the rate of 15,650 cubic feet per minute. Ours is a 24 in. outlet blower, but owing to want of space in the shaft we had to reduce our air-pipes to 22 in., so that we can only consider it as a 22 in. blower, which, according to the maker's catalogue, will deliver 12,625 cubic feet of air per minute.

18. How far?—At the outlet from the blower. It does not state how far.

19. Then, do you know that it would deliver a great deal less at a distance of 500 ft.?—Yes, that is so; but, still, there is the other side of the question—namely, if it is delivering that quantity when working at 120 revolutions, what will it deliver at 255 revolutions? Those men should have gone to the manager in the first place.

20. Have you had any experience of blasting accidents?—No, I have never had any accidents of that nature in the mines of which I have had charge. Might I state here that we found that 2 ft. of fuse will burn out in one minute, and in one minute a man could comfortably walk 300 ft.

21. *The Chairman.*] How long would it take to light six holes?—That question refers to having manholes for getting away.

22. What is your opinion as to these chambers?—Where you have a long tunnel it is advisable to have a lay-by here and there. If the men have to get out of the way of the shots I should say that the manholes would require to be 500 ft. apart.

23. *Mr. Cochrane.*] How far are the pieces of rock thrown?—It varies very much according to the country.

24. Can you give us the variations?—No, I cannot.

25. Have you any recommendations to make as to the better ventilation of, say, winzes and rises?—No, I do not think we can make any improvement on the present system.

26. What is the present system?—We have the box system.

27. Would you, if necessary, provide a small auxiliary fan?—Yes, if necessary.

28. In regard to ventilating your levels ahead of a circulation of air, would you be in favour of a maximum distance beyond which they should not go ahead of the air? Supposing no air is being led by pipes, how far would you drive the level ahead of the air?—That would vary very much under different conditions. It would be almost impossible to lay down any definite rule. The custom is to take a portion of the piping with you.

29. As to the question of the mine-manager controlling all the works in his own mine, and interference by either a board of directors or a superintendent, have you anything to say?—Well, I think, sir, that when a mine-manager is responsible, as he is under the present Act, for the lives of the men working in the mine, he should have full charge, with full power to see that the men are working in safety.

30. *Mr. Reed.*] Have the men taken advantage of the power to make inspection as provided by law?—Not that I am aware of. They have never paid me a visit.

31. Does the Inspector of Mines visit your mine frequently?—Yes, very regularly.

32. Does he thoroughly examine the mine?—Yes.

33. Does he insist upon all the provisions of the Mining Act being observed?—Yes.

34. Do you know why the miners do not take advantage of the power to make inspections?—Well, I suppose they are satisfied with the conditions.

35. Have you plenty of boilers for running your blower?—Yes, I think there are ten boilers.

36. Has the Deep Levels board received any complaints from the men as to the quality of air in the Deep Levels?—No, not that I am aware of.

37. Have you received any complaints as to the quality of the water used for sprays?—Not in the form of a complaint. I think some of the men have said that they preferred the water from the surface for drinking purposes, but they do not complain of the water used for boring.

38. You heard Mr. Warne's evidence on the subject of a standard temperature?—Yes.

39. Do you agree with it entirely?—Yes, I do. I do not think it is workable on a field of this kind. There might be conditions present as regards gas which are really worse for the men than a high temperature. They would be more entitled to work six-hour shifts by reason of the gassy nature of the country than because of the heat.

40. *The Chairman.*] As to the tribunals provided for by the Act for inquiring into accidents in mines, do you approve of the present system of such inquiries being conducted by a Warden and two assessors?—Yes, I think it is a very satisfactory one, and to be preferred before a Warden alone.

41. Would it not be better for the assessors to be a miner and a mine-manager?—Yes, that might be fairer; I would not object to that, personally.

42. At any rate, you think it is preferable to have two assessors rather than the Warden alone?—Yes.

43. *Mr. Dowgray.*] Have you had any experience of taking temperatures?—Not a great deal.

44. Can you explain the difference between a wet and dry bulb?—Not from experience.

45. *Mr. Parry.*] Well, then, I take it that you are not in a position to tell what effect moist temperature has upon the conditions of the men?—I am not a doctor exactly. Do you mean physically?

46. Yes, what effect would moist and dry temperatures have upon a man?—I do not quite understand what you are getting at.

47. You say you do not know the difference between a wet and a dry bulb?—Do you mean the difference in the atmosphere when tested by the two bulbs? Supposing you took the temperature with the wet and then with a dry bulb, the latter would register so many degrees higher.

48. It might not?—I think it would. I am not familiar with the subject.

49. Therefore you are not able to give an idea as to what temperature is injurious to a man's health?—It does not make any difference whether the temperature is taken with the wet or the dry bulb.

50. You are not in a position to give an idea as to what standard of temperature would be injurious to a man?—I know, from temperatures we have taken, what is high enough for a man to work in. Anything over 80° by the wet bulb is rather too warm for a man to work in comfortably.

51. That is to say, if the temperature goes over 80° by the wet bulb, the place is too hot to work an eight-hour shift in?—Generally speaking, it is too warm to be comfortable. I would not say it is too warm for an eight-hour place.

52. That does not answer the question. You say you corroborate Mr. Warne's evidence: do you also corroborate that given by Mr. Whitley?—In regard to temperature, yes. I think he was pretty well correct.

53. In corroborating the last witness's evidence you agree that if a standard were fixed it would presently apply to all places in the Thames?—Yes, I suppose it would. That hardly requires corroboration.

54. Seeing that you believe that, is it not a sufficient reason for fixing a standard temperature for a six-hour place?—No, that is a reason why you should not fix it.

55. Supposing a standard, say 80°, were fixed, and the majority of places did not exceed that standard, how would it apply to all those places as you say it would?—Sometimes those places reach that temperature in the summer-time.

56. And if they did, would it not only apply to those places, then?—Yes; but if you had a standard, one week you would be working it as a six-hour place and the next an eight-hour place.

57. Do you think, as a practical man, that is a great impediment to fixing a standard?—Yes, I do not think we ought to have a law which is continually changing from one week to another; the law should apply to the place all through.

58. Would you sooner work in 70° than in 80°?—In the lower, because it would be more comfortable.

59. And yet you do not think that a man is entitled to some protection from the law of the land in regard to those places?—I did not say he was not entitled to it; he already has it.

60. In what way?—Because the Inspector of Mines gives him it. If he is not satisfied he has only to get the Inspector along.

61. Do you not think it is placing a responsibility on the Inspector of Mines?—Yes, but he is there to take that responsibility.

62. Do you not think that the Government, we will say, are putting a responsibility on the Mining Inspector by not fixing a guide for him to go by?—No, not an unnecessary responsibility.

63. You said, in reply to a question by Mr. Dowgray, that one great reason against fixing a standard was that a man might be worse off working in a gassy place than he would be in a hot place?—Yes, he would be better off unless he worked six hours.

64. What impediment is that to fixing a standard?—It is just as justifiable to create a standard for the gas as for the heat.

65. What is the standard for gas at the present time?—There is no standard for gas.

66. Only when a man cannot work any longer?—Yes, that is so.

67. Is it not the same with a hot place?—No.

68. Do you not think a man himself is best fitted to judge as to the injurious effects the heat of his place has upon him?—He certainly knows how it affects him, and he is the best judge in that respect. Consequently, when he finds it is bad, it is his duty to acquaint the officials or the mine-manager, and they come to reasonable terms. The mine-managers on this field have never objected to meet the men fairly on any question.

69. In the event of the miner and the manager not agreeing, what is the position?—The Inspector of Mines is called in to decide.

70. And in the event of the Inspector not being available?—He is always available.

71. Here at the Thames?—Well, generally.

72. Supposing he is at Hikurangi?—He is never away very long; he is generally available.

73. But he is sometimes away for a week at a time?—Occasionally he may be.

74. Supposing after he had been away a day a dispute arose?—The place would remain idle until the Inspector returned, and the men would be put in some other place.

75. In the event of its being a place which the company desired to go on with, and stoppage threatened to cause the company both delay and expense, would it not be better for a standard temperature to be fixed?—No. If he wished to push on the work the manager would simply say, "I will give you a six-hour shift until the Inspector returns."

76. Have you worked on the surface in a hot temperature?—Yes, in Coolgardie.

77. What was the highest temperature on the surface?—About 100°.

78. Would you sooner work at a temperature of 100° on the surface than below at the same temperature?—On the surface.

79. Do you think mining is a healthy occupation?—No, I do not, generally speaking.

80. And yet, though you consider it an unhealthy occupation, you do not think that it is necessary to fix a standard for six-hour shifts in unhealthy places?—I did not say that. I do consider it so.

81. At what temperature do you consider it is unhealthy?—I do not think I can say; the conditions of the atmosphere have to be taken into consideration. In a surface drive, for instance, the temperature might be high, and still the conditions may be quite healthy.

82. You think that the provision in the Act is all that is necessary?—Yes; if the men have any complaint to make they can get it remedied.

WILLIAM JOHN ADAMS sworn and examined. (No. 14.)

1. *The Chairman.*] You are a mine-manager, Mr. Adams?—Yes.

2. What certificates do you hold?—A service certificate.

3. What mine are you in charge of at present?—The Waitangi.

4. What experience have you, Mr. Adams?—I have been mining for over thirty years.

5. Where?—Mostly at the Thames and Waihi.

6. What is your opinion with regard to ventilation?—I have not had much experience of ventilating shaft-workings, but in drives I have had to do with the blower and exhaust.

7. And which do you prefer?—In a surface drive I find that the exhaust is the better; it has proved so in the Waitangi. I have changed from blower to exhaust, and it has made a wonderful improvement.

8. Have you had any experience in deep mines?—Not as to ventilation.

9. Have you had any experience which will enable you to speak with regard to sanitary arrangements?—Yes, there are some mines where there is considerable room for improvement in connection with sanitary matters.

10. Do you consider that sanitary conveniences should be provided, and their use made compulsory?—Yes.

11. Have you had any experience of accidents?—No, I have only had one accident.

12. Have you any opinion to offer as to the number of holes it is safe to fire with fuse, and when electricity should be used?—With the hand-steel I think there should be a limit fixed. Six would be quite enough.

13. And any larger number should be fired with electricity?—Yes.

14. Have you any decided opinion as to the feasibility of a standard temperature being fixed?—It is a matter I have never gone into.

15. Are you any authority at all on the taking of temperatures by instruments?—Not except with a thermometer. That is all I use.

16. At what temperature would you consider a place too hot to work in?—I think when it gets over 80° it is hot enough for a six-hour shift.

17. At what temperature should a man cease work altogether, taking into consideration the heat alone?—I think when it rises above 80° a man cannot do much work in it.

18. Have you had any experience of anything else which will make a place injurious—gas or anything?—I have been in gassy places.

19. And do you consider a standard temperature to be a workable scheme—that is, the standard to be fixed by statute?—I am afraid the conditions at the Thames would not suit it very well. I cannot speak for other districts.

20. Have you given any consideration to the matter of the constitution of the tribunal which inquires into accidents in mines, the Warden and two mine-managers?—No.

21. What would you say to the tribunal being composed of a Warden, a miner, and a mine-manager, instead of two mine-managers?—I do not know; it is a matter that I have never studied.

22. *Mr. Cochrane.*] What is your opinion of the necessity for bath-houses?—My experience of bath-houses in Waihi is that, though there were a great number of men working, very few of them ever went into the bath; they simply washed themselves and went home. That was some years ago.

23. If they do use them, as you have heard it stated to-day, would you be in favour of bath-houses being provided in the larger mines?—Yes, provided the men are compelled to use them.

24. Would you make the compulsion as to taking baths apply to all the men, or only to those suffering from miners' phthisis?—I do not know how you could make it apply to all men.

25. Have you anything to suggest as to the better ventilation of winzes?—No, nothing better than we have at the present time.

26. What are your present arrangements?—Double passes.

27. Do you rise or sink?—Both.

28. Then how do you provide for ventilation?—In rising we put in a box rise; sometimes we use the blower. In surface workings we use the exhaust, which gives a good current, and we have no trouble.

29. Would you be in favour of making it compulsory for these rises to be ventilated by auxiliary fans?—I do not know how that would act in the smaller mines, but it should be satisfactory in the bigger mines.

30. Have you anything to say as to the ventilation of stopes where there is little air-current?—Certainly, where there is bad ventilation some provision should be made.

31. In what way?—By natural ventilation or by means of a fan or blower.

32. But that would necessitate a connection between the level?—Yes.

33. Have you any cages at your mine?—No, they are only surface workings.

34. But at other mines where you have been you have had cages: how did you test the safety appliances?—Just in the ordinary way. I have seen them tested, but I have had nothing to do with them.

35. *Mr. Reed.*] Are you an authority upon standard temperatures?—No, I am not able to express an opinion on that subject.

36. In reply to a question you stated 80° as a temperature which you would consider very warm?—Yes.

37. You would work a place with that temperature, wet or dry?—No.

38. Which bulb did you mean?—Simply the outside temperature of the atmosphere, dry.

39. You thought that was sufficiently hot, or did you mean with a wet bulb?—No, with a dry bulb.

40. Are you well acquainted with the Deep Levels operations?—No, I have not been down the shaft.

41. Is your mine at Waitangi a gassy mine?—No, there is no gas; there is light air.

42. So that the little exhaust fan which you have is quite capable of dealing with the comparatively pure air in the mine?—Yes, there is no trouble.

43. You do not know what effect that fan would have if there were much gas in the mine?—It depends on the quantity of gas. If there was only a small quantity the fan could cope with it.

44. You are not within the gassy zone?—No.

45. Have the workmen ever made any complaints or inspected your mine?—No.

46. Does the Inspector of Mines frequently visit and inspect your mine?—Yes.

47. Does he require the provisions of the Mining Act to be thoroughly carried out?—Yes.

48. Have you recently tested the time which a 5 ft. piece of fuse takes to burn?—Yes. I did not exactly take the time, but after setting fire to the fuse I walked a distance of 820 ft. at a steady pace before the cap went off.

49. Have you found any of that fuse defective?—No, it was the best quality.

50. What length of fuse do you use with rock-drills?—5 ft. and 6 ft.

51. What is the maximum distance at which you have known stones to injure a man when projected down a drive by an explosion?—In our case I do not think I have seen a man injured when more than 250 ft. away.

52. Would you think it a necessary precaution to have manholes cut in the side of your drive to protect the men when firing?—It would not be necessary in our case, because we have lay-bys and wide places for them to get into. There is one lay-by within 227 ft. of the face, and another one 540 ft., and a third 820 ft. Such a provision may, however, be necessary in some mines.

53. So that lay-bys will act as manholes?—Yes. Then there is timber all the way along, where a man could step in and get shelter.

54. *Mr. Dowgray.*] You walked 820 ft. before the shot went off?—Yes.

55. *Mr. Parry.*] You say, Mr. Adams, that the lay-by will protect the men if they wish to protect themselves?—Yes.

56. You do not allow for a piece of stone which might glide off the timber or the wall?—I have never seen a piece of stone go further than 50 ft.

57. Did you ever know or hear of a man being struck by a piece of stone like that?—No.

58. In answer to Mr. Reed you said the men had made no complaints as to the working-conditions?—No.

59. Is that the only place you are working where we were yesterday?—Yes.

60. Under the conditions of that drive they would not have any cause for complaint?—No, they seem satisfied as to the manholes.

61. With a view to keeping the bottom of the drive dry, do you think it is very convenient to have a drain kept open on one side in order to keep the footboards dry?—I do.

62. You have that in your level?—Yes, right to the face.

63. And your footboards are always dry?—Comparatively dry. The water is all carried away.

64. You have heard the evidence in regard to windlasses: do you approve of their being fitted with cogs and pawls?—Yes, I am in favour of a wheel being placed on windlasses, because I have had an experience of the necessity for it myself.

THAMES COURTHOUSE, 17TH AUGUST, 1911.

BOYD BENNIE sworn and examined. (No. 15.)

1. *The Chairman.*] What are you, Mr. Bennie?—I am Inspector of Mines for the Northern Inspection District, and also Inspector of Coal-mines.

2. What certificates do you hold?—A first-class mine-manager's certificate under the Mining Act, and also a first-class mine-manager's certificate under the Coal-mines Act, by examination.

3. What mining experience have you had?—Over forty-three years.

4. Where?—In Scotland for about nine years in coal-mines, in the North of England one year in coal-mines, Kaitangata eight years, New South Wales nine years; in gold-mines, at Coromandel for four years, Waihi about five years. I was also for two years manager of the Mokau Coal-mine, and I have been Inspector of Mines for about six years.

5. What are your duties now under your present appointment?—The examination of both coal and gold mines, the latter under Part V of the Mining Act, and Inspector of Quarries, Thames County.

6. And under whose direction do you carry out your duties?—By instructions from the Minister through the Under-Secretary for Mines.

7. You might give the Commission an outline of your duties and your general system of inspection?—Taking first the examination of gold-mines under the Mining Act, I inspect all the mines in the Thames County, and all metal and coal mines in the Provinces of Taranaki and Auckland, excluding the Ohinemuri and Coromandel Counties, with the Great Barrier Island.

8. In the course of your inspections do you take measurements and temperatures for ventilation and other purposes?—Yes.

9. Your inspection covers the whole field of our investigations?—Yes.

10. As to ventilation, will you give the Commission your opinion generally as to the system best adapted for your district?—There is no doubt that mechanical ventilation by fan is the best.

11. What have you found from observation in regard to sanitary appliances in the mine?—As far as the gold-mines of the Thames are concerned, I have not found that the miners use the underground workings for depositing excreta at all. They appear to go outside to the surface. In some cases pans have been provided.

12. Do you consider that in mines worked from shafts it would be convenient to the miners if pans and sanitary appliances were provided?—Certainly I do.

13. Would you suggest its being made compulsory upon the men to use the conveniences provided in the underground workings?—Certainly. I should strongly object if I found any men doing otherwise.

14. Have you any suggestions or opinions to offer with regard to change and bath houses, either as to the necessity for them or as to the amount of use that would be made of them if they were provided?—In the gold-mines at the Thames we have change-houses at nearly every mine.

15. Are they in a satisfactory condition?. Are they reasonably clean, and is there sufficient accommodation for the purpose?—Well, they might be kept cleaner, in two ways: waste paper is allowed to lie about, and the miners should take their clothes home for washing more regularly. There would then not be that stuffiness which is caused by clothes being dried. Some change-rooms have drying apparatus and some have not. Some of them—the May Queen, for instance—have proper enamelled baths.

16. Have you had any experience at all, apart from your district, of the use of baths by miners?—Yes, I was Assistant Inspector at Waihi for three years, and there the Waihi Company have installed what might be called an ideal system of change-rooms and baths. The Waihi Grand Junction have the same, and the miners make very good use of them, especially the younger men who are boarding. The married men seem to prefer going home.

17. A reasonable proportion of the men use the baths provided?—Yes.

18. As to accidents and the cause of accidents: have you any opinion to offer to the Commission as to the number of holes you would consider it possible to fire by fuse, and whether or not electricity should be used in firing shots?—I think that no man should light more than four holes with fuse.

19. For more than four electricity should be used?—No, not extensively; but the battery should be used in all sinking shafts, deep winzes, and long drives where they are using rock-drills. That should be made compulsory. Electric batteries are expensive, and every one does not seem to have the knack of using them.

20. Would you suggest that for firing by fuse there should be a regulation to prevent a man from firing more than four shots?—Yes. There is a practice at Karangahake and Waihi, where ore comes down in large rocks too big to spawl. The miners lay one, two, or more cartridges of gelignite on the rock with a short fuse, sometimes placing a piece of clay over the explosive, and at other times merely putting a stone over it. When going off for crib they light perhaps a dozen of these. Sometimes No. 1 goes off before No. 2 or No. 3, and the fragments of rock from the first shot removes the rock over No. 3. The result is that pieces of explosive are scattered about the stope. The primer with the detonator explodes, but the others do not, and consequently the result is that you get gelignite scattered all over the place.

21. Gelignite explodes by percussion the same as dynamite?—Yes, that is so.

22. You think that practice should be stopped?—It should be limited to about four shots in a series—that is, in one stope. They should not be allowed to fire more than four at one time.

23. How would that remove the danger you refer to? Supposing one went off, and it blew the stone and clay away, the chances would not be so great perhaps, but the result would be the same?—But it reduces the risk to a minimum, and that seems to be as much as can be done.

24. They do not plaster it in, but just lay it loosely?—Yes, and sometimes put it in a little cavity if there is one. As far as accidents are concerned, the Thames is very free from them. Of course, you must bear in mind there is only a small number of men employed, that the lodes are narrow, and the stopes are low.

25. What is your opinion about high stopes?—It was a rule laid down by the late Mr. Coutts, Inspector of Mines, and observed by him, that stopes should not be more than 8 ft. high; but we had a serious difficulty in carrying out that principle.

26. Is there any power to carry that out?—No; it was proposed in the draft of the 1910 Act, but was not carried.

27. Do you think it is advisable to fix a standard height, with a discretion given to the Inspector to increase or diminish it according to the nature of the ground?—Yes, I do, but I think the maximum should be 9 ft.

28. Even the maximum of his discretion ought to be 9 ft.?—Yes. The reason is that workmen cannot examine with a pick anything higher than 9 ft.

29. You have heard the evidence with regard to windlasses: have you any opinion to offer as to the desirability or suitability of cog-wheels on windlasses?—While I was Assistant Inspector at Waihi Mr. Williams and Mr. Gilmour, the managers, were experimenting with this cog and pawl, and the first they got out was cast-metal, which did not answer the purpose, because it broke. They got out another one, and it worked very well. I think they ought to be fixed on every windlass where they are sinking a shaft or winze. The greatest risk is in raising a full bucket, because you have a weight, and I have known of several accidents happening when the handle has slipped out of the man's hand.

30. They have not the reversible pawl?—I do not see how it would work.

31. Have you any other suggestion to make either as to the temperature that should be fixed as a standard for hot places?—It would be rather a difficult thing to fix a standard temperature.

32. What would you suggest as a test for hot places?—I agree with the opinion expressed in the report of the British Royal Commission on Mines as quoted by Mr. Whitley. It is a very difficult matter to fix a standard. The same conditions do not prevail at every mine, nor in every place in one mine. There are several things which ought to be taken into consideration when fixing a standard temperature for a six-hour place. A wet place may be considered a six-hour place, and a very high temperature may also be considered a sufficient reason. The vitiated air, as referred to in the Commission's report, would be another, and the presence of CO_2 would also require to be taken into consideration.

33. Would not some of these be reasons for not fixing six-hour places, but for stopping the work until the place was cleared?—Some of those conditions might be present, but in insufficient quantities to warrant the stopping of work altogether in that place.

34. Would you suggest a quantity or quality standard of ventilation in places where men work in injurious gases? Would you require more air, or a better quality?—Where possible I would insist upon a greater quantity of pure air. The difficulty in carrying out a fixed standard would be the question as to who is going to decide the matter. The Inspector of Mines cannot always be present, and samples would require to be taken, submitted to an analyst, and the results awaited. The manager might reasonably say "I will stop this place" in the summer-time, and in the winter-time it would come below the standard, and they could again work it on eight-hour shifts. Another serious difficulty is that to-day it may be above the standard and to-morrow below, so that changes from eight to six hours would require to be made from day to day. I am therefore afraid that there would be more trouble between the management and the workers with a fixed standard than under the present system.

35. What is your opinion of the reliability of the candle test which miners use to detect the gas CO_2?—Well, the standard laid down by this "Chart of Mine Gases" issued by the Mines Department shows that with 1·25 per cent. the light will burn.

36. Does it show any effect of the presence of gas of 6 to 8 per cent.?—Yes, breathing deepens, which symptoms increase as the amount of oxygen diminishes, and drowns similar to water. There would be toxic symptoms, and at 25 per cent. there is actual danger to life.

37. What I want to know is whether the candle is a sufficient test for a miner to ascertain if the conditions are safe?—It is a fairly reliable test when there is only a small percentage of CO_2 present.

38. What would you suggest in the case where a candle showed CO_2 to an appreciable degree which produced an effect upon the miner: what would you suggest in regard to that place? A reduction of hours would not do any good?—Yes, it might. A man might be able to work six hours in a place where he could not work eight hours; but in every such place, where possible, I would insist upon better ventilation.

39. Will you explain the method of your inspections? To start with, do you notify the management that you are going to inspect their mine, or do you arrive unknown to them?—I arrive unknown to them.

40. What do you do?—I examine their report-book, and the check inspector's report-book if there is one, and then go below, either by myself or in company with the manager or one of the officials of the mine. I go round the whole of the working-places, main roadways, and air-courses, carefully examining the timber and ventilation-currents.

41. If you observe a defect what do you do?—Make a request that it be remedied.

42. Do you make that request in writing or verbally, and to whom?—To the manager, sometimes verbally and sometimes in writing. If the conditions are serious I put it in writing. If it is merely a broken set and not serious I make a request verbally.

43. Should it be a defect which is liable to cause danger to life, how do you ascertain if it is remedied?—If possible, by making another visit at an earlier date than would otherwise be usual.

44. Should the law be broken, and your request not be complied with, what action would you take?—Report it to the Mines Department and ask for permission to prosecute.

45. Have you recently proceeded against any companies?—Yes, four in this district.

46. For what?—Defective ventilation. All four were fined in this Court for breaches of the Mining Act and regulations.

47. Was that long ago?—In April, I think it was.

48. Since you took this action have matters been improved?—Yes. One company has installed an oil-engine and a 2 ft. Price's fan, which is giving every satisfaction and supplying more than the minimum amount of air prescribed by the Mining Act. The other two companies have asked for and are now under protection. Nothing has been done, as far as I know, and they are not working.

49. So that your action in prosecuting these four companies has resulted in two of them ceasing operations?—Yes.

50. What became of the men who were thrown out of work? Did they obtain fresh employment elsewhere?—They would have to go to either Paeroa or Waihi. I do not know what became of them.

51. Do you know how many men were thrown out of employment?—Six men.

52. *Mr. Reed.*] Are you aware if any of these men had their homes at the Thames?—I think it is safe to say that nearly all of them had their homes here.

53. As regards certain tables which you prepared for the Commission [Exhibits 1, 2, and 3], are these correct to the best of your knowledge and belief?—Yes.

54. Are those measurements taken by you in cases where you were doubtful whether the law was being complied with?—In the Deep Levels we were anxious to know what the blower was doing. There were large quantities of CO_2 present, and a high temperature. We were anxious that as much air as possible should circulate in the workings, and to know the exact quantity of air going in.

55. Does the table show the condition of the ventilation at its worst point?—Yes, at its most unfavourable point.

56. If a mine were well ventilated, would you have an analysis of the air made?—No.

57. So that really these conditions are only taken when you have any doubt as to whether the law is being complied with?—That is so.

58. So that they do not show the working-conditions of the mines in their most favourable aspect?—Yes, that is so.

59. *The Chairman.*] Do you take measurements of air and temperatures on your regular inspections, or do you simply judge from the atmosphere whether the mine is in a satisfactory state and pass it at that?—I never visit the gassy zone, especially the Deep Levels, without taking my anemometer and my hygrometer and using them, and also my ordinary thermometer for the temperatures.

60. Do you keep your records?—Yes.

61. *Mr. Reed.*] Do you enter them in a register?—Yes, I enter them in a notebook, from which the entries are transferred to another book in the office when I have time.

62. Do you take your instruments and take readings at every mine? Would that not mean an unnecessary waste of time?—Yes; I have had so much experience that I can tell if there are any defects.

63. How many mines do you think you inspect during the year—gold and coal?—I think my last year's report showed fifty-six gold-mines and eleven or twelve coal-mines.

64. And, on an average, how many times during the year do you visit each mine?—The coal-mines receive three or four inspections each year. The mines in the gassy zone get more attention, because there is more danger.

65. So that you devote more of your time to mines where the conditions are less favourable?—Yes, that is so.

66. Is portion of your time taken up by duties other than those of Inspector of Mines?—Yes.

67. Can you state how many days during the first six months of this year you were occupied with work not at all connected with your duties as Inspector of Mines?—In examining roads paid for out of Mines Department grants, and supervising mine-managers', firemen's, and deputies' examinations there were seventeen days actually spent out of the office. Altogether it probably means about twenty-four days' work in every six months.

68. Do you think your inspections would be more complete and more satisfactory if your duties were confined to the inspection of mines in the interests of human life and safety?—Undoubtedly, because I have such a wide district. A visit to the Mokau Coal-mine alone occupies about twelve days, and there are only about twelve men working there. I have not been able to visit it more than once a year.

69. In measuring air in a mine would you observe the quantity of the air in the stopes or at the dead-ends where the anemometer will not indicate?—As a matter of fact, the anemometer will not indicate less than 50 ft. per minute velocity. You cannot always get a current in the stopes.

70. If the air is sufficient to deflect the candle, will it not move the anemometer?—No, the anemometer will not register less than 50 ft. per minute.

71. How would you ascertain the velocity in a dead-end?—As far as the anemometer is concerned, I think with about eight or ten revolutions per minute in a 6 ft. by 6 ft. shaft you would get between 288 and 360 cubic feet of air.

72. Now, the law fixes the standard per man of so-many cubic feet?—Yes; a minimum of 100 cubic feet per man per minute, and 600 cubic feet for a horse, in gold-mines.

73. Would you read that as applying to the air entering the main air-return?—I should read that as the amount of fresh air going in.

74. What is your practice in checking it: do you take it with the air going in or distributed? It is for you to interpret the law?—Wherever it is possible and it appears to me desirable I measure the air going into every section of a mine; and then, in going round a mine, if the distribution is bad I note it when taking my measurements, and ask the manager to attend to it.

75. *The Chairman.*] That is to say, you require sufficient air to keep every part of the mine up to the statutory requirement, according to where the men are distributed?—Yes.

76. *Mr. Reed.*] You have power under the Act to require anything even up to 1,000 ft.?—Yes, the Inspector has that discretion.

77. When in any doubts as to the quality of the air, what is your practice?—Generally I take small bottles, fill them with clean water, carry them into the mine, empty the water out, and take a sample, securely corking the bottle in the vitiated air, label and send them to the Dominion Laboratory.

78. Now, what is the standard you adopt for condemning a sample? What is the minimum quantity of oxygen?—19 per cent.

79. And the maximum of carbon-dioxide?—1·25 per cent.

80. So you have adopted the British standard?—Yes.

81. As regards fans and blowers in a deep mine with a single outlet, such as the May Queen and the Queen of Beauty, which ventilating-machine would you recommend—a blower or a fan?—A blower. When the scheme of the Deep Levels crosscut was under consideration there was a conference held in my office, attended by the representatives of the mine-owners, the Inspecting Engineer, Mr. Paul, and myself, as representing the Government, which proposed subsidizing that work, and the matter of adequate ventilation for the crosscut was then discussed. The great quantities of CO_2 likely to be met with led Messrs. Reed, Paul, and myself to recommend to the representatives of the companies the installation of a No. 10 Roots blower. From our experience at other mines and from our technical knowledge we were of opinion that was the best—and, in fact, the only possible—method of ventilating that crosscut.

82. Do you know the two winding-compartments in the Queen of Beauty shaft?—Yes.

83. Is it possible that under existing conditions they could be converted into an upcast and downcast shaft for exhaust ventilation?—They would be very defective for that purpose. The shaft is a rectangular one; the clearance of the cage is only about 2 in. at the end and about 4 in. at the sides where the guides are. The bottom of the cage is an iron sheet, and the shaft, when the cage is in motion, is completely blocked as far as ventilation is concerned.

84. Are you acquainted with the method of ventilation adopted in British collieries where circular shafts are employed?—Yes; but in collieries there is greater airway. The shafts are circular, as you say, and only about 50 per cent. of the area at the very most is taken up by the cage.

85. In that case would there be adequate space round the cages for the admission of air?—Yes.

86. In British collieries is there sometimes a spare upcast shaft utilized for nothing else but return air?—Yes, with nothing in it at all.

87. *The Chairman.*] Do you recommend an exhaust for this mine?—No.

88. *Mr. Reed.*] So that the winding-shaft in British collieries is sometimes used as a downcast?—Yes.

89. Where is the fan placed?—Immediately at the side of the shaft.

90. Is the top of the shaft sealed up to the outside air?—Yes, to prevent any air forming a short circuit.

91. Is it possible to seal up one of the winding-compartments in the Queen of Beauty if a fan were put in?—Not effectively.

92. Do the miners take advantage of the provision of the Act relating to workmen's inspections?—Not to my knowledge.

93. Do they in any of the mines?—No. Mr. Lucas, the secretary of the union, and the chairman went with me on one occasion when we were examining with a view to prosecuting.

94. To what do you attribute this neglect on the part of the men to take sufficient interest in their own welfare?—To carelessness.

95. Do you think it is the result of fear or intimidation?—Not at the present time. The managers and the men are fairly friendly.

96. As regards testing the cages, the safety-catch, the overwinding hook, and the rope, what do you insist on?—On a new cage being installed at a mine it is the duty of the Inspector of Mines to test that cage, and to give a written certificate to the manager before it is used, after testing it for automatic grips and making a thorough examination. It is the duty of all managers to test these appliances under section 254 of the Mining Act (44), and enter the result of their examinations in a book, which is open for inspection by the Inspector.

97. Do you see that that is done to the best of your ability?—I have seen it done on several occasions; on some occasions I have ordered examinations to be made when I have been there.

98. Is it possible that these tests are not made as required by law?—It is possible that they are not done regularly, but I believe that they are done periodically.

99. Do you insist upon the Act being carried out to the best of your ability?—I do.

100. Since you became Inspector has the number of mechanical ventilators been considerably increased in your district?—Yes; there was one put up at the Saxon, Waitangi, Watchman, Occidental, and New Sylvia Mines.

101. In a very large mine, what would be the number of electric batteries necessary if electric firing only were permitted?—It would mean that every party of men would require one.

102. Take the Denniston Colliery, for instance: how many would be required there, do you think?—The only practical system would be to appoint shot-firers, and give them the electric firing over a section each of, say, six or ten places.

103. *Mr. Parry.*] In gold-mines, too?—Yes.

104. *Mr. Reed.*] What would they cost?—Each battery would cost fully £20.

105. Would a large mine require very many?—The proportion would be about one battery for every ten men employed.

106. So that in the Waihi Mine, say, with five hundred men employed, they would require fifty batteries?—They might not require quite so many at Waihi as in a coal-mine.

107. And would they not require to employ skilled electricians to keep these delicate instruments in order?—They would require probably about two electricians at Waihi, and the others would only require to be handy men.

108. As regards the height of stopes, Mr. Bennie, you stated that the present statute does not give you power to take action in case of the stopes being too high?—No, I said that the 1910 amendment proposed to do so, but the provision was cut out.

109. If you turn up the Act you will find that subsection (11) of section 254 provides that "every excavation of any kind in connection with a mine shall be securely protected and made safe for persons employed therein"; and failure to comply with that section is an offence, is it not?——

The Chairman: I do not think that would cover the height of stopes.

Mr. Reed: Well, sir, the Government has taken action under section 261, which provides that in any case where an Inspector finds any mine or any part thereof, or any practice in or connected therewith unsafe, he can report it and take action.

The Chairman: Yes, the word "practice" there would cover the height of stopes, I think.

110. *Mr. Reed.*] Mr. Bennie, in connection with regulating the height for stopes, would that be determined by the holding nature of the rock or back?—Yes, certainly; but I have always insisted upon their being not higher than 8 ft. That would be safe, because the men could reach it. I remember one occasion while I was Assistant Inspector at Waihi two men were driving a place about 13 ft. high, and I objected. The manager ordered them not to fire the hole, but they did so, and the manager threatened to discharge them, but I persuaded him instead to give them three days off work.

111. What is your opinion of the idea to put a fourth compartment in the shaft for ventilating purposes?—I would rather have a separate ventilating-shaft put in.

112. How long have the regulations as to the use of sprays been in force?—Some considerable time—some years.

113. Do the men take advantage of them?—Some of them do and some do not.

114. Do you think there should be any better precautions taken for the laying of the dust?—No.

115. As to miners' phthisis, could you tell us generally what is the cause of it?—No, not from a medical point of view.

116. Do you think it originates with the dust?—No; the dust would seriously affect a man, but I do not know whether it would cause miners' complaint.

117. Have the men here on this field complained to you as to their conditions underground?—Very few; only now and again complaints have reached me.

118. What do you do when the men make such complaints?—I advise them to put their complaints in writing and submit them to the secretary of the union.

119. Have you ever received any complaint in writing?—No, not one; but the secretary has made some verbal ones, which I have attended to.

120. As regards the Mining Regulations, could you tell us what remedies or improvements you would suggest for the betterment of the men's condition?—There are several amendments which require to be made, but just for the time being I cannot enumerate them. I have been very busy, and have not had time to prepare them.

121. *Mr. Cochrane.*] Do you regard the present system of testing the safety appliances on cages as sufficient?—Yes.

122. You recommend electrical firers where there are more than four shots to be fired?—No, I did not say that.

123. Then what would you recommend when there are more than four shots to be fired?—I said that not more than four shots should be fired in a series by fuses, and that in shafts, deep winzes, and long drives electrical apparatus should be used.

124. Do you consider that should be made mandatory under the Act?—Yes.

125. *The Chairman.*] Does that apply to all shots unless in shafts?—I think that electrical apparatus only should be used in winzes, shafts, and long drives using rock-drill machines.

126. *Mr. Cochrane.*] Then, as to manholes in long drives for the protection of men from pieces of flying debris, what is your opinion?—Take the case of the Waitangi: when a round of holes is being fired no miner would like to be nearer than from 800 ft. to 1,000 ft., for the concussion.

127. *The Chairman.*] Is it advisable generally, in the interests of the miners, to have safety chambers?—Yes, at a distance of not more than, say, 200 ft. from the face.

128. *Mr. Cochrane.*] Would that not impose a very heavy cost on the companies?—Well, in some cases they are only small holes—say, 4 ft. deep by 4 ft. wide and 6 ft. high.

129. Would you insist upon these where there are sets of timber?—They are preferable to timber.

130. Would you insist upon them?—It depends upon the size of the timber. At Waihi the timbers are 15 in. by 15 in.; they would give adequate protection. Timber 9 in. by 9 in. would not, and where that size is used manholes should be provided.

131. *The Chairman.*] Would it meet the case if manholes were provided when required in writing by the Inspector of Mines?—Yes, I think so.

132. Would you suggest that it would be a workable plan to have the provision of manholes made compulsory on the request in writing of the Inspector; and should the workmen have the right to apply to you for manholes, leaving the Inspector to decide the matter?—Yes, I think that would be the better way.

133. *Mr. Cochrane.*] Would electrical firing not give much better results than blasting?—Some authorities on that point differ, but, for my own part, I prefer a cut to be shot out first with fuse or by electricity, as permissible.

134. Would it not promote better results in blasting to use electricity?—No, I do not think so.

135. We have heard some evidence regarding the interference with managers by superintendents: what is your opinion as to that?—I consider that the superintendent ought to confine his attention to the commercial side of the business, but the manager should have the full control of all matters concerning mining.

136. You think that he should be the captain of the ship and have full control?—Yes.

137. Then, in case of accident, you report to the Mines Department and request permission to summons: do you not think in this matter you should have full control and be captain of your own ship?—[Question ruled out by Chairman as being outside the scope of the Commission's inquiries.]

138. In regard to the height of stopes, your opinion is that they should not be more than 8 ft. high, so that the men could sound the rock?—Yes.

139. Would you put a specific provision to that effect in the Act?—As a stope rises the height should be fixed.

140. Now, as to the difficulty of taking samples of air: supposing the place is very warm, and you were not in the district, would it not be a simple matter if a hygrometer were hung in a place for a manager and miner to see, and automatically decide without calling you from a distance? Would that not relieve you of a great deal of trouble?—I have no desire to be arbitrator in the matter at all.

141. Would not the fixing of a standard temperature relieve you also?—It would depend as to whether I was made responsible to arbitrate or not. If there is a disagreement there must be a man to settle it.

142. How can they disagree as to the reading of a hygrometer?—They could not disagree on the reading, but the hygrometer might possibly be interfered with.

143. And would that be your reason against fixing a standard, as an experienced manager?—As an experienced manager I know the many difficulties that are always arising. The miner is so insistent on getting as much as he can, and the manager is so insistent on getting the work done as cheaply as he can, that there are bound to be disputes.

144. Are you of the opinion that the matter should be referred to you?—I have no desire to have it so, but do not see how it can be avoided.

145. But, in the event of a dispute between the manager and the men, is it not at present referred to you?—Not unless they are working under an arbitration award.

146. Would the other way not relieve you of that trouble?—It would, but somebody else would have to arbitrate.

147. You said that where the air was bad in dead-ends and elsewhere, where the anemometer would not work, you then tested by breathing and candle as to the quality of the air?—No, as to the quantity and quality. The deflection of the light would give me the quantity, and the effect upon the light would give me the quality.

148. And if you had both would the candle burn quite normally?—Yes.

149. But the candle will also burn brightly in bad air when certain gases are present: how, then, would you test it?—By taking a live bird or a mouse into the air of that place and observing the effect upon the animal.

150. But I am talking about the presence of carbonic acid?—I would take samples of the air and submit them to the analyst.

151. So that you are not against taking samples of air?—No, not where it is necessary; I have done it.

152. Do you get CO in any quantities in quartz-mining?—No, it is not present except in small quantities.

153. Is not that deleterious matter met with in the stopes when blasting?—Not very much.

154. Is that the injurious part?—Yes, it is injurious wherever it is found.

155. What is the injurious matter in the air in the stopes?—It is the CO_2 given off by the breathing of the men; also from the candles and from a little gas from the explosives.

156. And that gas would be carbonic oxide, would it not?—Yes, I think so.

157. Do you know?—I do know, but just for the moment I am not certain.

158. Have you any recommendation to make as to the ventilation of rises?—The system generally adopted is the box method, with three compartments—one for air to go up into the rise, another for the debris from the stopes, and the third is a travelling-way with a ladder. By that means they get a current of air passing along either by natural means or by a fan, and so get a circulation. Another method is to carry pipes up to the end and exhaust into the rise, and return the other way.

159. In spite of that, are the rises some of the worst ventilated places in the mines?—If these means are adopted they would not be the worst; the dead-end would be the worst.

160. Are you in favour of fixing a definite distance beyond which men should not be allowed to work without pipes leading out?—No, because if you have a strong current of air it will drift into the face probably 30 yards; if you have a weak current it will drift 10 yards. It is a matter which should be left to the discretion of the Inspector.

161. We have heard a good deal about the ventilation in the mines here, to the effect that it is better under other conditions than it is at present, and I wish to ask you, Mr. Bennie, would the ventilation in those mines which we have visited be better in the summer-time than it is now?—Yes, I think this close muggy weather is the worst you can get.

162. And you consider the air good in these small mines?—Mostly. The other day when you visited the Sylvia you got the air in the worst possible condition. There was no velocity, but the air was fairly good. If it recurs like that often they will have to put a fan in.

163. You have heard the Royal Commission's report read by Mr. Whitley: do I understand that you disagree with the saturated standard?—I did not say so.

164. He said he agreed with the Royal Commission's recommendation: do you agree with Dr. Haldane that 78° saturated still air is the highest a man can conveniently work in?—Dr. Haldane said 80° moving air saturated was not worse than 100° dry.

165. You do not challenge what he says as to temperature?—No, because he is an expert.

166. *Mr. Molineaux.*] In any of your analyses of mine-air has the presence of carbon-monoxide been detected?—No.

167. Does the current of air enter a dead-end by diffusion of gases? You will have good air in the dead-end, but it will show no current: how do you account for that?—It gets there by gravitation. The cold air will carry along the floor, and as it gets heated it will rise and go by the return along the roof.

168. *The Chairman.*] In connection with this candle test, I understand you to say that if CO_2 were present to affect the candle CO might be present to counteract that effect, and thus the miner would be working in CO_2 and his candle might still burn brightly?—No, I have never known that state of things to exist so as to render the candle test unreliable.

169. *Mr. Dowgray.*] What amount of air, Mr. Bennie, would be necessary to dilute the fumes of gas from 1 lb. of gelignite?—That is a matter to which I cannot reply offhand. You are asking me questions which require calculation.

170. It requires a certain amount of air?—Yes, certainly.

171. Does it not necessarily follow, then, that the air ought to be circulating in the stopes?—The Mining Act requires that the air shall be circulating in every place.

172. But where there is a greater amount of gelignite being used it follows that the air-current should necessarily be stronger?—Yes.

173. Did you take that into consideration when speaking as to whether the stope is ventilated or not?—Yes.

174. If the air is dull in a stope, and a considerable amount of gelignite is used, would there not be CO present?—There will be vitiated air, of course.

175. In reply to a question by Mr. Reed you stated that you tested the air always in the worst places: did you do that in the Deep Levels?—I think my statement to Mr. Reed was to the effect that these were the worst places under my supervision.

176. I understood your reply to mean that all the tests which you made were in the worst places, as it was not necessary to test it in the good places?—No.

177. Then you did not test the air in the worst places in the Deep Levels?—Yes, I did, right in the face, where I took the air-samples.

178. You apparently, according to the table which you have laid before the Commission, have not tested the air in the Deep Levels since March of this year?—Yes, I have.

179. Your last report in connection with the ventilation appears to have been made on the 23rd March?—Yes, but that is as to temperature and quantity of air.

180. You have not tested it since then?—Yes, by volume.

181. Where is it in your report?—If you look at the reference to the Saxon section you will find it. Under the Deep Levels, in the third column, "Where taken," you will find it referred to.

182. Were these samples taken prior to the installation of the blower?—Yes.

183. Have you taken samples since?—No.

184. Do you consider that that mine was adequately ventilated on Saturday when we visited it, from the chamber to the face?—The word "adequate" is very wide.

185. What does the Act say?—"Adequately ventilated."

186. From where?—It says that the face and drives shall be ventilated and the air shall be kept travelling therein, so that they may at all times be in a fit state for working and passing therein.

187. Do you think that that face was in a fit state for working?—Yes.

188. Did you measure the air in the return?—That would be almost impossible. There is a drive 8 ft. by 7 ft. by 7 ft., which would mean about 60 ft. of area, while the minimum which the anemometer would register (ten revolutions) would give 600 ft.

189. Do you not think that efforts should be made to keep the shaft clearer?—Yes, an endeavour is being made. 150 cubic feet of air is being discharged out of the air-boxes in the shaft-chamber. Every 25 ft. there is an airhole for discharging the air into the drive.

190. Do you not think that, seeing that the blower is capable of producing more air, a greater quantity should be supplied?—At the time of your visit a fresh flow of water and sudden inrush of carbon-dioxide gas had come into the drive, and made the conditions worse than they have been at any time since the Exchange reef was cut.

191. Are you aware that the gas in the Deep Levels tunnel increased to such an extent last night that the speed of the blower had to be increased?—No, I was not aware of that.

192. How do you know that the conditions on the occasion of our visit were worse than at any time previously?—By my previous examinations and long experience of working in mines.

193. In spite of the evidence given by witnesses that it was better than it had been for some time?—That was their evidence.

194. Do you know of any colliery in Great Britain where shafts are used exclusively for ventilation purposes without winding-apparatus in them?—No, I do not.

195. Is it customary for the shafts in the Old Country to be all sunk nowadays? Is it not a modern method?—I remember they were round shafts when I was a boy.

196. Are they all round shafts in the collieries in Scotland, for instance?—No, not at all.

197. Can you name any that are round shafts?—No, not in Scotland; but in the North of England there are the Backworth, Maud, and Sea Pits.

198. Have you had any experience in firing shots with batteries?—No, but I have seen them used.

199. You seem to consider the cost to be one of the principal obstacles to their use?—I heard the mine-manager at Hikurangi say they cost £20. I simply quote his statement. I have not purchased any myself.

200. Would it surprise you that they cost only £4 10s.?—It would surprise me to hear that they cost less than £20, with cable.

201. In reply to a question by Mr. Reed you said that the use of batteries would add considerably to the working-cost. Is it not a fact that there is a vast difference between coal and gold mines, in that in the former the men's earning-powers depend upon the material gotten, and that in those mines they are not permitted to fire their own shots?—I am not aware of that. There is nothing to that effect in the statute.

202. It is in the English Act?—That may be so.

203. Would it surprise you that in a colliery like Millerton, which employs four hundred miners, four batteries would be sufficient under the present system there?—Their workings must be very much concentrated if four would be sufficient. I know that in the Huntly Mine they have three or four shot-firers, and they are kept going continually.

204. Do you not consider that such matters as providing manholes and shot-firing should be put into plain English, and not left to you as Inspector to decide?—It is already provided as far as haulage-ways are concerned.

205. But the Act is very vague on the point. It says, "Where more than 10 tons are passing in a particular hour"?—That section you are quoting provides for the safety of people travelling, and not as to shot-firing.

206. Do you not consider precautions should be taken as to shot-firing?—Certainly; but no man will remain within 200 ft. when shots are being fired.

207. *The Chairman.*] The point is, Mr. Bennie, do you consider that a standard distance should be fixed, or that it should be left to the Inspector to decide?—I think it should be left to the discretion of the Inspector.

208. *Mr. Parry.*] You say that mechanical ventilation is the best?—Yes.

209. Taking the Waihi Mine as an instance, do you think much better results would be obtained by mechanical ventilation than by the natural ventilation they have there?—Yes, very much.

210. Have you not noticed in different places where there are stopes being worked that a good current of air has been passing through the level, but in the stope the current has been very small?—In one mine visited by the Commission they were taking out a stope. The mine had been closed for some time and close timbered up. They are now opening it, and there was no communication to circulate the current round. As soon as that stope is taken out I shall insist on better circulation.

211. You think it is possible to force the air up and round with stope doors?—Decidedly.

212. You said, in answer to a question put by the Chairman, I think, in regard to the use of baths and change-houses, that the miners at the Thames might take their clothes home and wash them more regularly. Do you not think that if proper provision were made for the men to obtain warm water and the use of drying-apparatus those men would wash their clothes more frequently than they do at the present time?—I have known very few miners who would take the trouble of washing their own clothes if they had a wife or sister capable of doing it for them.

213. Do you think the change-houses at the Thames are comfortable?—There is only one mine at the Thames, as far as I know, which has baths at present. All the mines have change-houses, and are reasonably comfortable.

214. Do you not consider it in the interests of the health of the miners to have proper bath-houses and so forth?—Certainly.

215. In regard to the question put by the Chairman, and your answer, with reference to the danger of plastering stones, do you not think it is injurious to the health of the miners to plaster over explosives rather than drilling?—Certainly. They put sufficient dynamite on the stone to break it in order to save the cost of labour.

216. Do you think it is in the interests of the men to plaster those stones?—The plastering is not the serious injury, but the excessive amount of explosive used. If holes were drilled less explosive would be used, and consequently working in such places would be less injurious.

217. Is there not any other reason?—Of course, the clay is blown into the air in fine particles, with the result that the men breathe it. I cannot think of any other reason now.

218. Do you not think that there is more poisonous gas given off from burning dynamite than when it fully explodes?—Yes.

219. Do you not think there is more dynamite burnt by plastering than when it fully explodes?—Yes.

220. Is the dynamite not more likely to burn when plastering is practised than by firing a hole? Is that not a scientific fact?—Yes, when there is incomplete combustion.

221. *The Chairman.*] Does incomplete combustion set up CO?—Yes.

222. *Mr. Parry.*] Then there are three reasons in favour of drilling a hole instead of plastering?—Yes, the danger, the excessive amount of explosive used, and incomplete combustion. There is also the effect of the clay being thrown into the air in the form of fine dust.

223. In regard to those men who were thrown out of work by the closing of the mines here as the result of your prosecution, do you not think it was much better for the men to go away than to risk their lives by working in badly ventilated mines?—I think the ventilation was inadequate and not fit, but beyond that point it was not for me to consider whether they were going to be thrown out of work.

224. In regard to air in a stope, you said you would be able to detect the presence of noxious gas by the deflection of the candle: is there anything else that would bring it under your notice?—I also said that I would detect it by my breathing; and then again I said that if it were necessary I would obtain a live bird or a mouse and note the effect which the air had upon it.

225. And would you not also take into consideration the state of the men working there?—No, I do not think it would be fair to take into consideration whether the men were perspiring or not.

226. And would not the high perspiration into which working under such conditions throws a man be taken into consideration?—I think I said that that is a matter with which I had nothing to do; it is the condition of the air which is of importance.

227. *The Chairman.*] Do you take into account the apparent condition of the men as a determining factor as to whether the air is bad? Do you observe their condition at all?—Yes, certainly, as a practical man I could not help observing that.

228. *Mr. Parry.*] Do you think the workmen's inspectors should have more power than they have at present? Do you not think it would be a help to the Inspector of Mines if they had more power?—My experience goes to show that it would not. One reason is that—at the Thames, for instance—they do not employ an inspector at all.

229. Have you any other reason?—I would prefer not to answer that question.

230. In the event of your being at Hikurangi, and the workmen's inspector had the power to go into a mine when a complaint was made, would that not be an advantage to you as an Inspector of Mines?—It depends on the workmen's inspector. It is my experience that there are workmen's inspectors and workmen's inspectors, and one man may find fault where another would not.

231. If a workmen's inspector had such power in your absence, would it not take the responsibility off your shoulders?—I have no conception as to what powers you propose to give to these check inspectors, and therefore I cannot answer your question.

232. In the event of your being away from the Thames, and a complaint being made which necessitated a telegram to you, if you had some one like a workmen's inspector to go and inspect the place, would that not take a lot of the responsibility off you?—If your workmen's inspector, in company with the manager, inspected the place and reported to me afterwards, it would certainly be an advantage for me to know the conditions, provided they reported similarly and their reports agreed.

233. *The Chairman.*] Do you know of any cases of intimidation?—No, sir.

234. *Mr. Parry.*] What temperature do you think is an excessive temperature for a man to work in?—I have already stated that I generally agree with the opinions expressed by the English Royal Commission on Mines.

235. Do you think that the winze which leads from No. 6 level to the May Queen shaft, where we travelled the other day, is in a safe condition?—The winze by which you went down is not a travelling-road. The work is being done in the level above that. No men were working down that winze.

236. *The Chairman.*] Does that winze comply with the regulations?—The ladders are placed at the most convenient angle.

237. Is it constructed in accordance with the requirements of the Act—that is the question?—The section reads, "A ladder permanently used for the ascent or descent of persons." That is not a ladder used permanently.

238. *Mr. Reed.*] In connection with that matter of the winze, the escape from the Deep Levels is by a separate shaft in the May Queen, is it not?—Yes.

239. So that, in the event of an accident happening in the Queen of Beauty shaft, all the men working in the bottom levels could escape by the May Queen shaft, could they not?—No; that is, if the accident occurred between the 1,000 ft. and the 747 ft. level.

240. Supposing it occurred in the shaft above the 747 ft. level, could the men escape by the May Queen shaft from the bottom level?—They have ladders in the shaft up to the 747 ft. level, and there is a winze by which the Commissioners descended. I think there is also another winze.

241. Is that winze a travelling-road in general use as defined by the Act?—No.

242. *Mr. Dowgray.*] Were the mines which the Commission visited a fair sample of the mines in your district, or were they the only mines using fans and blowers?—I consider they were the worst mines in the whole district, with perhaps the exception of the Occidental, where they are engaged clearing out a drive. When that is done the ventilation will be increased to comply with the requirements of the Act.

243. Those are the only mines ventilated by fans and blowers?—Yes, that is so.

244. Is it a fact that the fans have been installed during the last twelve months?—No, not during the last twelve months.

245. How long ago?—During the last three years. Since I have been Inspector of Mines, and as necessity demanded.

246. How many of them have been put up during the last twelve months?—The fan in the Watchman only, I think.

247. And not that in the Waitangi?—No, it has been up eighteen months.

248. What about the blower here?—It has been installed eighteen months or nearly two years. Immediately the Deep Levels got under way I ordered the men out, and they then obtained the blower.

BOYD BENNIE recalled.

Boyd Bennie, Inspector of Mines, was recalled with regard to alterations requiring to be made in Exhibits 1 and 3 previously put in by him. Permission was given to make certain amendments in the figures in Exhibit 1, also to add to Exhibit 3 data showing air-measurements taken during the inspection by the Commissioners of the New Sylvia, Watchman, and Waitangi Mines on the previous day.

WAIHI COURTHOUSE.—22ND AUGUST, 1911.

MATTHEW PAUL examined.

1. *The Chairman.*] You are Inspector of Mines for the Hauraki Mining District?—Yes.

2. You provide a list of temperatures taken by you in the Waihi Mine?—Yes, for the period from 1909 to date. [Exhibit 5 put in.]

3. And also the record of temperatures taken by the Commissioners during their inspection of the same mine?—Yes. [Exhibit 4 put in.]

CHRISTOPHER MCMILLAN sworn and examined. (No. 16.)

1. *The Chairman.*] What are you, Mr. McMillan?—I am the secretary to the miners' union.

2. And what are you by occupation?—I have followed mining a good deal, but my duties as secretary to the union occupy my whole time at present.

3. You have followed mining for how long?—About four or five years.

4. And what experience have you had in the Waihi Mine?—About two years and a half.

5. Have you had any experience of taking temperatures by wet or dry bulb?—No.

6. And upon what matters do you wish to address the Commission?—Well, my duties as secretary to the union bring me into contact a good deal with the men who meet with accidents, and I wish to refer to that subject. I also wish to speak as to ventilation.

7. Will you please deal with accidents first?—I have here some figures on the subject which cover the last twelve months. The injuries to hands and head from falls numbered seventeen in the Waihi field, as follows: Waihi Company's Mine, 13; Waihi Grand Junction Mine, 3; and Waihi Extended, 1.

8. Will you please confine yourself to the Waihi Mine?—Very well. I may say that these records are taken from my accident register, but I have not taken the descriptions of the accidents.

9. Were these accidents, or any of them, serious?—Yes, a good many of them were pretty nearly life and death.

10. How many?—I could not say, but I could mention two.

11. Were any of them fatal?—No, neither of them. There have been two fatal accidents in the Waihi Mine through falls of quartz.

12. Do you know the circumstances of these accidents?—One occurred about two years ago by a fall in a stope.

13. Have you these particulars of your own knowledge—I mean the immediate circumstances surrounding the accident?—In connection with the second fatal accident I was present at the inquiry, but I did not visit the place.

14. It would be more satisfactory if the men who were present at the scene of the accident could give us the information?—Yes, perhaps that would be best, though I heard all the evidence given at the inquiry. There were two fatal accidents, seventeen non-fatal ones (seven from falls of quartz), and thirty-six cases of poisoning during the twelve months.

15. To what extent were the men incapacitated who suffered from poisoning?—Well, they were all under medical treatment and obtained doctors' certificates, principally for poisoned fingers and poisoned hands; 80 per cent. would be poisoned fingers, the result of bruises and scratches.

16. Were the causes given in the certificates?—Yes, they were mostly down as septic wounds.

17. Which doctors examined them? Could you get the medical certificates?—There are three doctors here, and about 95 per cent. of the men drew compensation from the company.

18. Could you get the medical men if necessary? We have agreed to subpœna medical men should the occasion require it?—Yes, there is one doctor who has been here for a considerable number of years, Dr. Craig. He could be called. There were thirty-six cases of poisoning from the Waihi Mine, eleven from the Waihi Grand Junction, and one from the Extended.

19. Any other causes of accidents?—Yes, there are those given under the heading of sprains.

20. Any cases of rupture?—Yes, a good many.

21. What is the primary cause of that?—Trying to move heavy trucks. There were forty-one strains for the twelve months. They were all medically treated. Then there were six blasting accidents for the twelve months—four in the Waihi Mine, and two in the Grand Junction.

22. Were any of those fatal?—No, but three were very serious. One man lost the use of both eyes, and one man lost his right arm.

23. Have you any first-hand information—whether they happened as the result of misfires or delay in leaving the place when firing shots?—No, I only know from hearsay.

24. Any other form of accident?—There were fifteen cases of injury to the eye in the twelve months.

25. Are they included in the others?—No.

26. How were they caused?—In various ways, but principally by blasting.

27. Are they included in the blasting accidents?—Yes, but there were thirteen injuries to eyes apart from the cases in which the men lost their eyes through blasting. There were also 116 minor accidents classed as accidents to hand and foot.

28. How many cases had to be medically treated?—Every one of them; all of these I am giving you have been medically treated.

29. In regard to these 116, have you divided them up as to the different mines in which they occurred?—No.

30. Have you any other form of accident?—That is as far as I can go for accidents during the twelve months. With regard to the fatal accidents, there have been twelve during the last three years; two of these, however, were not recognized by the insurance companies.

31. How long ago did they happen?—One man died within the last three months, and the other died about twelve months ago.

32. Why did the insurance companies not recognize them?—They failed to get satisfactory medical certificates. In one case the man was barring down quartz in a stope, and injured his stomach by ricking himself. He was taken to the hospital suffering from this rick, and afterwards developed typhoid fever when he had been treated in the hospital for four or five days. He was in the hospital for about six weeks. I am not quite positive where Dr. Robertson is; that was the medical man who treated him.

33. Out of the twelve you mentioned can you say how they were distributed?—Six occurred in the Waihi Mine, one at the Silverton battery in connection with a water-race there, one at the Victoria battery, Waikino, and one at the Waihi Company's battery here.

34. Do you know the reason why the certificate was refused in the other case?—Yes, the man was struck on the nose by some part of a rock-drill, and suffered from hæmorrhage for a week or more. After he had been off work for a fortnight he resumed work, and hæmorrhage started again. After the doctor examined him he was taken to the hospital, and the doctor there said he was suffering from a long-standing complaint that was responsible for this hæmorrhage.

35. Which doctor?—Dr. Craig.

36. What periods do these accidents cover?—The fatal accidents cover the past two years, from 1909 to date. It may be slightly over two years, but nothing I have quoted goes back further than 1909. The minor accidents I have quoted cover a period of exactly twelve months.

37. Have you anything else to say regarding accidents?—One fatal accident occurred from a fall from the cage, and two of them were caused by men getting caught in machinery at the battery —all the Waihi Company's mine and battery.

38. Were these recognized by the insurance companies?—Yes.

39. What period is covered by these accidents?—They occurred during the last twelve months, both the machine accidents and the fall from cage—October, I think.

40. From your own personal knowledge or experience, have you anything to suggest as a remedy in regard to these accidents? I want you to speak from experience and not from hearsay? —Well, I have had experience at both mines, and in regard to the cases of poisoning I would suggest that, in view of the higher percentage of such accidents at the Waihi Mine than at the Waihi Grand Junction, there should be hot water installed in the change-house at the former, as there is at the latter. A man might have a cut on his hand, and when he has to wash in cold water it only closes it up and does not remove the poisonous matter. Then I would like to make a suggestion in regard to the accidents from strains. These are caused by trying to push heavy trucks, and, in my opinion, the grade on the travelling-roads should be easier and more uniform. The lines should be straighter and be kept cleaner than they are at present. There has been a fair number of men suffering from poisoned ankles through having to walk through the dirty water, and the ways should be kept cleaner and free from drainage. Then, as regards the accidents resulting from men being caught in machinery, the provisions are not sufficiently specified in the Act. The machinery should be better protected, and the question as to whether the Act is carried out or not ought to be considered.

41. Do you consider the provisions of the Act adequate?—I think so. As far as I know, the provisions of the Act are adequate if they were carried out to the letter.

42. Are the requirements of the Act adequate in regard to cages?—I do not think so. There should be some sort of a protection for men when in the cages; a bar could be provided.

43. But you have that protection already?—Yes, I think the bars meet the case fairly well. But it is not provided for under the Act; it is simply done by the Waihi Company.

44. Have you any improvement to suggest on the Waihi Company's method?—No, I do not think I can suggest anything better.

45. Have you any further recommendation to make, in regard to blasting, for instance?—No, I have not had any experience further than the ordinary way of firing by fuse. I know nothing of the use of electric batteries for firing.

46. Have you anything to say with regard to ventilation?—No, I cannot set up to be an expert in ventilation. I have not had much experience in the distribution of air, most of my mining having been done in drives, and so forth.

47. *Mr. Dowgray.*] I understand you have been working in Waihi for the last two years and a half: during that time were you working in the Waihi Mine?—Yes.

48. In your opinion, was the mine well ventilated?—Well, it is about seven or eight years since I worked in the Waihi Mine, and I remember that in the particular place I was working in it was rather well ventilated for my liking. I was working eighteen months near No. 1 shaft, downcast.

49. In reply to a question by the Chairman you said there were seventeen accidents caused by falls: did these occur in the stopes?—I think the most of them occurred in the stopes.

50. Did the height of the stope have anything to do with them?—Well, it would be very hard for me to pass an opinion on that, because the men simply report the accidents to me, and I ask them the necessary questions as a rule, and hear no particulars of the accidents unless they volunteer the information. I do not go into the ins and outs of what happened.

51. So that you are not in a position to say whether the height of the stopes was the cause of the accidents?—No.

52. In regard to the poisoned hands, do you know whether the water used in the sprays caused the trouble? Where does the water come from?—I could not say.

53. You would not care to drink it?—I do not know whether it is drain-water or whether it comes from the levels.

54. Has it anything to do with the poisoning of the hands?—I do not know. The poisoning may be caused by the mineral.

55. *The Chairman.*] Do you think the poisoning is caused by the water from the rocks?—Yes; also, in the face a good deal of dirt accumulates.

56. *Mr. Dowgray.*] You do not think the water is pure, at any rate?—No.

57. In regard to strains, do you attribute them to the condition of the roads, or has the weight of the truck anything to do with them?—The condition of the road would be responsible to a great extent, and, of course, the trucks are very large.

58. What is the carrying-capacity of them?—Of course, quartz varies a good deal in weight, but the trucks would be between 17 cwt. and 18 cwt.

59. *The Chairman.*] What is the system of work carried on in the Waihi Mine as compared with the other mines—wages or contract?—Contract.

60. Does that apply to the other mines?—Yes, all the mines in Waihi.

61. When did the contract system come in?—About ten years ago.

62. It extended over the whole of the period you have quoted?—Yes.

63. *Mr. Dowgray.*] Do they work three shifts in the Waihi Mine? Can you give us any idea of the proportion of these accidents which occurred on the 12 o'clock shift?—No, I have no idea.

64. *Mr. Parry.*] With regard to knowing the circumstances surrounding the accidents, is it necessary for you to make those inquiries according to your constitution?—No.

65. With regard to the Chairman's question as to the carrying-out of the provisions of the Act respecting machinery, do you think that machinery should be repaired while in motion?—Certainly not; the Act says not.

66. Have you ever worked in a place where the temperature has been taken?—Yes, when I was working in the Junction Mine in connection with the pipes to take the ventilation up to the men.

67. Have you any idea as to what the temperature was?—I remember in one part it was about 81°, but I forget whether it was wet or dry.

68. Would you regard that place as hot?—Yes.

69. Do you think eight hours was too long to work there?—Yes.

70. Judging from your experience in that heat could you suggest a standard temperature?—I would suggest that it should be a good deal less than it was there.

71. *The Chairman.*] Who took the temperature?—Both Mr. Paul and Mr. Parry.

72. Where was it taken?—On the Empire reef in the drive in the Junction Mine.

73. In a dead-end?—Yes.

74. How long ago?—Slightly over twelve months, roughly speaking.

75. Was anything done after that temperature was taken?—They paid a little more attention to the fan pipes by attending to a leakage, but it continued hot till I left.

76. Do you know the surface temperature on the day that temperature was taken down below?—No.

77. What time of the year was it?—In the winter-time, a little while before this time last year.

78. *Mr. Parry.*] Have you worked in stopes at all?—Yes, but not much; about a couple of months.

79. Which would you sooner work in, a high stope or a low stope?—For safety, in a low stope.

80. Do you consider mining a healthy occupation?—No, not by any means.

81. Will you tell the Commission as to the risk run by the men when being lowered with only one man at the winding-engine?—They are running a considerable risk, as there is a danger of the man suddenly taking ill.

82. *The Chairman.*] Have you ever known of an accident caused directly or indirectly by the fact that there was only one man at the engine?—I do not think we have ever had an accident in Waihi from that cause. Still, there is always the possibility.

83. *Mr. Parry.*] What do you call "minor accidents"? What is responsible for the majority of these accidents?—The contract system.

84. Have you found the men suffering from boils?—Yes, a great number.

85. *The Chairman.*] You do not include them in your list of accidents?—No.

86. *Mr. Parry.*] You say that you have had no experience as far as conducting air in stopes is concerned?—No.

87. *Mr. Molineaux.*] You consider there is great danger incurred by men travelling in cages: do you understand the working of a modern winding-engine?—No, I do not pretend to do so.

88. What would happen if the driver dropped down dead?—It depends on the state in which he left the engine.

89. What would happen to the cage?—The cage would be caught by the safety-clips, but I have never seen it tried.

90. Then, where would the great danger come in?—I have heard of the clips not acting.

91. Have you seen such a thing?—No, I have not seen it, but I have been told it has happened in this mine.

92. *Mr. Reed.*] Did you state that there were twelve fatal accidents in the Waihi Mine from the beginning of 1909 to date?—No, that was in all the mines in the district.

93. Are you aware whether, in connection with any of those fatal accidents, a Coroner's jury suggested anything in the way of improving the conditions or appliances?—No, I do not think so—not so far as I remember.

94. Have any verdicts been returned other than "Accidental death—no blame attachable to any one"?—Not that I remember. I do not remember the exact verdicts in connection with the fall of the cage. I am not sure whether a rider was added.

95. In connection with the death of Berryman, was any suggestion made as to bars on cages?—It was suggested in the evidence, but I do not know if it was put in the form of a rider.

96. Do such Coroner's juries consist of half working miners?—Yes, I believe that is so.

97. Were not some of the non-fatal accidents which you quoted somewhat trivial?—Well, they were sufficient to lay the men up for anything from a fortnight to six, seven, or eight weeks.

98. Did all those accidents incapacitate the men for a fortnight or more?—Yes.

99. You quoted a case of a safety-catch not working: where was that?—No. 4 shaft. I am just speaking from memory; I did not see it.

100. Was anybody hurt?—No.

101. What happened?—The cage went down to the bottom.

102. How long ago?—About eight years ago.

103. What caused the cage to fall—did the rope break?—No.

104. Were there safety-catches on the cage?—I do not know. But there were catches of some sort.

105. Was a certificated engine-driver in charge?—Yes; his name was John Hume.

106. Was not action taken against him by the workmen's inspector?—There was no workmen's inspector at that time. No action was taken against him; he kept on working.

107. *The Chairman.*] Do you know what caused the cage to break away?—He thought the cradle was down on the brake, and he intended to let the cage go down on to the cradle. The cradle was not there, and the cage went down to the bottom.

108. *Mr. Dowgray.*] Are all the cages in the Waihi Mine fitted with these safety-bars?—I have not been down the mine since the bars were put on, but I have seen them on the shafts. I have not been down lately.

109. So you do not know whether all the cages have the bars on?—No.

110. Have you ever known of a verdict at a Coroner's inquest being given against the company?—I have never heard of such a thing.

111. *The Chairman.*] There is another matter within the scope of the Commission which we have not submitted to you. We are empowered to inquire into and investigate the cause of accidents, and if you have any suggestion to make as to the tribunal that investigates these accidents we will hear you. Do you know of any more satisfactory method of conducting these inquiries?—Well, it is highly essential that workers should be represented on these inquiries.

112. The Mining Act provides that half of the jurymen shall be miners?—I mean a representative outside of that.

113. Do you mean that a workers' representative should have a legal standing at the inquiry to appear as representing the body of workers, with the right to examine witnesses?—Yes, that is what I would suggest.

114. But you are satisfied with the constitution of the tribunal?—Yes; I would not be prepared to suggest any improvements.

CHARLES OPIE sworn and examined. (No. 17.)

1. *The Chairman.*] What are you?—A miner.

2. How long have you been mining?—Over twenty years.

3. Where?—In Victoria, Western Australia, and New Zealand.

4. How long have you been on this field?—About twelve years.

5. Which mines have you worked in?—The Waihi Mine, the Grand Junction, Waihi Extended, Waihi South, and Waihi West.

6. How long have you been working in the Waihi Mine?—Between seven and eight years. I am working up there now. I have been out of it a matter of two years during that time.

7. How long have you been working there this last time?—About eight or nine months.

8. How long were you out prior to this last spell?—About two years.

9. Have you had any experience of taking temperatures?—No.

10. Have you had any practical experience of ventilation and the system of distributing air?—I have worked in mines where the ventilation has been regulated.

11. Upon what matters do you wish to inform the Commission?—As to ventilation, sanitary matters, accidents, bath-houses, and change-houses.

12. Will you first give the Commission your views on ventilation?—Well, I find that the Waihi Mine is not as well ventilated at present as it was formerly when I was working there.

13. Where do you work?—In No. 9 level, in the stopes.

14. In what way do you consider the ventilation not so good?—Formerly the system of mullocking was to put the filling down from the surface through winzes, and each truck of stuff that was tipped down caused a current of air. That system has been done away with altogether, and the present system of mullock shafts introduced. They are sunk away off in the country, and the ventilation is not so good, and it is much warmer. The air is not distributed on the levels—that is, the air coming from downcasts. The hot air and fumes come up from the level below, mix with the air in the level, and then pass up into the stope, so that the party working there gets the fumes and smoke coming from below.

15. Have you any remedy to suggest?—Yes; I think these fumes and smoke should be drawn out from a fan from the bottom level and taken away to the surface, something the same as is done in coal-mines with back headings. I would suggest that doors be put on these levels where the current of air is going through so as to force the air up into the stopes—that is, the good air.

16. What have you to say in regard to sanitary matters?—I wish to say that the pans should be emptied every twenty-four hours.

17. Do you consider that it should be made compulsory for all men working in the mine to use them?—Yes, they should be made by statute to use them. I would also suggest that disinfectants be used in the form of ashes, or loam, or carbolic. It would be beneficial, too, if the place were concreted underneath to prevent soakage. It could be covered with soil or loam.

18. What have you to suggest in regard to bath-houses and change-houses?—I think hot water is badly required in the change-houses. Men coming out of a hot place into the cold air or in wet weather need a wash in hot water.

19. What number of showers would be required, do you think? How many men to a shower?—I think about one shower-bath for every eight men would be reasonable.

20. To what extent are the baths at present used?—I think that nearly the whole of the men use them. I do not think there are many who go home without changing.

21. That is referring to changing in the change-houses: how many would use the baths?—The great majority of the men use them. In the Grand Junction most of the men use the baths.

22. Have you any matters regarding accidents on which you wish to inform the Commission?—Well, the trucks are too large, and the roads are dirty and not well laid down. The men have to keep the trucks going fairly fast, as, of course, a truck travels easier at a high rate of speed than slowly. The truck very often jumps off the rails, and there have been many accidents through the men's hands being jammed against the timber. You are also liable to be caught with the handles. I think if the lines were straighter and better laid down, with the trucks lighter and the roads clean, fewer accidents would happen, and the men would be better off.

23. Have you had any experience from accidents caused by falls from the roofs or sides, or blasting?—Not personally.

24. Have you ever seen any?—No, but I have known of a good number.

25. You are working in a stope: from a miner's point of view, what is the best height for a stope?—Well, what I would consider to be a fair and safe height would be where a man could touch it with a pick.

26. In order to give an arch to the roof, the roof would be higher than the sides, would it not? What height would your sides have to be?—We do not usually arch the place. If we arched it our stopes would be too high for the filling, and we would get very little stone.

27. Does that apply to stopes of any width?—I am speaking of wide stopes.

28. Have you known of any accidents happening through men not being able to reach the roof, either with bar or hammer?—In my opinion most of them happen that way; they are most likely to happen if you cannot touch the roof to sound it.

29. What effect do you think the working of lower stopes would have upon the working of the mine?—I believe it would cost a little more to keep a low stope; a man would require to have a bigger price to work it.

30. Would it have the effect of leaving more stuff in?—No, none whatever.

31. Have you anything more to suggest as to accidents—in regard to the cages or machinery?—No, except from hearsay. I consider that the battery should be used for firing shots in shafts and winzes and when sinking after they got about 50 ft.—that is, when rising up.

32. And as to the number of shots which should be fired at one time with a fuse?—I should say that not more than six shots should be fired in one place.

33. Have you worked a rock-drill or popper?—I am stoping now, but I have had experience of the use of rock-drills.

34. We are also empowered to make inquiries as to miners' disease: have you any workable suggestion to offer in regard to the prevention of that disease?—Only that the men should be compelled to use the water where rock-drills or poppers are worked.

35. Would a popper work with a spray?—Well, I hardly think so; the popper would be done away with if they made the use of the spray compulsory, and perhaps that would be a good thing for the miner.

36. Then it is not good for his health?—It would possibly be the means of his living a little longer.