Report of Board appointed to inquire into the prevalence and prevention of lead poisoning at the Broken Hill silver-lead mines to the Honourable the Minister for Mines and Agriculture.

Contributors

New South Wales. Legislative Council.
New South Wales. Department of Mines and Agriculture.
London School of Hygiene and Tropical Medicine

Publication/Creation

Sydney : Charles Potter, Government Printer, 1893.

Persistent URL

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NEW SOUTH WALES.

Legislative Council.

REPORT

OF

BOARD APPOINTED TO INQUIRE INTO THE PREVALENCE AND PREVENTION OF LEAD POISONING

AT THE

BROKEN HILL SILVER-LEAD MINES

TO THE

HONORABLE THE MINISTER FOR MINES AND AGRICULTURE.

ORDERED BY THE COUNCIL TO BE PRINTED,
25 *May*, 1893.

SYDNEY: CHARLES POTTER, GOVERNMENT PRINTER.

1893.

[4s. 6d.] *c 133—*a* 92—

LEAD POISONING INQUIRY BOARD.

MINUTES OF MEETINGS.

MONDAY, 20 *JUNE*, 1892.

The Board met in the Council Chamber, which was courteously granted by the Mayor and Aldermen of Broken Hill for the purposes of the inquiry.

PRESENT:—

J. Ashburton Thompson, Esq., M.D., D.P.H., Chairman,

W. M. Hamlet, Esq., F.I.C., F.C.S. | R. Sleath, Esq.,

J. Howell, Esq.

The Chairman opened the proceedings by describing the way in which the appointment of the Board had been made, and stating in general terms the nature of the inquiry with which it was charged. Attention was drawn to the subject of lead poisoning in the mines of the Albert Mining District through a question asked by Mr. Cann, M.L.A., on the 16th of August, 1891. The Chairman himself, in his capacity of Chief Medical Inspector of the Board of Health, made a sanitary inspection of Broken Hill during his return from Europe, beginning on the 3rd October, 1891, and pointed out that there had been four deaths from lead poisoning during the year 1890. He also drew attention to the importance of making inquiry into the matter. The then Minister for Mines (the Hon. Sydney Smith), made a Cabinet Minute on the 28th September, 1891 (*See Appendix* A), in which he proposed that a Board should be appointed consisting of a medical man, an analytical chemist, and a representative of the miners. Accordingly, the Minister for Mines (the Hon. T. M. Slattery), requested the Board of Health to nominate a medical man and an analytical chemist, and the Amalgamated Miners' Association to nominate a representative of the miners. The Miners' Association, through their President, Mr. M. Bourke, nominated Mr. R. Sleath, District Secretary of the Amalgamated Miners' Association; the Board of Health nominated Dr. Ashburton Thompson and Mr. W. M. Hamlet. Then, on the 3rd May, 1892, the Hon. Secretary of the Barrier Ranges Mining Companies' Association, Mr. W. Knox, addressed the Minister for Mines requesting that a representative of the Mining Companies' Association might be appointed to sit on the Board. The Association was requested by the Minister to nominate a representative from among the mine managers, and on the 23rd May the Mining Companies' Association nominated Mr. John Howell, general manager of the Broken Hill Proprietary Mine, to represent the proprietors. Accordingly, on the 28th May, Mr. Howell was appointed by the Minister for Mines to represent that Association on the Board.

The Board then proceeded to consider the course of procedure to be followed in conducting the inquiry.

It was thought desirable to visit the leading mines of the District, in the first place, and the following were selected for inspection by the Board in the order named:—The British and Block 14 on Tuesday, Block 10 and the Central on Wednesday, the Proprietary Company on Thursday, and the South Broken Hill on Friday, the Secretary being instructed to write to the managers of the several companies requesting permission to visit their mines.

It was also decided to write to the managers of the different mining companies referred to, requesting them each to furnish a statement showing the number of hands employed in the various departments of each mine during the years 1890 and 1891, under classes such as miners, truckers, plattmen, feeders, smelters, and others, including tradesmen; also a brief description of the general character and lead contents of the ore treated during the two years 1890 and 1891, together with the quantities of ore raised during that period; and the Secretary was instructed accordingly.

The next question dealt with was that of taking evidence; and it was resolved to begin taking evidence on Monday, 27th instant, the Secretary being instructed to call the following witnesses for that date:—Mr. P. O'Donnell, secretary of the Surface Branch of the Amalgamated Miners' Association; Mr. A. J. O'Connell, secretary of the Underground Branch of the Amalgamated Miners' Association; and Mr. J. Triplett, secretary of the S.C. and S.H. Union.

The question whether Press representatives should be admitted to the meetings during the examination of witnesses having been raised, the Board unanimously resolved that its duties would not be facilitated, and might be impeded, if its proceedings were reported piecemeal, and therefore that the Press should not be admitted.

The Board then adjourned.

TUESDAY, 21 *JUNE*, 1892.

The Board met by appointment at 10 o'clock, a.m.

PRESENT :—

J. Ashburton Thompson, Esq., M.D., D.P.H., Chairman.

W. M. Hamlet, Esq., F.I.C., F.C.S. | R. Sleath., Esq.,

J. Howell, Esq.

Proceeded to the office of the British Company, where they were courteously received by the manager, Mr. Cecil Morgan, and were by that gentleman escorted through the workings of the mine.

At 2 o'clock the Board paid a visit to Block 14 Silver-mining Company's Mine. The manager, Mr. Z. Lane, was not in his office, and the Chairman of the Board was informed by the officer in charge, Mr. Roddar, that Mr. Lane had gone rifle-shooting, and had left instructions that no one was to be allowed to go down the mine in his absence. The Board therefore returned to the office at the Town Hall, and made arrangements for the business of the following day.

The Secretary reported that in accordance with instructions he had written to the managers of Block 10 and the Central, asking permission for the Board to visit those mines, and had received favourable replies from them.

It was accordingly resolved to visit Block 10 Mine at 10 a.m. on the following day, and the Central in the afternoon at 2·30.

The Secretary was instructed to ascertain the names and addresses of the secretaries of the various local benefit societies with a view of calling them as witnesses.

The Board then adjourned.

WEDNESDAY, 22 *JUNE*, 1892.

The Board met by appointment at 9·45 o'clock, a.m.

PRESENT :—

J. Ashburton Thompson, Esq., M.D., D.P.H., Chairman,

W. M. Hamlet, Esq., F.I.C., F.C.S., | R. Sleath, Esq.

Mr. Howell was absent in consequence of his attendance being required at the Assessment Appeal Court.

The Board visited Block 10 Mine, and were escorted through the workings by the manager, Mr. John Warren.

It had been arranged to visit the Central Mine in the afternoon, but during the forenoon a letter was received from the manager, Mr. R. Adams, intimating that he would be engaged at the Assessment Court, and asking that the Board would appoint some other day.

The Secretary was instructed to write Mr. Adams asking if Saturday forenoon would be convenient.

The Board then adjourned.

THURSDAY, 23 *JUNE*, 1892.

The Board met by appointment at the Proprietary Company's office at 10 o'clock, a.m.

PRESENT :—

J. Ashburton Thompson, Esq., M.D. D.P.H., Chairman.

W. M. Hamlet, Esq., F.I.C., F.C.S. | R. Sleath, Esq.,

J. Howell, Esq.

The forenoon was occupied in travelling through the underground workings of the mine, more particularly the lead stopes.

In the afternoon the Board were shown over the extensive surface works, and inspected the smelting furnaces, the concentrating and leaching machinery, and the newly-erected amalgamating plant.

The Board then adjourned.

FRIDAY, 24 *JUNE*, 1892.

The Board met by appointment at 9·30, o'clock, a.m.

PRESENT :—

J. Ashburton Thompson, Esq., M.D., D.P.H., Chairman.

W. M. Hamlet, Esq., F.I.C., F.C.S. | R. Sleath, Esq.,

J. Howell, Esq.

Mr. Howell explained that he would be engaged during the day at the Assessment Court. The other members of the Board subsequently visited South Broken Hill Mine. They were met at the office by the manager, Mr. J. M'Kay, and were shown through the underground workings of the mine, and also the surface works.

The Secretary was instructed to call two additional witnesses for Monday, viz., Mr. B. Hoddinott, secretary of the Broken Hill Lodge, No. 65, I.O.O.F., and Mr. H. Inmann, Secretary, Bourke Lodge, I.O.O.F.; and for Tuesday to summons the following :—J. Pedler, secretary of the Picton Lodge, I.O.O.F.; D. Townsend, secretary of the Manchester Unity Lodge, I.O.O.F.; G. Howard, secretary of the Foresters' Society ; B. Brittan, secretary of the Druids Society ; Charles Wort, secretary, Imperial Lodge, I.O.O.F. ; and E. Archibald, Grand United Lodge, I.O.O.F.

The Board then adjourned.

SATURDAY,

SATURDAY, 25 *JUNE*, 1892.

The Board met by appointment at 10 o'clock, a.m.

PRESENT :—

J. Ashburton Thompson, Esq., M.D., D.P.H., Chairman.
W. M. Hamlet, Esq., F.I.C., F.C.S. | R. Sleath, Esq.

Proceeded to the Central Company's Mine. Were met at the Company's office by Mr. Randolph Adams and escorted through the underground workings of the mine. The Board subsequently spent some time in examining the surface works and machinery.

The Board then adjourned.

MONDAY, 27 *JUNE*, 1892.

The Board met at 10·30. o'clock, a.m.

PRESENT :—

J. Ashburton Thompson, Esq., M.D., D.P.H., Chairman.
W. M. Hamlet, Esq., F.I.C., F.C.S. | F. Sleath, Esq.,
J. Howell, Esq.

The following witnesses were examined :—A. J. O'Connell, secretary, Underground Branch of the Miners' Amalgamated Association of Broken Hill; J. Thomas, president of the District Branch of the Amalgamated Miners' Association; J. Triplett, secretary of the S.C. and S. Union; P. O'Donnell, secretary of the Smelters' Branch of the A.M.A.; and S. H. Alker, Inspector of Nuisances.

It was arranged to call the managers of Block 14, Block 10, the Central and the South Mines, and the underground manager and metallurgist of the Proprietary Mine as witnesses for Wednesday, and the Board then adjourned until 11 o'clock, a.m., the following day.

TUESDAY, 28 *JUNE*, 1892.

The Board met at 11 o'clock, a.m.

PRESENT :—

J. Ashburton Thompson, Esq., M.D., D.P.H., Chairman.
W. M. Hamlet, Esq., F.I.C., F.C.S., | R. Sleath, Esq.,
J. Howell, Esq.

The following witnesses were examined :—G. Howard, secretary of Court Stuart, Ancient Order of Foresters; John Hines, secretary of the Broken Hill Branch of the H.A.C.B. Society; J. Pedler, secretary of the Picton Lodge, I.O.O.F.; R. B. Brittan, secretary of the Broken Hill Branch of the Ancient Order of Druids; W. R. Stewart, secretary of the Loyal Silver City Lodge, M.U., I.O.O.F.; E. A. Archibald, secretary of the Broken Hill Branch of the Grand United Order of Oddfellows.

Mr. B. Hoddinott, who had been asked to attend and give evidence, as the secretary of the Broken Hill Lodge, No. 65, I.O.O.F., sent, per favour of Mr. Pedler, an apology for his non-attendance, and a statement showing the number of members of his Society who had suffered from lead poisoning during the years 1890, 1891, and 1892.

The Secretary was instructed to write to the several secretaries of the benefit societies who had been examined asking them to furnish additional particulars on the subject of lead poisoning, showing the proportion of such cases to the number of members enrolled and working in the mines during the years 1890, 1891, and 1892, &c.

The Board then adjourned until 11 o'clock the following day.

WEDNESDAY, 29 *JUNE*, 1892.

The Board met at 11 o'clock, a.m.

PRESENT :—

J. Ashburton Thompson, Esq., M.D., D.P.H., Chairman.
W. M. Hamlet, Esq., F.I.C., F.C.S. | R. Sleath, Esq.
J. Howell, Esq.

The Secretary reported that a letter had been received from Mr. R. Adams, manager of the Central Mine, stating that he could not attend to give evidence on this date owing to his presence being required at the Assessment Court, and a similar communication was received through the telephone from Mr. Lane, manager of Block 14.

The following witnesses were examined :—Thomas P. Uren, underground manager of the Proprietary Company; J. Koehler, metallurgist of the Proprietary Company; Andrew Eddy, miner; John Warren, manager of Block 10 Mine; Wm. Strachan, miner.

The Board then adjourned until Friday, the 1st proximo, at 11 o'clock.

FRIDAY, 1 *JULY*, 1892.

The Board met at 11 o'clock, a.m.

PRESENT :—

J. Ashburton Thompson, Esq., M.D., D.P.H., Chairman.
W. M. Hamlet, Esq., F.I.C., F.C.S. | R. Sleath, Esq.
J. Howell, Esq.

The following witnesses were examined :—J. B. Doolette, Assistant Town Clerk, Broken Hill; S. Brenton, miner; Cecil C. Morgan, manager of the British Mine; J. McKay, manager of the South Mine; B. B. Hoddinott, secretary of the Broken Hill Lodge No. 65, I.O.O.F.; Wm. Curgenven, miner; M. Ormsby, miner.

The Board then adjourned.

MONDAY,

MONDAY, 4 *JULY*, 1892.

The Board met at 11 o'clock, a.m.

PRESENT :—

J. Ashburton Thompson, Esq., M.D., D.P.H., Chairman.
W. M. Hamlet, Esq., F.I.C., F.C.S.

The Chairman explained thatthe strike of miners and others engaged in the Barrier Mines would in all probability prevent Mr. J. Howell, as general manager of the Proprietary Company, and Mr. R. Sleath, as district secretary of the Amalgamated Miners' Association, taking part in the proceedings of the Board at this stage. Accordingly, he suggested that, as arrangements had been made for the examination of several medical men and certain Government officers, the evidence of these witnesses might be taken by the members of the Board now present, and that then the inquiry should be adjourned until a future day to be appointed; the evidence already taken to be in the meantime transcribed, printed, and proof copies forwarded to the witnesses, and the local members of the Board.

It was agreed to carry out the arrangement suggested by the Chairman, subject to the approval of the other members, but to call only such witnesses as could be depended upon to appear again before the Board some weeks later for cross-examination, if necessary, by the members now absent.

The Secretary communicated these messages to Messrs. Howell and Sleath. Mr. Sleath expressed himself well satisfied with the course proposed to be adopted, which suited his convenience under the circumstances. He proposed to call a number of witnesses who could speak from experience as to the effects of lead poisoning in the district. Subsequently, Mr. Sleath wrote to the Secretary to the same effect, and drew attention to the necessity of meeting again at some future date to take further evidence. A letter was received from Mr. Howell, also expressing concurrence in the course proposed, and his intention to call several witnesses.

The following witnesses were examined :—J. Hebbard, inspector of mines; F. Whysall, telegraph-master, Broken Hill.

The Board then adjourned.

TUESDAY, 5 *JULY*, 1892.

The Board met at 11 o'clock, a.m.

PRESENT :—

J. Ashburton Thompson, Esq., M.D., D.P.H., Chairman.
W. M. Hamlet, Esq., F.I.C., F.C.S.

The following witnesses were examined :—Dr. J. F. Bartley, Dr. Belgrave, Dr. Blaxland.

The Board then adjourned.

WEDNESDAY, 6 *JULY*, 1892.

The Board met at 11 o'clock, a.m.

PRESENT :—

J. Ashburton Thompson, Esq., M.D., D.P.H., Chairman.
W. M. Hamlet, Esq., F.I.C., F.C.S.

The following witnesses were examined :—Dr. H. J. F. Groves, Dr. E. Govett.

The Board then adjourned.

THURSDAY, 7 *JULY*, 1892.

The Board met at 11 o'clock, a.m.

PRESENT :—

J. Ashburton Thompson, Esq., M.D., D.P.H., Chairman.
W M. Hamlet, Esq., F.I.C., F.C.S.

The following witnesses were examined :—Dr. J. T. Harvey, Mr. D. Parr, veterinary surgeon.

The Board then adjourned.

FRIDAY, 8 *JULY*, 1892.

The Board met at 11 o'clock, a.m.

PRESENT :—

J. Ashburton Thompson, Esq., M.D., D.P.H., Chairman.
W. M. Hamlet, Esq., F.I.C., F.C.S. | R. Sleath, Esq.

The following witnesses were examined :—Mr. A. N. Barnett, warden; Mr. J. Melville, veterinary surgeon; Dr. F. C. Evill; and Dr. C. E. Thompson.

The Board then adjourned *sine die*.

SATURDAY, 14 *JANUARY*, 1893.

The Board met by appointment at 11 o'clock, a.m.

PRESENT :—

J. Ashburton Thompson, Esq., M.D., D.P.H., Chairman.
W. M. Hamlet, Esq., F.I.C., F.C.S. | J. Howell, Esq.
J. Thomas, Esq.

The further proceedings of the Board were discussed at length.

The further evidence necessary to be called was settled.

The Board resolved to visit the British Blocks Silver Mine on Monday next, at 11 o'clock a.m.

The Secretary was instructed to inform the manager, Mr. Cecil Morgan, of the proposed visit.

The Board then adjourned.

TUESDAY,

TUESDAY, 17 *JANUARY*, 1893.

The Board met by appointment at 11 o'clock, a.m.

PRESENT :—

J. Ashburton Thompson, Esq., M.D. D.P.H., Chairman.
W. M. Hamlet, Esq., F.I.C., F.C.S. | J. Howell, Esq.
J. Thomas, Esq.

The following witnesses were examined :—C. Lawrey, tapper; J. Dimpsey, feeder; H. Barnet, tapper; J. Cogan, feeder; S. Seymore, feeder.

The Board then adjourned.

WEDNESDAY, 18 *JANUARY*, 1893.

The Board met by appointment at 11 o'clock, a.m.

PRESENT :—

J. Ashburton Thompson, Esq., M.D., D.P.H., Chairman.
W. M. Hamlet, Esq., F.I.C., F.C.S. | J. Howell, Esq.
J. Thomas, Esq.

The witnesses through a misunderstanding failed to appear.

The Board discussed the proposed recommendations for the prevention of lead poisoning, drawn up by the Chairman.

The Board then adjourned.

THURSDAY, 19 *JANUARY*, 1893.

The Board met by appointment at 11 o'clock, a.m.

PRESENT :—

J. Ashburton Thompson, Esq., M.D., D.P.H., Chairman.
W. M. Hamlet, Esq., F.I.C., F.C.S. | J. Howell, Esq.
J. Thomas, Esq.

The following witnesses were examined :—Wm. Gilbert, Francis Daykin, James Henry Christopher T. Ellery, underground miners.

The recommendations, as amended, were further discussed.

The Board then adjourned.

FRIDAY, 20 *JANUARY*, 1893.

The Board met by appointment at 11 o'clock, a.m.

PRESENT :—

J. Ashburton Thompson, Esq., M.D., D.P.H., Chairman.
W. M. Hamlet, Esq., F.I.C., F.C.S. | J. Howell, Esq.
J. Thomas, Esq.

The proposed recommendations, for prevention of lead poisoning, drawn up by the Chairman, were further discussed.

The Secretary was instructed to inform Messrs. Morgan and Lane that the Board would visit their mines on 23 January, at 11 a.m.

The Board then adjourned.

SATURDAY, 21 *JANUARY*, 1893.

The Board met by appointment at 11 o'clock, a.m.

PRESENT :—

J. Ashburton Thompson, Esq., M.D., D.P.H., Chairman.
W. M. Hamlet, Esq., F.I.C., F.C.S. | J. Howell, Esq.
J. Thomas, Esq.

The Chairman resubmitted the proposed recommendations, with amendments, for further consideration, and they were considered.

The Board then adjourned.

MONDAY, 23 *JANUARY*, 1893.

The Board met by appointment at 10·30 o'clock, a.m.

PRESENT :—

J. Ashburton Thompson, Esq., M.D., D.P.H., Chairman.
W. M. Hamlet, Esq., F.I.C., F.C.S. | J. Thomas, Esq.

The Board proceeded to Block 14; but Mr. Z. Lane, the manager, refused to allow them to inspect the mine. The Board then retired and proceeded to the manager's office at the British Blocks. The manager was not there. The Board went on to the mine and inspected the surface workings, but upon requesting the braceman to send them down the mine he refused.

The Board then adjourned.

TUESDAY,

TUESDAY, 31 *JANUARY*, 1893.

The Board met by appointment at 9·30 o'clock, a.m.

PRESENT:—

J. Ashburton Thompson, Esq., M.D., D.P.H., Chairman.
W. M. Hamlet, Esq., F.I.C., F.C.S. | J. Thomas, Esq.

As Messrs. Lane and Morgan, managers of the Block 14 and British Blocks Silver-mine respectively, had written to the Chairman, intimating that they had withdrawn all opposition to the Board visiting their mines, it was resolved to proceed to the above mines. Mr. Hebbard, the Inspector of Mines, at the Chairman's request, accompanied the Board.

Block 14 was visited. The manager was not in his office and could not be found. The Board went on to the mine and made an inspection of the surface works, after which they requested the braceman to send them down the mine, but he refused.

After consultation, the Board decided that they had been again obstructed in their endeavour to act on the authority vested in them.

The Board then adjourned.

TUESDAY, 7 *FEBRUARY*, 1893.

The Board met by appointment at 9·40 o'clock, a.m.

PRESENT:—

J. Ashburton Thompson, Esq., M.D., D.P.H., Chairman.
W. M. Hamlet, Esq., F.I.C., F.C.S. | J. Thomas, Esq.

The following witnesses were recalled, and examined:—Dr. T. R. Belgrave, Dr. C. E. Thompson, and Dr. W. Blaxland.

After lunch the Board, accompanied by the Mining Inspector, proceeded to Block 14 and the British Mine, and inspected the underground workings.

The Board then adjourned.

Report of a Board appointed to Inquire into the Prevalence and Prevention of Lead Poisoning at the Broken Hill Silver-Lead Mines.

Sir, Sydney, April 17, 1893.

In presenting this Report I do myself the honor to make the following remarks :—

1. Unempowered as the Board were to examine witnesses on oath, it can scarcely be necessary to excuse manifest deficiencies in evidence which directly affected pecuniary interests of very unusual magnitude. Had the illness which was the subject of inquiry been either novel in kind or obscure in manifestation, it is possible that an investigation conducted under the conditions referred to might have failed altogether; it is fortunate, therefore, that lead-poisoning has been familiar from antiquity, and that its symptoms are a common-place of practical medicine.

2. The Report is not unanimously signed, and I venture to express the opinion that no other conclusion could be expected. The inquiry was really into the mode of conducting a trade-process which actually had proved harmful (it was well known) to many of the workmen engaged in it. It might have been found that every reasonable precaution to prevent injury to health had been taken already by the management on the one hand, and by the workmen themselves on the other; but whether it were so or not was the question to be judged. In consequence the representative of the Associated Mining Companies, and the representative of the Amalgamated Miners' Association, stood from the beginning in a false position; and as all who are acquainted with the history of sanitary effort against harmful trade-processes could foresee, it was probable that the latter would, and extremely likely that the former would not, feel able to accept conclusions arrived at by the disinterested and merely practical members of the Board. Thus, also, it has turned out.

I have, &c.,
J. ASHBURTON THOMPSON.

Harrie Wood, Esq.,
Under Secretary for Mines and Agriculture.

LEAD POISONING INQUIRY BOARD.

REPORT.

To the Hon. the Minister for Mines and Agriculture,—

Sir, March, 1893.

The constitution of this Board, appointed to gather the best information obtainable as to the amount of sickness and the percentage of deaths due to lead-poisoning under the present conditions of work at the Broken Hill silver-mines, and to recommend measures to remove the unsatisfactory state of things actually existing (*cf.* Appendix A), was completed on 28th May, 1892, by addition of Mr. John Howell, Manager of the Proprietary Mine, to represent the Associated Mining Companies. The first meeting was held at Broken Hill, on 20th June, and between that date and 1st July the full Board met nine times; the late strike was then declared, and further attendance of Mr. Richard Sleath, who represented the Amalgamated Miners' Association, and of Mr. Howell was thereby prevented. With consent of those members, however, the remainder of the Board continued to examine such witnesses as could probably be recalled when, at a future date, the full Board should meet again; but that class of evidence having become exhausted in the course of a week, farther proceedings were necessarily adjourned. On 1st December you appointed Mr. Josiah Thomas, President of the Amalgamated Miners' Association, to the seat formerly occupied by Mr. Richard Sleath, which had fallen vacant; and on 14th January the full Board reassembled. Between that date and 7th February nine meetings were held, and we now have the honour to present the following Report:—

2. The important lead-yielding properties are situated on Broken Hill itself, a low, long outcrop of manganiferous ironstone, which springs abruptly from a barren plain, and which runs north-east for a distance of about 1½ mile. (*See* map.) This ridge is parcelled into 40-acre blocks, of which numbers 6, 7, and 8 form the South Mine; 9 the Central; 10 Block Ten; 11, 12, and 13 the Proprietary; 14 Block Fourteen; and 15 and 16 the British. The number of workmen employed on 19th December, 1892, [*See Appendix* H] was 4,445, namely, 2,345 on the surface, 1,926 underground, and 174 unclassified; and that is much below the number employed before the late strike. Smelting is carried on at all the mines except Block 10, whence ore is sent away for treatment; the total weekly output of silver-lead bullion is very great, that from the Proprietary alone (or Big Mine, as it is commonly called) being usually equivalent to more than 225,000 ounces of fine silver each week. A considerable town, officially known as Willyama, has gathered round the Hill, by which it is divided into two parts, called the north and south towns. Of these the former is the more important. The total estimated population within the municipal boundaries (12 square miles) was 22,500 at the end of 1891, the Census enumeration, taken at beginning of the second quarter of that year, having shown 19,789 persons. Only 5,000 of them live in the south town, and, as the prevailing winds are southerly, by far the greater number are thus exposed to the fumes which escape day and night without ceasing from the smelter stacks. This place is extremely remote; all supplies have to be brought by rail either from Adelaide, South Australia, or from Port Pirie in the same colony, over distances of 333 or 253 miles. Outside the town there is nothing but a waterless wilderness of salt-bush country, in which no industry can be conducted except a hazardous sheep-farming, and which in consequence is nearly uninhabited; however, there are in various directions from the Hill itself a few mines which for the present are of little significance. The

climate, although extremely favourable to health from its dryness, is very hot in the summer months; and this circumstance, combined with want of wood and water, and with inefficient sanitary management has told unfavourably on the public health in past years, when the infantile mortaiity and the proportion of total deaths due to filth diseases were unusually high. Such information on these latter points as it has been possible to gather will be found tabulated in Appendix B.

3. The present inquiry concerns the extent to which lead poisoning occurs, not alone among the getters and smelters of silver-lead ores, but also among the townspeople who live in houses clustered round the mines and smelter-nests, who are not themselves engaged in mining. The kind of poisoning to be expected among both classes is almost exclusively of the chronic sort: this is not very often so immediately fatal that the cause of death is clearly seen to lie in it; and in fact only eleven deaths out of a total number of 2,132 have been due to it during the five years, 1888-92, in one of which no death, and in one other only a single death occurred. [*Appendix* B, *Table* XII.] Nevertheless lead poisoning has immediate economic and remoter social effects of serious importance. Its immediate economic importance lies in its reducing the power of effective work in persons who are still able to attend to their daily duty although suffering to some extent, and in causing repeated attacks of graver illness which incapacitate them entirely for more or fewer weeks at a time. Its remoter and less obvious social importance consists in its being attended, in persons at young ages or in the prime of life, who alone are here exposed to risk, by degenerative organic changes which are akin to those commonly observed at old ages. A branch of its social importance, equal to the former as far as it goes, but doubtless of less magnitude, is the special power possessed by lead to interfere with the procreative function; so that chronically lead-poisoned persons often produce no offspring at all, or one which dies soon after birth. All these effects are so well known and so much feared that several European Governments regard the production and use of lead with great jealousy, and have enacted searching laws to shield workmen and the public from risk of leading, in as far as they may be so protected. The qualities in virtue of which lead requires safe-guarding in its uses by man may be summarily described as follows:—

4. Lead is an irritant poison which can destroy life when it is taken in the form of a soluble salt (such as sugar of lead) and in large quantity; but even under those favourable conditions it is seldom immediately fatal. Farther, in nature this metal occurs in nearly insoluble forms, in which also it is used in various arts and manufactures; and it is absorbed by those who get lead-ore, or who produce lead, or who work with materials which contain lead, in very small and scarcely appreciable quantities. Nevertheless, bad effects of a serious character are produced upon those who habitually absorb minute portions of these insoluble forms. This result is due to a power possessed by the natural juices to transform the insoluble into soluble compounds, so that they can be taken up by the blood and carried to the farthest recesses of the body; to the property lead has of then accumulating in the tissues so that the inappreciable quantities absorbed day after day presently aggregate into large and easily discoverable amounts; to its power (probably exerted directly upon the elements) of impoverishing the blood; to the irritative action it has upon the nervous structures in which it is in part deposited, and in which it produces degenerative changes; to the same action exerted on the liver, through which both nutrition and the excretion of wastes is interfered with, and on the kidneys whereby the excretion of wastes is checked, so that effete matters are retained in a degenerated blood-stream, and in their turn act as deleterious poisons. Thus it appears that lead is a slow and insidious poison, generally obscure in its earlier effects; sometimes productive of permanently diminished efficiency of vital organs.

5. In consequence, the usual effects of lead poisoning are, briefly, as shown in the following description, which is compiled from the experience of medical practitioners at Broken Hill, and mainly from the evidence appended hereto; it does not differ in any important way from similar descriptions compiled from experience got in other parts of the world, although, for reasons to be given later, it is in some respects defective. The earliest symptoms are indefinite as a rule, and such as are comprised under the word indisposition; that is to say, the appetite becomes poor, the face pallid, the bowels constipated, and the day's work is done

done with reluctance as well as with difficulty. After a longer or shorter time, during which indigestion, a sweetish taste in the mouth, a foul breath, slightly ulcerated gums, and rheumatic pains gradually show themselves, an acute attack of colic supervenes; very severe pain is suffered for a few days, and weakness remains after the pain has been relieved; but in two or three weeks the sufferer is again able to work. If he should then resume his occupation he will most likely experience the same train of symptoms over again, and repeated attacks of colic will ensue; his digestive powers will become weaker and weaker, his pallor greater and greater, until at last he finds himself compelled to relinquish his business and to resort to some other. But too often he carries to it a broken constitution. After a time of withdrawal from influence of lead he may recover his health to a considerable extent, but seldom perfectly; the subtle degenerations of structure which have already been spoken of persist and progress; and, from vital organs becoming inadequate fully to perform their functions, he becomes prematurely aged, and liable to be carried off by one of those affections which so often are the immediate cause of death in the old, but which are usually escaped or survived by the young and vigorous. Earlier or later in the course of illness many sufferers from chronic lead poisoning get muscular paralysis in addition, of which dropped wrist, familiar to plumbers and house-painters, is an example. This paralysis is often delayed, sometimes even until exposure to the source of poisoning has ceased; and when it does appear it is often permanent. In other cases, which occur in but small proportion, the brain seems to be especially attacked, and epilepsy is caused; in yet another form, which attacks but a still smaller proportionate number of leaded persons, the sufferer continues to work, unconscious of danger, until he is suddenly struck down by an apoplectic seizure, in the course of which death ensues after a day or two. In two or three instances a form of insanity has been seen to follow here. Rheumatic pains, felt principally about the knees and legs, commonly attend upon the symptoms already mentioned, but pronounced arthritis (or chronic joint inflammation and distortion) has very seldom been observed, probably from want of opportunity to watch the more serious cases sufficiently long. Affections of the eye, not infrequently traceable to leading, have not been noticed here; and especially no case of optic neuritis has been seen among mine hands. Gout is extremely uncommon, practitioners of long experience having seen but very few cases, and those not in lead-workers alone. (Q. 1986, 2154, 2208, 2756.)

6. Thus it appears that a description of chronic lead poisoning deduced exclusively from experience gained at Broken Hill would be wanting in some details usually witnessed elsewhere; whence it becomes necessary to say a word of conditions of labour there, to which the deficiency referred to is probably due. One of those conditions lies in the circumstance that silver-lead production is a branch of mining but recently undertaken in Australia, so that the workmen employed at it are largely miners of other metals, to getting which they can sometimes revert if they get leaded. Besides this, miners of all kinds often have a trade or some occupation altogether unconnected with mining, which last they have been accustomed to follow only at intervals; this, also, opens a way of escape from an occupation which many of them find hurtful. Another important condition is that among the several mines on the line not a few yield classes of ore in which either there is little lead, or which are found to be harmless in practice; and sometimes bodies of ore which are not dangerous are met with on the same blocks with and adjoining ore-bodies of the dangerous kind, so that men who have fallen ill while working at one mine can sometimes get employment at a harmless mine without leaving the locality. Sometimes, again, there is opportunity of exchanging from underground work to safe work at the surface; or employment may be found on some of the mines off the main line, which, as a rule, yield little or no lead, or at the flux and iron-stone quarries, whence large quantities of material are being daily gathered and sent in to the Hill. All these means of relief are open to and are used by a proportion of the miners, so that there is a pretty steady stream of workmen through the more dangerous mines. If, on the one hand, however, this may prevent any large proportion of miners from becoming constitutionally wrecked by enforced long adherence to their occupation, on the other hand it must expose a much larger number of persons in the course of several years to the slighter degrees of poisoning than might be supposed after averaging the number borne on the pay-sheets for the same period.

7. At Broken Hill the proportion borne by the lighter forms of lead poisoning (colic) to those which are more obviously persistent or more immediately dangerous to life is probably 85 or 90 per cent.; the remaining 15 or 10 per cent. being pretty equally divided between those cases in which muscular paralysis and wasting are the prominent signs, and those in which the brain is the main seat of injury. Actual figures were furnished by Dr. Bartley [*Appendix* E], who classified 294 cases of leading which were admitted to the hospital between 1st January, 1890, and 30th June, 1892, while he was house-surgeon; 85 per cent. of them were cases of colic, 13 per cent. were cases in which the brain was chiefly affected (epilepsy, dementia, and the apoplectic form called encephalopathy), while only 2 per cent. were attended by muscular paralysis. Dr. Harvey also furnished a statement (Q. 2391), drawn, however, from a brief experience of five months duration only; he had met with twenty cases of leading during that period of practice, of which seventeen were examples of colic, two were brain cases, and one muscular paralysis. Dr. Blaxland, who has practised here several years, furnished an estimate (Q. 2194); he thought that in every 100 cases 90 would be examples of colic, five would be brain cases, and five would be paralytic. The discrepancy in the proportion of colic to brain attacks, and of the latter to paralyses, between this estimate and Dr. Bartley's record, is probably due to the tendency of hospitals to attract the more urgent cases, and to the paralytic forms being of no apparent danger and unattended by great pain. Other medical witnesses agreed in general terms that the proportions mentioned are most likely correct, colic being very greatly more common than all other forms taken together. It was not thought that repeated attacks of colic usually led up to one of the other and more serious forms, but that (as one medical witness put it) patients usually "stick to their type" of illness (Q. 2673); but perhaps this opinion would be modified if the general conditions either obliged workmen to steadily persist in returning to work after each attack of colic, or permitted such patients as retired after suffering two or three times to be subsequently watched. However, it is well known, and is observed here, that susceptibility to lead varies very widely in different persons. There are those who can work in lead almost with impunity for years without taking any special precautions (and even at that most dangerous industry, the making of white-lead), while there are others who begin to feel ill almost as soon as they are brought into contact with lead, and who are incapacitated, or even killed, after an exposure of a few weeks. This difference between people appears to depend on a constitutional peculiarity, which stands in no relation to general robustness or muscular strength; the special susceptibility is inevitable when it exists, and therefore any person who finds that he possesses it should not try to overcome it, but should forthwith retire from an employment for which he is unfitted by nature. As, however, it is beyond possibility to make a majority of persons engaged in lead-manufactures understand this, or, at least, voluntarily act upon it; and as there is no difference of opinion among the well-informed, who know that continuance at the work in spite of this natural unfitness can only end (and after no long time) in permanently incapacitating illness or death; the case is one for interference of Governments. But it is much easier to point this out than to devise a way of prevention; and after careful consideration it appears to us that no law or regulation which could be enforced can be based upon the knowledge just recapitulated. This natural incapacity to resist lead is matched by an incapacity which is acquired. It is equally well-known, and equally observed here, that drinkers are especially susceptible to this poison. Medical men and employers alike observe that lead picks out the drinker; if others escape, he is sure to suffer.

8. Such are the effects of mining and smelting silver-lead ores at Broken Hill, as far as it has been possible to follow them. In different persons they differ in the speed with which they make their appearance, in severity, and (from parts being selected for attack in some people which in others seem to be passed over) in manifestation; and it is likely that a large, although unascertainable, proportion of those who suffer in the slighter degrees do recover entirely if they withdraw from the danger in time and if their constitution happens not to be of the specially susceptible kind. The next question to be discussed is the extent to which lead-workers on this field actually do suffer—what the incidence of lead poisoning upon them is.

After

After much time had been spent in inquiring it turned out that no exact statement could be made; no records at all existed. The secretaries to the several labour unions which, at the date of earlier inquiry, June, 1892, represented about 4,500 men, could furnish nothing; the secretaries to the several Friendly Societies had nothing of value—they represented less than 1,000 men, admitted members of all sorts of occupations, and members entered on the books at joining as miners were in many instances found, after a time, to be following some other kind of employment (Q. 1620). Such officials at the various mines as could be examined had often no knowledge of lead poisoning among the workmen they controlled, or, at best, would admit knowledge of only rare or occasional cases (Q. 797, 957, 1435, 1544); an attitude of mind with reference to a circumstance perfectly well known to every other adult inhabitant of the town, to which it will be necessary to revert when certain recommendations and the manner in which they can best be enforced come under consideration. No figures were furnished by the medical witnesses, but several estimates were given of the number of leaded persons met with by them in the ordinary course of the year's practice. Thus, Dr. Belgrave thought he met with 300 cases during the year, and (Q. 2052) that it would be impossible to find more than 1 or 2 per cent. of all miners working in the British, Block 14, and the Proprietary mines who had escaped leading, and possibly not a single one; and he expressed the opinion that taking all hands together (surface and underground) probably three-fourths became leaded sooner or later. Dr. Blaxland thought he saw two or three cases every week (Q. 2164). Dr. Groves thought (Q. 2282) he saw about three a week, excluding "mild cases." Dr. Emilius Thompson met with about five cases a week (Q. 2646). All the foregoing have practised in Broken Hill four years or more. Then Dr. Evill, who has practised here about a year, had seen thirty-eight cases during the latter six months alone (Q. 2562); and Dr. Harvey had seen twenty cases during a short experience of five months (Q. 2388). Lastly, from Dr. Bartley's record already quoted, it appears that about 118 cases per annum (or more than two a week) are admitted to the hospital, where, for economical reasons, admissions are limited as far as possible to the more urgent forms of illness. Thus, although the above statements are for the most part merely estimates and not records, they amply serve to prove that leading is an extremely common cause of illness among workmen at the mines; but should doubt remain in any mind then reference may be made to the five witnesses brought forward by the managers to show that some workmen had followed their employment for years without suffering (Q. 2788–3227). It appeared from the evidence they gave that none of them had ever been laid off by leading; but on examination it also appeared that three out of the five showed a well-marked blue line. These three, then (but the medical testimony in general shows clearly that even in leaded persons the blue line is so often absent that it is its presence alone which is of value in judging the cause of an illness)—these three then, although not ill, afforded evidence that they had absorbed and were eliminating lead; so that, if they had so far escaped such illness as would incapacitate them for a time, that was due, not to any care taken by themselves or others, but to the personal insusceptibility, or (possibly) power of steadily eliminating the poison, which some people seem to possess. Such people, however, are in a minority, and lead-works must therefore be regulated in the interests of the majority, who are sure to suffer by them. The first step towards such regulation is to provide for ascertaining the extent of the evil to be abated, and for subsequently watching its fluctuations. This can very easily be done on this field since the mine-owners have lately undertaken the management of a sick-fund to which every workman is obliged to belong; every man laid off has, of course, to furnish a medical certificate of the cause of his absence from work.

9. But the lead-workers themselves are not the only persons who are here exposed to risk. Lead is volatile at high temperatures, and very large quantities are steadily poured forth from the smelter-stacks by day and night. The loss from the twenty-eight smelters, of which none are of less than eighty tons capacity, thus suffered in the form of "smoke" was calculated by Mr. W. M. Hamlet, F.C.S., to contain a quantity of metallic lead and silver in excess of fifteen tons weight of metal every twenty-four hours—a moderate estimate, probably well within the truth (for the data and calculation *see Appendix* L). This for the most part is in an exceedingly attenuated and light form, which floats away to great distances; but another part consists

consists of sensible particles which are heavy, and which are deposited at a distance from the stack from which they have issued, which varies partly with their size and partly with the state of the atmosphere. These two constituents of the "smoke" are distinguished as fume and flue-dust, and their actual contents at Broken Hill were found to be as follows :—The fume consists of that metallic vapour which arises when the molten metal is brought into contact with atmospheric air which is forced into the furnaces in the form of a cold blast, at a pressure of about eight ounces; thus lead, silver, and copper oxides, chlorine, bromine, iodine, and sulphur compounds, traces of antimony and arsenic,* and (rarely) of selenium and mercury compounds, make up the fume. The heavier part or flue-dust consists, first, of particles of all that goes into the furnaces borne out upon the draught—of coke, quartz, limestone, and iron, lead, silver, and manganese ores; secondly, of minute globules of argentiferous lead as metal, together with lead oxides and sulphates, and traces of arsenic* compounds. The proportion of lead in flue-dust varies between 20 and 40 per cent., the quantity of silver from fifteen to thirty ounces fine per ton of dust; and the amount of dust deposited in the flues is about one-third of the total produced, two-thirds being discharged to the air. Although the stacks reach to heights of from 200 to 300 feet above the houses, yet the prevailing wind very frequently indeed directs the smoke towards the earth, and so that it strikes it at about the distance of the nearest street to the north. Hence the houses in the north town are very frequently, though not continuously, enveloped in the fume, and the various forms of lead and other mineral compounds are deposited on roofs and soil; a point on which the following observations were made [*Appendix* L] :—

Samples of the air were tested from a point distant twenty-two chains from Block 14, and somewhat more than one-twentieth of a grain of lead was obtained from one cubic foot, equivalent to fifty-two grains per 1,000 cubic feet of air. Glycerine-coated plates exposed on the verandah of the "Freemason's Hotel," in Argent-street, for eight hours were found to collect three and one-third grains of lead, and traces of arsenic per square foot of surface. On 31st January, the smoke from the British and Block 14 was blown downwards immediately over the town, and was found to pollute the atmosphere very considerably. As much as 165 grains of lead was estimated per 1,000 cubic feet.

Thus, those persons who live in or frequent those streets which are nearest to the Hill (of which Crystal-street runs parallel with it at a distance of about 400 yards, while Argent-street, the principal business thoroughfare, lies parallel with and next to Crystal-street) must have frequent opportunities of respiring these lead compounds with the air, both directly from the stacks and indirectly from the ground on which they have been deposited, and from which they are raised again on the winds which almost constantly blow there, and which keep the atmosphere more or less laden with dust. Nor would these lead-particles reach the inhabitants by the lungs alone. Until the end of 1892 the water supply was either from private overground or underground rain-water tanks, or from public open tanks, or from private ponds; and these reservoirs, in many cases still retained to catch rain-water, so as to economise the use of the town water which is sold by meter, do contain lead in solution. Thus, lead was found in the waters of eight sources of domestic supply out of thirty-one which were examined, and in quantities which varied from traces to one-fourth of a grain per gallon [*Appendix* L], the latter being a large quantity, and having been found in a water-tank attached to the Central Public School. [*See description and comment in Appendix* C.] In another case which was separately examined, and which will be referred to again below, no less than five and a half grains of lead per gallon were found in the iron water-tank from which the household was supplied; but the water had fallen low before the sample was taken, and had been purposely so stirred up that the deposit at the bottom of the tank should pass into suspension. Thus, many people living at Broken Hill within an unascertained limit of distance from the smelters are exposed to danger of respiring and of swallowing portions of lead-compounds; it is therefore necessary to inquire whether the public health (of the townspeople as distinguished from the lead-workers) suffers from the industry carried on in their midst.

10. When the subject of inquiry is some influence suspected of acting unfavourably upon the general body of the population, the registered causes of death usually afford the required evidence. But, as has been pointed out above, lead is not very often a direct or immediate cause of death, and therefore leading cannot be expected to appear frequently in the register; and, in fact, it does appear in the course of the five years,

* No evidence whatever was gathered of arsenical poisoning.

years, 1888-92 only eleven times. [*Appendix* B, *Table* XII.] For the same reason however, since cases of death from leading do appear year after year it is certain that there must be a large number of cases of non-fatal illness from which such deaths, even in small number, could alone be furnished. From the Table quoted it appears that all those who died were lead-workers, with a solitary exception; here, then, is farther evidence that lead-workers do suffer in numbers—which has already been ascertained in a more direct way. Only one death among the general population was registered during those five years as due to leading; and that was of a child belonging to the family of the manager of Block 14, who is believed to have been poisoned in consequence of a habit she had of picking flowers and putting them in her mouth, the flowers bearing visible particles of flue-dust which had fallen upon them from the smelter stack under the shadow of which she resided. Fatal cases among the general population could not but be rare at the worst; the latter number many more than the total workmen, but on the other hand the conditions of their exposure are entirely different—much less persistent and less close, and probably of rapidly decreasing importance as distance between their residences and the stacks increases. Failing deaths, as in the nature of the case they usually must fail, the general causes of death must be examined for a preponderance amongst them of those diseases to which chronic lead poisoning conduces. Those general causes will be found abstracted from the registers for the years 1888–91, tabulated, and as far as possible analysed, especially for the purposes of this inquiry (the births and deaths in no town or district outside Sydney being as yet returned in a form useful for purposes of practical sanitation). It will be noticed that the diseases referred to do occur; but they are more often due to what may for the present be called indifferent causes than to leading, and upon consideration it does not seem that they appear in these lists in proportions which would make it necessary to seek a special cause of them such as leading would be (as to infantile deaths *Cf.* medical evidence under Q. 2084, 2220, 2321, 2710.) Probably, then, the townspeople are not subject to leading in any such degree as would leave manifest traces on the death-roll; but that is far from being equivalent to a statement that they do not suffer to any appreciable extent. Farther and more direct inquiry was made with assistance of the medical witnesses. In part their evidence was clear, in other part it was little more than conjectural. Dr. Bartley said (Q. 1974–84) that many townspeople were admitted to the hospital, and among them he had seen four who were leaded; but in those instances he had traced the illness to the causes of leading which are met with in every large town, and therefore they stood in no relation at all to the works. But he had, in addition, seen cases of malaise, languor, and anæmia, which might probably have been due to leading (no other cause being assignable), and he had seen "a slight blue line in several cases in which no other symptom of lead poisoning was present" (Q. 1980). That he had never seen a leaded female (Q. 1949) seems to be an observation of some importance (but compare Dr. Belgrave's evidence *infra*); but he pointed out that his hospital experience was limited in several directions, and that the doubtful or, rather, not certain cases he mentioned had come before him casually. Dr. Belgrave had met with two cases of leading which were not referable to the common risks of town life referred to above—one in an infant, the other in a woman, both of whom lived in the north town and about half-a-mile from the Hill. Dr. Groves had seen one case among the townspeople in a man who drank a great deal of water from roof-tanks attached to premises in Crystal-street (2312–20); if this patient got lead with his drinking water, he should expect that many other persons would get it by the same channel, and thought they probably had done so, although no other case of consequent illness had fallen under his notice; he met with no cases of indisposition among townspeople which he could not satisfactorily account for without reference to lead, and was not of opinion that the smoke had any appreciable effect; he thought that children who lived within 400 yards of the smelters did suffer, but not adults; and, finally, that the general population did not suffer from leading. Dr. Harvey, who had practised here but five months, had met with cases of ill-defined illness, in producing which he thought lead played a part (2414-9); he had never actually diagnosed lead poisoning among the townspeople, and, as far as that went, thought the fumes not harmful, but, on the other hand, he would not express an opinion that they were innocuous in view of the ill-defined cases he had mentioned. Dr. Evill's opinion was (2555–640) that the fumes were deleterious to the townspeople, and that children suffered to about the

age

age of ten years; but the evidence on which he relied was not clearly given, and should be referred to. Dr. Blaxland thought that leading was practically confined to lead-workers; and Dr. Emilius Thompson (2702–9) considered that the fumes were practically innocuous, having very often heard them accused, but after long and careful watching having formed that general opinion nevertheless. The evidence of these two last witnesses was made weightier by the circumstance that both gentlemen met with their first cases among townspeople after they had given it, and they deposed to them on being recalled under Questions 3618 and 3620.

11. Connected with the foregoing inquiry was the fate of animals kept within moderate distances from the Hill. The evidence on this point was unanimous; it was wanting in detail, but certain facts appeared. There is no doubt that milch cows kept within a radius from the Hill of between 1 and 2 miles at farthest suffered from an illness which was new to persons acquainted with stock, and sometimes died of it; also that they recovered from it after being removed to more distant spots. It was also certain that there was mortality among cats, dogs, and fowls not met with in other localities, and which diminished as the distance from the Hill at which they were kept increased. There were no sparrows in the district, and other birds, although not entirely wanting, were rare; on the other hand, there was no difficulty in keeping many different sorts of cage-birds (even quite near the smelters) provided sand put in their cages was carefully gathered, and not scraped off the surface within something like the radius mentioned.* The evidence showed, then, that animals suffered from an illness which was connected with locality, and that the locality was included in a circle of from 2 to perhaps as much as 4 miles in diameter, to which the Hill was central; but attempts to more exactly define the area, and to ascertain whether its quality were equally fatal over the whole of it or stood in any definite relation to prevailing winds, failed. So, also, it has to be admitted that attempts made to ascertain the nature of the illness, or, rather, whether it were due to leading, also failed. Only three bodies of animals said to have died of it were procured—a horse, a fowl, and a dog, and in the latter alone was lead found. [*Appendix* L.] Several samples of soil, and the only sample of herbage that was gathered, taken within a fourth of a mile of several stacks and to the north of them, all contained more or less lead [*Appendix* L]; while similar samples gathered in the south town only yielded traces. It appeared, on the whole, that animals which ran about the surface and took their food therefrom were those chiefly exposed to danger, which the immunity of carefully-tended cage-birds supported to some extent; and the Inspector of Stock had observed that there was less illness of the kind now referred to in a bad season, when food and water had both to be supplied by hand, than in a good one, when the animals were allowed to wander and to pick up what they could for themselves. (Q. 2773.)

12. In attempting to answer this important question, whether the general public health was injuriously affected by the smelting operations or not, after carefully considering the circumstances we found the *data* were as follows:—Matters are emitted from the stacks in large quantities, which could, and, in one case at all events, probably did destroy human life. In the case of some persons who lived within 600 yards of the Hill, and to leeward of the smelters in relation to prevalent winds, it was shown by medical evidence that leading occurred, and was not traceable to any other cause than near neighbourhood of the smelters and consequent exposure to smoke. Other medical witnesses testified that they met with cases of illness among the townspeople which they suspected were due to leading, although they could never make certain of it; and evidence of similar kind, but of greater weight, was got from inspection of the scholars in the three public schools. [*Appendix* C.] These are distinguished as the North, Central, and South schools, and the average attendance is respectively about 500, 800, and 600. The children who attend the North school come from neighbourhoods east and northerly from Oxide-street; those who attend the Central from west of Oxide-street, and easterly thereof so as to include nearly all the length of Argent-street and the streets between it and the mines; those at the South school are residents of the south town exclusively. [*See Map.*] The result of inspection of the scholars in class was as follows:—At the South and North schools there were not more than half-a-dozen scholars altogether whose

* It may be here noted that persons of many different classes generally agreed that fleas and bugs were rarely met with, although not absent; but merely as an observation of fact, and without attempted explanation.

whose pallid appearance attracted attention, but at the Central pallor seemed to characterise them as a body, and in many individual cases was very marked. The markedly pale children being in some instances interrogated were often, but not always, found to live either in Crystal-street or in streets to the west of Argent-street, but close to it. The relation to the smoke of the three districts roughly indicated above will be understood at once if the usual prevalence of southerly winds and the line of smoke-stacks on the Hill be compared. The south town is almost free from it; it blows in that direction very seldom, and then for but a few hours at a time. The northerly district is, no doubt, on the line usually taken by the smoke, but (regarded as a source from which scholars come) it may probably be taken to begin at least half-a-mile distant from the nearest stack, and to stretch far away northerly. The Central school, however, draws its pupils in great numbers from just those streets which lie within three-quarters of a mile from the Hill, and are pretty constantly bathed in the smoke; they are the streets upon which the smoke was seen so often to beat down before it rose again and was carried farther afield; they are the streets immediately adjacent on one side or the other to those spots at which the air was found to be so heavily charged with flue-dust and lead-fume; they include the streets in which the indubitably leaded persons and the doubtful cases spoken of by certain of the medical witnesses lived. Then, it was proved that lead is borne upon the air, by examining the latter in suitable ways at points of the inhabited area near to the stacks and farther away; lead was found in drinking-waters and in soils: animals died of an illness connected with locality, and that locality lay within a short distance of the Hill—the exact radius could not be ascertained with reference to the properties on which their owners lived, and especially it could not be ascertained in particular cases whether the animals had wandered or had been confined to such properties. From these *data* we conclude that the fumes are injurious to the general population; and after considering all the circumstances, it seems probable that at this place the effectively poisonous part of the matters which issue from the stacks is the heavier part, or flue-dust—no direct evidence having appeared to show that the fume which travels to very great distances actually exerts poisonous influence; and that the flue-dust affects man, perhaps, mainly through drinking water. Hence, we are of opinion—not that lead-fume is innocuous, but that in the present case the task of preventing the escape of particles of flue-dust should be regarded as imperative and urgently needing to be undertaken. It may be pointed out that the expense incurred in any alterations necessary to prevent its escape would probably be balanced, or more than balanced, by the great weight of lead and silver which would be saved, but which at present is entirely lost by scattering over the country: and on the other hand it must be noticed that the smelter-nests have here been erected absolutely without reference to the effects likely to be produced on the health both of workmen and of neighbouring residents. The proof of this lies—first, in the convenient but remarkably reckless way in which the ports for removing flue-dust have universally been made to open into those populous and partly-enclosed spaces, the tapping-floors (but on this point see farther below); and, secondly, in the circumstance that the total length of flues, reckoned from the junction of the first furnace-flue with the champion flue to the top of the stack, varies at different mines between about 250 feet and 600 feet only, whereas at works where economy is an object, and where in consequence exit to the air of valuable material is as far as possible prevented, corresponding flues are usually built of lengths which vary between half a mile and several miles, even up to 8 miles.* No hesitation, therefore, need be felt in insisting upon the alterations referred to; and, in fact, Mr. Howell, who is General Manager of the Proprietary Mine has already caused experiments to be undertaken with an apparatus which, it is expected, will save much of the heavier dust. [*See Appendix* K.]

13. The general public health being thus appreciably injured by the flue-dust discharged at present from the smelter stacks and (apparently) not in any other way, and the remedy being a profitable process of catching and retaining the dust within the flues for re-smelting, this branch of the subject may be dismissed for the present, and

* The flue at Sunny Corner Silver-lead Mine, New South Wales, approaches a mile in length, and rises several hundred feet.

and the circumstances under which lead-workers become leaded in the large numbers already noticed may be inquired into. To lead-workers alone, then, the following remarks refer:—The channels by which lead enters the body are three—the stomach, the lungs, and the skin. Of these, the stomach is that which should be most carefully guarded, although the others have real and great importance; and the difficulty of guarding it is considerable, and arises in the many and hidden ways by which it can be reached. Thus it can be reached by a dusty atmosphere, particles of lead-dust being filtered out of respired air, caught against the back of the throat, and thence swallowed. Thus:—

Some of the dust obtained from one of the lead-stopes was analysed and found to contain 8 and 15 per cent. of lead respectively * * * Some of the air in the stopes was found to contain ·38, ·40, and ·51 grains of lead per cubic foot in suspension as dust or solid particles * * * while some sputum obtained from miners contained 2, 1·6, and 1·8 grains of lead respectively. [*Appendix* L.]

Or, dust falls directly on the lips and is swallowed in moistening them; or dippers exposed in a dusty place communicate lead to the water subsequently drunk out of them; or food which, perhaps, may have been carefully wrapped in paper to protect it, becomes contaminated by being touched by dirty hands. By dusty air the lungs also are reached, to which the finest particles are drawn in and are there rendered soluble and capable of being absorbed into the blood; yet the lungs probably become most important as a channel of entry when the exposure is to strong fumes of molten lead, such as escape from the lead-well, from molten slag, and occasionally from imperfectly constructed furnace throats, or from well constructed furnaces under certain occasional conditions of the ore within them; or such, again, as obtain when water-jackets have to be replaced while furnaces are in blast. That the skin affords a sufficiently easy channel of access seems proved clearly enough, though it has been doubted, by the numberless cases of leading which have been traced to use of lead-containing hair-dyes. In every other instance the chance that lead has entered by the mouth as well is very great, but in that one not great; and thus although it is impossible to assign to the skin its exact degree of importance as a channel under the conditions of mining, which are such as to make sure that in every instance in which the skin is dirtied some of the lead-compound shall be swallowed as well, stress should be laid upon need for keeping the skin thoroughly clean and free from prolonged contact with lead-dust. Leady clothes have an indirect importance likely to be overlooked; it is that the movements of the body must drive out the particles in small clouds, whence they may be inhaled with the air. The custom of cutting plug tobacco while at work, and of rubbing it small for the pipe with dirty hands, is also a means by which lead in the form of vapour reaches the lungs and the blood.

14. The workmen chiefly exposed to dust are underground hands in general, and these include carpenters sometimes employed underground; and among surface hands, those who feed concentrators, and all hands on smelter feed-floors, who are liable to have it blown upon them when trucks discharge ore into the bins, and when the ore is shovelled into barrows, weighed, and tipped at the furnace throat to be fed in by the feeder. Those who are exposed to that dangerous material, the flue-dust, are all those engaged at smelter-nests on both upper and lower floors, and, of course, those engaged to remove it from the flues. Those especially exposed to danger from fumes are tappers, bullion-skimmers, and slag-wheelers; workmen engaged on feed-floors to a small extent generally, but to a greater extent when (as at the Central Mine) the feed-floor is not doubled with close and broken joints, so that the fumes which ascend to the ceiling of the tapping-floor are able to pass through it without much hindrance; and, lastly, workmen who repair furnaces in blast.

15. The manner in which work is carried on below ground may be expressed (for the present purpose) as follows:—A perpendicular shaft having been sunk, a horizontal drive is run off it along the lode; this gallery is lined with squared timbers to carry the super-incumbent weight; passages at right angles to the main galleries are carried to suitable distances, and are opened out by removal of the ore; the cavity thus formed is called a stope; it is carried up in the ore and divided by timbers into floors, which are connected by foot-ways; shoots are also carried up by which the ore is passed down to the main level, delivered into trucks, and thence wheeled along a tramway to the plat in the shaft, whence it is lifted to the surface. The more shafts there are, and the more complete the connection of the various passages with them, and with channels called air-passes which are sometimes carried to the surface for

purposes

purposes of ventilation only, the better is the ventilation of the main galleries; but in every mine any recess carried off a well-ventilated passage must of necessity become less and less well ventilated until it has been carried far enough to open into another well-ventilated passage, or in the case of stopes, until they have been raised high enough to open into a level above that from which they started. The ore is broken by blasting, or sometimes with the pick, according to its character, and thus great quantities of dust are raised which settle upon the timbers, and which are raised again and again by every fresh concussion. In addition to dust, the air becomes mixed with carbonic acid from the earth itself, from candles which are burnt for light, from human respiration, and from combustion of explosives; and the fumes of dynamite form a serious impurity of another kind. The character of the dust, the extent to which it is sometimes present in the air of the stopes, and an idea of one way by which it enters the stomach from this source, may be gathered from the quotation already made at page 18 from *Appendix* L; in which latter, also, a note is made of the warm and oppressive feeling of the air met with in some of the less well-ventilated stopes and passages. This matter of ventilation is one of great importance, both in general and as regards presence in confined air, not only of lead-dust, but also of dynamite fumes. Natural forces are relied upon to ventilate metalliferous mines, and as regards main galleries are here sufficient; however, they must be supplemented in the recesses just referred to, and generally by forced currents of air. Now, in the first place, it seems necessary to furnish the Mining Inspector with a criterion of good ventilation, and not leave it, as at present it is left, entirely to his judgment, which practically means to his personal sensations—in this matter misleading, and therefore worse than useless. We have concluded that in such mines as these, where the main galleries furnish a nearly normal atmosphere, and the earth but little carbon dioxide, a criterion may be found in the proportion of carbon dioxide present, and that where the proportion exceeds one part in 1,000 parts of air the Inspector should have power to order work to cease in that place until, either by putting in a blower or by some other means, the proportion shall have been reduced to less than one part per 1,000 parts of air. Then as regards the laying of dust and dispersion of dynamite fumes, we draw attention to the following matters:—Water is at present led (in carefully managed mines) so that it can be scattered over lead faces, and it is usually run from an ordinary rubber hose; secondly, the fans by which the forced ventilation just declared necessary is best effected are most conveniently and most economically worked by air compressed at the surface and conducted below in pipes. Then, what is wanted to lay dust is not the slop of water which issues from a hose, but a fine spray which shall damp without wetting; and such a spray if properly produced would have the farther effect of washing the air as it passed through it, and so of clearing it of suspended dust particles. To produce this spray why should the compressed air not be turned into the water-pipe? But it is especially desirable to kill the dynamite fumes, and for this purpose it would be easy to devise a spray-apparatus which should be worked from the compressed-air pipe, and which should be fed with a solution of proto-sulphate of iron. Thus the three main objects might be gained at one operation, and gained quickly; the dynamite fumes would be killed, the dust would be washed out of the air, the face and dislodged fragments would be damped, while no superfluous water would drip through the floors, &c., &c.; and there cannot be doubt that so far from its being costly to secure these advantages to the workmen it would prove profitable—by actual saving of time after shooting, and, less directly, by the improvement in working power and energy which attends upon a pure atmosphere when it is substituted for a foul one.

16. The dangers due to dust (aggravated in the stopes underground by the other causes of ill-health which attend on faulty ventilation), are continued at the surface, in as far as ore is there handled after being raised, although in a minor degree, no doubt. Other and fresh dangers are now added, however—they are those which attach to the operation of smelting. The way in which this part of the business is conducted is the following:—The smelting furnaces are structures which have an area of 47 square feet, and which are 14 feet high; they are fed at the top; a forced draught is supplied to them at a pressure of about 8 ounces; they stand in a row, and parallel with them runs the (champion) flue which leads

leads to the stack, and with which they are connected by short furnace-flues, which enter it at right angles; bullion and slag are drawn off at the bottom by apertures which are pierced at different levels, and which are stopped with wet clay; the bullion is run from the crucible into the lead-well, where it is skimmed, and then ladled into moulds; the slag runs into iron pots on wheels, from which it is discharged at the edge of the slag dump. The furnaces are placed in view of the needs thus indicated; they have to be fed at the top, and, therefore, when possible, a hill or bank is chosen, in the side of which, at a low level, a surface is cut on which the smelters can be built; this surface forms the tapping-floor, and the slag dump is continuous with it. Then the champion flue is built in the angle between the level surface and the cutting, and the tapping-floor is covered by a shed, which is closed on the side of the cutting, and sometimes at the two ends as well, but which is always left open on one longitudinal side—that, namely, parallel with and opposite to the champion flue. This shed has two stories—that is, the ground, or tapping-floor is ceiled; and the ceiling stands at the height of the smelters, so that on the first floor the oblong openings through which they are to be fed are seen like traps in it; and this part is called the charge- or feed-floor. The feed-floor is roofed, closed at the ends, and open on one longitudinal side—that, namely, opposite to the side on which the tapping-floor below is open; and as the structure ascends in height the bank falls farther and farther away from it, so that the feed-floor has to be run back to the bank to touch it, and thus a very large unroofed part of this floor is made. Upon this latter are several large open bins, and above the bins is a tramway; trucks which run on the tramway discharge ores of different grades, flux, and coke into the several bins, and opposite the latter stand weighing-machines. A hoist connects the tapping and the feed floors, and by this slag and flue-dust are raised for return to the smelters. The course of proceeding is briefly as follows: workmen, called charge-wheelers, take ore, coke, flux, &c., from the various bins in the required proportions, which are measured by weighing, and dump them at the furnace throat; thence the feeder gradually supplies them to the furnace; they are smelted in the blast, and tappers on the floor below draw off the bullion to the lead-well and slag to the slag-pots; the bullion is transferred to moulds by the bullion-skimmer, and the slag to the slag-dump by the slag-wheeler. The main or champion flue accumulates flue-dust, which is daily removed by special workmen; it accumulates between the first furnace-flue and the base of the stack, and is carefully hoed out, so as not to cause more of it to blow about than can be helped, at small ports in the main flue, to the tapping-floor at the base of the latter—for from the mode of arrangement which has just been described it will be seen that these ports can be placed only so as to open into the smelter shed on the tapping-floor; it is cautiously wetted, so as to convert it (or rather most of it) into a moderately wet mud; it is then shovelled into trucks, which are sent to the feed-floor by the hoist; the hoist rises high above the feed-floor, so that the partly wetted flue-dust falls to the latter through a height of about 12 feet; and it is taken thence in quantities of a shovel full and a half at a time by the charge-wheelers, and added to the charges they dump at the furnace-throat. Thence it is fed with a shovel again by the feeder.

17. Thus workmen on the feed-floor are exposed to the influence of ore-dust, of flue-dust, and of fumes; but the latter risk is there slight when furnace-throats are carefully constructed, when furnaces are running well, as they usually do, and when charge-floors are laid double and with broken joints. As for ore-dust, without for a moment suggesting that it is of no practical importance as met with on the feed-floor, it may yet be pronounced to be (*quâ* air-borne particles) in all probability of comparatively slight importance, and not to come in this respect of dangerousness into comparison with the same dust as it impregnates the confined and still air in the stopes underground; the danger of conveying it to the mouth from the hands remains, too, although doubtless in a lessened degree. The case with regard to flue-dust is different. This dangerous material, which, as already described, contains from 20 to 40 per cent. of lead, and chiefly in very pure metallic form brought to a state of extremely fine subdivision, is difficult to wet thoroughly; and consequently, when after wetting it is disturbed (as in discharging to a feed-floor from trucks) numbers of aggregations of still dry dust are disclosed, which until disturbance had lain hid in the centre of wet masses. Then, even if it were thoroughly wetted, yet outlying portions of the larger

larger mass become dry and reconverted to dust; and since the place of hoeing it below and of tipping it above is not protected from being trodden upon, portions of the mud must be carried by feet to various parts of the floors, whence, after drying, they must become detached and borne on the air. As to danger from vapours of lead, that seems to be small on the feed-floors; but furnace-throats are not always carefully constructed or carefully kept in repair, and then fumes escape continuously by cracks, &c., and cannot fail to be harmful in the long run. [*See Appendix* M]. On the tapping-floor the workmen are exposed to vapours and to flue-dust much more fully than on the feed-floor above. Vapours rise from lead and slag in course of every operation as long as they are molten; they do not often appear in considerable quantity, but the time during which they continue to appear in the course of a shift is rather long, and they cannot escape from the tapping-floor as steadily and as easily as should be possible. And so on this floor with flue-dust, from which the danger is so great and so constant that it seems likely (though impossible to ascertain) that the total effects of vapours may sink into insignificance by the side of the total effects of flue-dust: it has already been pointed out that because advantage is generally taken of a hill, to build against it and thus save part of the expense of staging to carry tram-lines above, that side of the flue which is away from the furnaces is inaccessible, and therefore the ports have to be on the furnace-side of the flues—that is to say, have to open on the tapping-floor. Then, in the first place, the tapping-floor has many persons on it and within the shed constantly; and next, while some dust blows about in mere process of hoeing it out of the flues, however carefully this may be done, much more must of necessity cling to the natural earth to which it is hoed and must be carried about the shed as mud adhering to boots, and both thence and from the soil near the flue, must circulate in the air, after the moisture which holds it for a time has been removed by the drying to which the heat of the neighbouring flue conduces. The arrangement described seems calculated to bring this finely-divided, and in part impalpable dust in contact with as many workmen as possible; the way in which it came to be made has been described. It appears to be dangerous and wrong, and to require alteration.

18. Certain conditions of labour are the following: The day is divided into three shifts of eight hours each; no man works more than one shift a day; every man works on a certain shift for a week, and then changes to the next for the next week. Each man, except tappers and slag-wheelers, is entitled to twenty minutes out of his shift; this is called crib-time, and it gives him an opportunity to eat the food taken to work, which is called crib. It is customary to carry this food in paper, and to tear the paper down to eat it, so that it is held by the part still remaining wrapped up. When crib-time comes, underground hands retire to any neighbouring spot which is well-ventilated; surface hands sit down on barrows, &c., at their work; and those engaged at the smelters cannot be sure of having their crib-time uninterrupted—usually it is so, but sometimes the furnaces run so that they cannot be left for as long as twenty minutes. Underground hands carry their tea or water below with them in their own vessels, and in quantity sufficient to last them through their shift. If the work is very hot, they drink their water before they have finished; then they may take their billies or bags to the plats, whence they can be sent up, filled by the brace-man, and returned. On the surface drinking water is furnished from tanks in which it is condensed from the engines, to canvas-bags, and a dipper hangs upon them by a wire loop. The bags are of different patterns; thus, at the Proprietary smelter-sheds they are circular and deep, open at the top and without covers, and the water has to be baled out with the dipper which hangs as described, exposed to dust; at the Central the bags are of similar construction, but have a rude and inefficient canvas cover, and the water has to be bailed out with the dipper; at the South the bags have a rough cover, and in addition a canvas pipe leading from the bottom, through which the water can be drawn by lowering its outlet end. The rule as to smoking, which is probably a matter of as much importance as any other, is that there shall be none underground; but this rule is neither observed nor enforced, and it appears that in practice it cannot be enforced. Above-ground there is no rule against smoking. Water is led below along main drives, &c., at some mines for the purpose of sprinkling the faces, to which it is conducted by hose. Above-ground changing-rooms are provided in accordance with the letter of mining regulations devised to meet the case of any but lead-mines; these rooms consist

consist of the barest provision that could be taken in satisfaction of the regulation referred to, and in nearly every instance had an appearance of never being used; in the one exceptional case the use was certainly very small, and probably exceptional. [*See Appendix* M.] Workmen appeared to us sufficiently aware of the desirability of washing hands before eating, of eating away from their place of immediate employment, of changing their home-clothes for working-clothes before going on duty, and of washing after shift; but the necessary opportunity or provision is not made by proprietors, nor probably will be generally made except under definite regulations very strictly enforced by an official responsible to the Minister; these should also provide for an entire reform of the manner in which drinking-water is at present furnished.

19. The danger of getting leaded is not the same to miners at different mines on the line, nor to those who are working in different parts of the same property; all silver-ores do not contain lead in important quantity, but, on the contrary, some are so dry (a term used with reference to absence of lead and to their consequent behaviour in the furnaces) that it is necessary to add lead-ore to them before they can be successfully smelted; some are damp, and afford much less dust than others which are free from moisture; some again are massive, and yield less dust in being blasted and broken down than do others which are not so compact and brittle, and which are more friable. These different kinds of ore are met with sometimes on the same mine; and when that is the case the proportion of dry ore (or ore containing little lead) being got is sometimes greater than that of dangerous lead-ore; it is then possible to so change the men from face to face that they shall work in lead faces and out of them alternately. At the Proprietary Mine this practice has been followed, and as far as could be learned with good results to the workmen, as it has been followed also at the South Mine, when changing character of ore-bodies rendered it possible. The kinds of ore met with at the more important mines are as follows:— Beginning at the north end, the British yields carbonates alone of grades which vary between 12 and 40 per cent. of lead; Block 14 yields carbonates which are of a less compact and much dustier character than those found in the British Mine, and a deposit of sulphides underlies them; the three blocks which constitute the Proprietary Mine carry ores as follows:— Block 13 is the principal lead-yielding block, and carries this metal in combination with iron, and in forms of which some are hard and some soft; Block 12 carries a silicious kaolin and ironstone ore with 7 to 8 per cent. lead, which is moist and putty-like; Block 11 formerly yielded carbonates, but that deposit has been worked out, and it now yields manganic iron-ore, garnet-sandstone, and kaolin, with a deposit of sulphides at bottom not yet touched. Block 10 has kaolin and sulphides, and but few spots in which some carbonates have been met with (and cases of poisoning are extremely rare or altogether wanting among the workmen at this mine); the Central Mine carries kaolin, carbonates, and sulphides, much mingled together; while the three blocks which constitute the South Mine carry carbonates of varying degrees of hardness, and, consequently, of danger. Thus, the lead-ores occur mainly in one of two forms, carbonates and sulphides, and of the two the sulphides are very massive and little dangerous. All carbonate ores do not occur in the same state, however; and there is some evidence that they are dangerous in proportion to their friability, or, in other words, to their dustiness. Thus, although exact figures are wanting as has been pointed out already, the South Mine, which carries hard or massive forms of carbonate ore, has not been so dangerous a mine as the British, which also carries carbonates but in a less compact form; and the British is beyond doubt less dangerous (dangerous as it is) than Block 14, which, again, carries carbonates, but largely in a pulverulent form, which sometimes is nothing more than a running sand or dust. So that the amount of poisoning met with at different mines will differ, first, according to the kind of ore met with, then partly according to the state in which dangerous ore-bodies occur, and, more indirectly, according as the mine affords opportunity for judiciously transferring the workmen from lead-faces to harmless kinds of work. Lastly, a mine at which no smelting is done will, of course, yield somewhat fewer cases than others. It is necessary to mention these circumstances, on which depend not only the amount of leading met with at particular mines, but also the closeness with which the management should be watched. But they vary too much, even at the same mine as work progresses, to influence regulations. These should be uniform, of general applicability, well known to all concerned (to men as well as masters), and easily enforced.

20.

20. We believe that the recommendations with which this Report closes need no other explanation than may be drawn from the above descriptions and comments. Before proceeding to give them, however, it is necessary to point out the steps which have already been taken by some managers to abate the risk of leading in their mines. In mines which afford bodies of harmless ore as well as the dangerous kind, it appears that men have been so allowed to work at the latter and the former faces alternately, as to benefit them considerably. This is to be commended, but it cannot, of course, be made the subject of any formal recommendation. The Proprietary is the sole property where this course has always been open; it has occasionally been possible at the South Mine; but at the British and Block 14 but one class of ore is got, and it has never been possible there. Something has been done to lay the dust at some mines, by carrying water-pipes through the principal levels, to which hose are attached, so that it can be delivered in the stopes. The Proprietary Mine and the British are equipped in this respect; these mines also are kept free from accumulations of dust and rubbish as far as possible, and bear evidence of careful tendance. Then, in the matter of forced ventilation, very much has been done at the Proprietary Mine, where little engines, which are moved by compressed air to rotate fans of large size, are numerous; these are made to deliver air to close places through 10-inch pipes, commonly called blowers. At the South Mine there is at the surface one engine of a different pattern for the same purpose, which is said to be all that mine requires; and there may be some similar small provision at another mine, but the Proprietary is the only one which is equipped in this respect. Then at all the mines such changing-rooms are provided as will serve to fulfil the letter of exisiting mining regulations; they are bare sheds with a seat round, and a few nails in the walls. Only at the South was there any washing accommodation, and there it was trivial and apparently out of use. Lastly, during the strike, baths were erected at the Proprietary Mine, which are excellent, and which appear to be used by the men in reasonable numbers; they are farther referred to in the Recommendations, and might be taken as a pattern (but not necessarily) for similar baths to be erected on the other properties. We are strongly of opinion, however, that baths and changing-rooms should be close together and in communication, and that the use of both these accommodations would be seriously restricted were they separately provided.

21. Something, then, has been done to reduce leading; but neither uniformly at all mines, nor systematically, nor with sufficient thoroughness. It appears necessary, therefore, to frame regulations to apply to lead mines especially; and after this inquiry we think that such regulations should be made so that they can be easily enforced by penalty for neglect, and so that the Mining Inspector may easily see that they are observed; and that they should be so published that the men may learn to what they may thus be newly entitled. Perhaps it is unnecessary to support by reasons the expression of opinion that new rules should be compulsory under penalties, since, after all, this is a merely usual arrangement; but we feel obliged to point out that the evidence appended hereto shows that not all managers are likely voluntarily to recognise the obligations under which they fall as employers of labour at so dangerous an occupation as this is. Thus, for instance, to illustrate the point, it is enough to quote the following evidence:—

Colonel Cecil C. Morgan, manager of the British Blocks:—

1435. *Chairman.*] Do any of your men get leaded? I have never personally known of a case.
1436. If a man desires to leave his work, does he state the reason? Not to me. No one has done so yet.
1437. If a man became leaded, and was obliged to give up work, or fell ill of a fever, or any other disease, and was obliged to leave, you would only know that he had left his work? Of course he would have full right to let me know, but I have never had any case brought before me by any man personally.
1438. Do you wish us to understand that your personal knowledge does not enable you to say whether or not your miners do get leaded? Yes. I have never had a case of lead poisoning brought before me—that is, of one of our men—since I have been at the mine:—

it being notorious on this field that the British Mine is the most dangerous in point of lead poisoning next after Block 14. Or the thoughtful consideration apparent in the following answer to Question 1439:—

1439. *Chairman.*] Do you take any precautions against leading? Yes; we do take every possible precaution; for instance, we take very great care in regard to ventilation. We also take great care in regard to keeping our faces sprinkled, so that the dust shall not fly around. Of course, as you doubtless know, there is great trouble in getting men to be strict in the observance of cleanliness. We always impress upon our men the necessity of changing their things when they go home, and especially warn them against sleeping in

in the garments they have worn all day; because, as they perspire freely, the dust will enter the system through the pores of the skin. I have had a great deal of experience in lead mines during the past twenty years; and have found the main thing, as well as the great difficulty, is to get the men to keep themselves clean, and change their clothes regularly. I may say, Mr. Chairman, that since I saw you at the mine, I have had a rather severe attack of rheumatism, and I was afraid that I would not be able to attend to give evidence personally, so I wrote out a statement of what I consider worthy of attention in regard to the conditions of work, &c., and with your permission I will make that statement here now:—

may be contrasted with the facts as elicited from Colonel Morgan at a later stage of his examination:

1446. *Chairman.*] You lay great stress upon the point of personal cleanliness of the men? Yes.
1447. But under the conditions of this town you know it is very often difficult for the men to get the conveniences for washing, or even the water itself for washing, in the ordinary way; probably they cannot afford to do it? I do not mean necessarily to take a bath frequently, but at least to sponge themselves down. What I consider the main danger is sleeping in the clothes they have been sweating in all day; a great many of them do that. I am speaking from hearsay, of course, but I have made enquiries, and I am positively assured they do.
1448. Do you provide a changing-house for the men on your mine? Yes.
1449. Do they use it? Well, they generally change underground. They take their upper garments off underground—they prefer it. They say they catch cold unless they have a jacket or something else on when going up.
1450. Can you describe your changing-house? It is a wood and iron building at the back of the shaft.
1451. It is quite true that the men who work underground do feel cold when they come to the surface, is it not? Yes; that is what they say. They would rather take their things down, and put them on when they are coming up.
1452. I suppose if they had a changing-room warmed by a waste steam-pipe running through it, they would be more likely to take advantage of it. You do not, I suppose, yourself recommend that their outer clothes should be hung up in the stopes, underground? Well, it certainly would be best if they kept their outer clothing away.
1453. What provision at the mine do you make for helping the men to carry out these rules of cleanliness which you think are of the first importance—what provision, for instance, have they for washing? We have no washing-place at the British. The fact of the matter is, directly the men reach the surface they rush away to their homes as fast as they can. I do not think they would use a convenience of that kind if they had it. Nor should I advise them to wash at the mine, because they ought not to put on their lead clothes again afterwards.
1454. That is what I have in mind. Of course, if every man could have a nice bath in his cottage, and have it suitably warmed in winter, I think I should recommend that he washed at home. But we know, as a matter of fact, that the majority of the men cannot make that provision for themselves; and therefore, it occurs to me, if cleanliness is of such importance, that the mine-owners might reasonably do something to provide for it. If, for instance, they provided warm baths—which might easily be done, with plenty of waste steam—perhaps there would be a considerable proportion who would not rush away from the mine as soon as they reached the surface; what do you think upon that? Well, I think we might try it; but I did not mean that it was necessary for the men to take hot baths regularly. I think if they sponged themselves down on leaving their work it would be all that would be required.
1455. But you know, perhaps, that in some lead works it is considered necessary, and the men not only take hot baths provided for them, but also medicated baths? I know it is frequently done in America; that is, that baths are provided for the men:—

from which it is reasonable to infer that rules having the force of law would probably be a judicious safeguard to provide. Or again, the attitude held by Mr. Lane, the manager of Block 14, towards the Board may be pointed out for consideration in this connection [*See the Correspondence printed in Appendix O.*] This mine is by common consent the most dangerous of all on the line [*see the evidence passim*], which is mainly due in all probability to the extremely friable and dusty character of the carbonate ore it yields: and yet it is the case that when at last the obstinate evasions of this manager were overcome, we were able to discover no provision of water-pipes for sprinkling and moistening the very dusty ore, and no arrangements for forced ventilation in places where it was much required; while for accumulations of rubbish, dust, and litter underground, these workings were conspicuous among those visited by us on this field. It is unnecessary, probably, to say more on these points, except that most managers were courteous and obliging; it is true that all alike were a little blind (as already pointed out) to the occurrence of lead poisoning, but that is a small matter on which it would be captious to lay stress. Regulations, however, have to be made so as to meet all possible cases, and they will not bear harder upon the humane and law-abiding for that they are strait enough to oblige the unruly.

RECOMMENDATIONS.

1. It should be illegal to employ females in any capacity at works where lead, lead-ores, or lead-compounds are mined, dressed, smelted, or manufactured.

2. It should be illegal to employ any boy below the age of 16 years underground at any mine where lead-containing minerals are got; to employ any such boy on the surface in any place where lead-ores, lead, or lead-compounds are handled; to employ any boy below the age of 14 years.

3.

3. The manager of every mine should be required to record the name, age, branch of occupation, and length of time employed of every workman laid off by leading, and to transmit a copy every month to the Minister not later than the seventh day of the next following month.

4. *Drinking-water.*—An ample supply of sweet and wholesome drinking-water, freely and easily available to all hands at all times should be maintained; (*b*) it should be stored with special care to prevent contamination with dust; (*c*) whenever canvas bags are provided—as, for instance they now are generally provided at smelter-sheds—they should be so constructed as to be closed at the top by a solid (not a canvas cover), and the water should be drawn from them through a metal or wooden tap (not a canvas pipe) suitably fixed to the bottom; (*d*) the dipper for drinking out of should hang in an enclosed place so as to be thoroughly protected from dust; (*e*) a pattern water-bag, &c., should be submitted, and after approval by the Minister should alone be used; (*f*) as an alternative to the pattern water-bag either condensed water safely stored as mentioned above, or Stephen's Creek water, may be drawn from taps on pipes connected with the protected reservoir of condensed water or with the public mains, provided an enclosed space for the dipper be furnished as already mentioned; (*g*) drinking-water should be supplied by pipe to every plat in the following way, the source being either the public water-mains or well-protected reservoirs of condensed water at the surface; the supply pipe should descend to the lowest plat and should there enter a closed metal reservoir of about 100 gallons capacity or larger; a delivery-pipe should return from the reservoir to the surface, and should be fitted with a tap at every plat for supply of water thus cooled to underground workmen. When the shafts extend to much greater depths than at present a modification of this arrangement may be necessary.

5. *Sprinkling water.*—On feed-floors and tapping-floors, and at every other place where dust is raised, stand-pipes and hose should be so provided that dust may be conveniently laid by sprinkling the ore &c.; (*b*) as long as flue-dust is collected and removed as at present, and as long as may be necessary, water for wetting it should not be delivered except by hose; (*c*) sprinkling water should be furnished in the main drives on all the different levels so that it can be led to every working, and so that it may be easily distributed to allay dust; (*d*) it is very much to be desired that pipes carrying compressed air should accompany the water-pipes into the faces for uses mentioned in the text (*see* Sec. 15); (*e*) such taps should be fixed on these water-pipes in the levels as would enable men to wash their hands before crib with least possible difficulty.

6. *Bath-water, bathing, and changing.*—At every mine bath-houses and changing-rooms should be provided, in general as follows:—(*a*) the baths should include both showers and plunge-tanks; (*b*) the changing-rooms should be attached to and in communication with, although separate from, the bath-houses, and should have boarded floors; (*c*) both bath-houses and changing-rooms should be available to the workmen free of cost at all reasonable hours and so that they can be used by every shift; (*d*) both should be reasonably comfortable, sufficiently lighted after dark, and sufficiently warmed in cold weather; (*e*) both plunge and shower baths should be supplied with water warmed to such a degree as may be found desirable in cold weather—probably to 75° or 80° F.; (*f*) a caretaker should always be in charge of baths and changing-rooms, and it should be a part of his duty to keep a day-book and to record therein the names of all persons who use the baths*; (*g*) plans and specifications of any buildings proposed to be erected in accordance with these recommendations, and a block-plan showing the position in which it is proposed to erect them, should be submitted for approval before beginning the work, and power should be reserved to the Minister to direct such improvements, extensions, structural alterations, and alterations of position, as may from time to time seem necessary upon report made by his officers.

7. Every underground workman should be required to change his ordinary clothes for working-clothes, in the changing-rooms to be provided for this purpose, before descending to his work; and to change his working-clothes for his home-clothes again on finishing his work and before leaving the mine. Surface workmen should have liberty to make the same change and should be encouraged to do it, but for the present need not be obliged. 8.

* This has already been spontaneously ordered by Mr. John Howell, the General Manager of the Proprietary Mine.

8. Emission of flue-dust from smelter stacks should be as nearly prevented as possible, and should at all events be very greatly reduced below what is at present allowed; a time should be named within which the necessary alterations are to be made, and such time should not exceed twelve months.

9. The way in which flue-dust is at present handled urgently requires radical alteration on some systematic plan which shall as far as possible avoid the possibility of its being blown about on the air; in the meantime points which should be insisted upon are the following:—(*a*) the ports by which flue-dust is removed from champion flues must not open into tapping-floors, but on the other side of the flues and into a space otherwise unoccupied; (*b*) the floors to which the dust falls when first hoed out, when tipped on the feed-floor, &c., &c., must be smooth and impermeable, slightly raised above the surrounding surface so that the deposited dust or mud may not be stepped on and carried about, and must be perfectly clean except when in actual use; (*c*) workmen employed to cleanse flues and to gather and transport flue-dust should lie under the same obligation to change before going on shift as underground hands; (*d*) it should be illegal for any man thus employed to appear on the mine unless carrying a suitable respirator to cover nose and mouth; and to engage in his work, and to stand about where it is being carried on by others, except after having put his respirator on; (*e*) no accumulation of wet flue-dust should be permitted on any mine unless within a securely closed receptacle, nor any accumulation at all of dry flue-dust outside the flues; but this material should be charged back as regularly as possible.

NOTE.—No *a priori* difficulty appears to prevent the collection, transport to the feed-floor, wetting, and (perhaps) feeding of flue-dust entirely by mechanical means, and without scattering it in the least; but we are unaware of any machine devised to do this.

10. Tapping-floors should be ventilated at the angle between the top of the champion-flue and the feed-floor, to reduce draught on the tapping-floors, and to afford fumes a way of escape which at present they nowhere have; probably circular flues of large diameter might be carried up through the feed-floor without interfering with operations there, and they might expand below into oblong openings inches across and feet in length.

11. It should be illegal for any workman to engage in repairing a furnace in blast (as in replacing a faulty water-jacket panel) except he be wearing a respirator as mentioned above in connection with removal of flue dust.

12. It is very desirable that furnaces should be surrounded with a jacket which should expand below so as to catch fumes from molten metal and slag, and which should terminate on one side in a chimney leading to the air on the open side of the tapping-floor.

13. Inspectors of Mines should be required to show themselves proficient in some simple process of estimating the proportion of carbon dioxide present in atmospheric air; and the minimetric process devised by Dr. Angus Smith appears to us to be a suitably easy and rapid one.

14. It should be an instruction to inspectors of metalliferous mines to pay especial attention to the state of the air in the various workings; to see that sufficiently pure air circulates through the galleries; to see that the air in all workings off through-ventilated passages is sufficiently pure; and to stop work in any place until by appropriate means the air has been restored to sufficient purity.

15. The criterion of "sufficient purity" should be the presence in the air of less than one part of carbon dioxide in every one thousand parts of air, as ascertained by the method mentioned above.

16. Any regulations which may be made in accordance with these recommendations should be enforced by the Mining-Inspector; penalties recoverable before a court of summary jurisdiction should attach to neglect or infringement of them; and they should be continuing penalties in every suitable case, and in others progressively increasing for successive offences under the general body of regulations.

17. Such regulations should be framed definitely whenever possible, and should leave as little as may be to the discretion of the Inspector, or to be dealt with as a matter of opinion between managers and the Inspector. 18.

18. Such regulations should be printed and presented by managers to each workman on engaging him under a penalty; and it should be an instruction to the Inspector to ascertain from time to time that this is duly done, a similar regulation at present in force being altogether neglected.

19. The following circular of advice to men engaged in lead-mining or smelting, &c., should be delivered to every hand on every occasion of engaging him or of letting a contract to him, and for this purpose every man employed by a contractor should be deemed to be a contractor; it should be affixed to and maintained on many parts of the surface workings—as poppet-legs, office-doors, bath-houses, changing-rooms (within and without), &c., &c. Any other circular containing information as to the provision and use of baths, and as to other matters, which it may seem desirable to issue, should be additionally distributed by Managers as the Minister may from time to time direct.

Prevention of Lead Poisoning.

To all Underground and Surface Workmen.

Lead gets into the system in the shape of ore-dust, flue-dust, and smoke formed in the course of smelting, by way of the stomach, lungs, and skin.

The way to avoid leading is to guard the stomach, lungs, and skin as closely as possible; to follow such habits of life that any lead which does enter nevertheless shall be rendered comparatively harmless by nature acting within the body; and to take care that no accumulation of lead particles shall take place in the bowels.

Lead gets to the stomach with the food swallowed, and it gets to the food from dusty or dirty hands as well as from the air; it gets into drink either by dust falling into it or by the drinking-vessel being so carelessly kept that it becomes dusty; it can also reach the stomach from dusty air, which deposits it on the throat, &c., whence it is swallowed. So that

Food should be carefully protected from dust;
Water should be kept in securely covered vessels;
Pannikins, &c., should be so kept that they cannot get dusty, especially on the *outside;*
The mouth should be rinsed out before drinking or eating;
Hands should be washed before eating.

Lead gets to the lungs from dusty air breathed where ore or flue-dust is being handled, and from working clothes which have got full of dust, and from which it is shaken into the air by movements of the body; as vapour (or smoke) from the smelters, molten bullion, and slag, &c.; and as vapour with tobacco smoke, when tobacco is cut with dirty hands, so that portions of lead or of ore are put into the pipe, where they are turned to smoke by the heat and breathed in. So that

Dust should be prevented both underground and at the surface by regular sprinkling, &c., as much as possible;
Moustachios should be worn to protect the lips from falling dust;
The vapour and smoke from smelters should not be breathed for a moment when it can be avoided by moving to windward;
Tobacco should be cut with clean hands *before going to work.*

Lead gets to the skin as dust, and if allowed to remain upon it long works through it into the system. So that

Working clothes should be kept in the changing-rooms, and put on before beginning work;
A bath or shower to cleanse hair and skin should be taken after work and before putting on home-clothes again.

Milk is an excellent preventive, but it must be suitably taken. A pint every day is probably enough—more will do no harm. It should be taken at twice, and one time must be immediately or *very shortly before beginning work*, not in the course of work; the other time may be chosen—after getting home from work would do well.

Never begin work with an empty stomach, nor more than two hours after a meal.

Wash

Wash hands and rinse the mouth before eating; rinse the mouth before drinking; keep the teeth well brushed and clean.

Bathe every day if possible; do not bathe less than twice a week.

Regulate the bowels in the following way: Use Epsom salts for the purpose; take as much every day as will cause a single action of the bowels every day. That is a much more useful plan for the present purpose than the custom now generally followed of taking a large dose of salts once a week or once a fortnight. Each must find out for himself the proper quantity he requires to produce this regular and daily action; but the following is a good way to make the medicine, and more or less of it should be taken daily as may be found necessary.

Epsom salts	2 ounces.
Water	A wine-bottle full.
Red pepper	As much as is agreeable.

Take a wine-glass full (or more or less as may be necessary to cause a single action of the bowels) in a tumbler of water, on getting up after sleeping, once every day.

Notice.—There are a few people who throw the lead off and who are not seriously affected by it. There are other people who cannot throw it off at all, but feel ill, or actually fall ill, almost as soon as they begin to work in it. This difference has nothing to do with bodily strength, but is a personal peculiarity. *It is therefore of no use to persevere against leading.* Persons who suffer soon, however slightly, should leave their work in lead without delay, and seek some other kind of labour. For example: If a man get colic within a few weeks of taking up his employment, or if he get colic twice in the first six months, or three times in the first year, he should give up. His constitution will not stand it, and if he keep on he will probably suffer badly, and permanently, or even fatally.

Men who drink are in special danger of getting leaded, and are sure to suffer seriously.

We beg leave, in conclusion, to express the opinion that this matter of lead-poisoning is of far-reaching importance and urgently requires attention in the general public interest.

We have the honour to be,

Sir,

Your most obedient Servants,

J. ASHBURTON THOMPSON,
Chairman.

WILLIAM M. HAMLET.

JOSIAH THOMAS.

My reason for not signing the foregoing report in conjunction with my fellow members on the Board is that I dissent from some of the clauses and portions of clauses therein. It is not my intention to traverse the whole of the report here, as such would render this addendum too lengthy, but I beg to submit the following remarks having reference particularly to the recommendations forming the concluding portion of the statement.

Recommendation No. 3—Monthly returns of lead cases.—In my opinion it would be practically impossible for mine managers to comply with the terms of this recommendation if it should become law. In a mine, and reduction works, where nearly 3,000 men are employed, we know as a matter of fact that large numbers of workmen lay off for three or four days or a week from some trifling ailments and do not go near a doctor. If asked what is the trouble with them, many will say they are "leaded," but we have no proof whatever that they are, and I am satisfied that anything like reliable data could not, by the means suggested, be obtained of the number of men leaded or affected by lead.

Recommendation

Recommendation No. 4—*Drinking-water.*—Referring to that portion of this recommendation which relates to the manner of supplying the "underground" workmen with drinking-water, I am of opinion that the suggested means would not be as good as the method now followed. Many of the men now bring billy-cans of tea with them when they come to work which last them to the end of the shift; others, who prefer water, fill their cans at the mouths of the shafts with condensed or other pure water, which is provided for them before they go underground. These billy-cans have close fitting covers, and are always hung in a cool place some distance away from where the men are working. I know of no other way by which the underground hands could be supplied with cooler or better water, and I am satisfied that even if water-pipes were put all through the mines on each plat the men would still adhere to their present custom.

Recommendation No. 7—*Changing.*—We have the best of proof gained from long experience, that miners and men working on smelting furnaces will not, as a general thing, change their clothes in changing-rooms on the mines no matter how the accommodation is constructed, preferring to change underground or at their homes.

Recommendation No. 8—*Emission of flue-dust.*—It is certainly desirable to prevent the emission of flue-dust from the smelter stacks as much as possible, but, with the volume of atmospheric air necessarily forced into the furnaces, and the strong draught required to carry off the smoke and gases, a very considerable quantity of flue-dust must of necessity escape no matter how flues are constructed.

Recommendation No. 9—*Handling the flue-dust.*—From close and constant observation I am satisfied that flue-dust (and the method of handling and treating it) is charged, in the foregoing report, with more bad effects than it should be, for there is nothing of a dusty nature left in this material. The fact that the dust and fine particles of ore escaping from the furnaces having to pass through flues in which there is constantly a very strong draught renders it impossible for fine dusty particles to settle, and any ordinary wind would not disturb or blow it about after it had been drawn out of the flues.

Recommendation No. 12—*Jackets to catch furnace fumes.*—It would also in my opinion be impossible to surround the jacket portions of the furnaces with draught-pipes or other devices which would effectually carry off the fumes from the slag taps or lead wells. Experiments of this kind have been made, and, in practice, have been found to be ineffectual. The ingress end of a draught-pipe of any kind would have to be a considerable distance away from the tapping hole or lead well in order to give the men an opportunity to do the necessary work. This intervening space would permit the ordinary currents of air to drive the fumes away, and would prevent them from entering the pipes. There would be very little danger from these fumes did the workmen exercise more care in keeping out of them which they can do without interfering with their work.

Recommendation No. 13—*Estimating carbon dioxide.*—I do not think it would be possible for the Inspector of Mines to satisfactorily determine the quantity of carbon dioxide in stopes, drives, dead ends, winzes, or other openings in the Broken Hill mines. It is a well-known fact that carbon dioxide is found irregularly throughout the mines, impounded in small cavities in the ore, and is liberated only when these little cells are broken into; consequently, in any opening where the ventilation is fairly good and steady, the quantity of carbon dioxide would be continuously changing as the ore, containing more or less quantities of the gas, was broken into. Tests made as suggested would vary several times in an hour from pure atmosphere to over one part of carbon dioxide to one thousand parts of atmospheric air.

Respectfully submitted,
JOHN HOWELL.

MINUTES OF EVIDENCE.

MONDAY, 27 JUNE, 1892.

Present:—

DR. ASHBURTON THOMPSON (CHAIRMAN).

W. M. HAMLET, Esq., F.I.C., F.C.S. | J. HOWELL, Esq.
R. SLEATH, Esq.

Mr. A. J. O'Connell called and examined:—

Mr. A. J. O'Connell. 27 June, 1892.

1. *Chairman.*] What office do you hold, Mr. O'Connell? At present I am Secretary to the Underground Branch of the Miners' Association of Broken Hill.
2. And you keep all the books of your society, I suppose? Yes.
3. Have you referred to them at all in connection with the evidence you are asked to give here? Unfortunately, Mr. Chairman, I have not. That is, in the sense you would take it, because we have never compiled any statistics in reference to this question.
4. We shall come to that presently. Your society deals with men only, I believe—that is to say, your membership includes only men? Yes.
5. What limit of age is there—how young, and up to what age will you take them? We take them as members independent of age, so long as they are working in the mines.
6. Would you take a lad who was ore-picking, for instance? Yes.
7. You would take him if he offered himself? Provided he was doing that work underground, we would.
8. How long has your society existed—I mean your branch here on the Hill? As it is at present constituted, it had been in existence two years on the 22nd March last; but it was in existence before I came here, five years ago, I cannot exactly name the date.
9. That will take us over the time we want. The class of workers represented in your society, you say, are the underground workers? Yes.
10. What class of underground workers do you recognise? Miners, truckers, plattmen, bracemen, and all such men as work underground.
11. How many members are there in your branch? Just a fraction over 3,000.
12. Has that been the average number during the two years last past? No; the average number has been about 2,700. That is a rough estimate. I may state that we started, when I took office, with 2,000 members, and at the present time there are over 3,000.
13. Do you refer to five years or two years ago? Two years ago.
14. You society is not a sick fund in any sense, I understand? No; it is entirely an accident fund in regard to its business.
15. Have you any knowledge at all when a member falls sick? Oh, yes. We have a record; but in that case he is merely marked as being out of work, or sick. There is no record kept of the nature of his illness.
16. Then, can you give us any information at all as to the number of members who have been incapacitated by leading? I can do so in a general sense. I should think, so far as my opinion goes, that of the men who work in lead ore, the percentage affected would be about seven out of every ten, more or less; but I would wish to be understood that that applies only to certain mines and certain portions of those mines.
17. Very well. Then any information you may have to give us now will be simply the opinions you have formed from what you have heard on the subject, and so forth? Yes; chiefly so.
18. Have you, yourself, worked below? Yes; I worked two years underground in the British Mine.
19. What kind of work were you doing? I was mining at the time.
20. What class of ore were you getting? I was working fourteen months altogether in lead. For ten months I worked in wet ground in the shaft.
21. Were these fourteen months and the ten months continuous? The ten months was continuous away from the lead.
22. Were you working for the fourteen months continuously in the lead? There was a break between the fourteen months. After working in the lead, I was taken away from it and put to this other class of work, and when that was completed I began again on the lead.
23. How long did you stay at it? I suppose I was at it about eight months. Then I was taken away, and went to the other class of work.
24. And you remained at that ten months, and then went back to to the lead again? Yes.
25. Have you ever been leaded? I felt the effects of lead after I had worked there three months.
26. Were you laid off? Yes; I remained, I think it was, seven days off.
27. And did you resume your work again immediately after that? Yes.
28. Did you fall ill again? Not sufficiently so to prevent me working.
29. Then you finished your first spell in lead ore without any further illness? Yes.
30. Then you went away and came back to the lead; and did you suffer again? Yes.
31. After you had been working how long? Well, I had been working a good while before I felt it a second time. The mine was more opened up, and the ventilation was better when I returned the second time.

Mr. A. J. O'Connell. 27 June, 1892.

32. What form of illness did you have the first time—was it colic, or did you feel it in the head? It was colic, and weakness in the knees and the joints.
33. I suppose you had a doctor;—do you remember the doctor who attended you then? Yes; it was Dr. Drinkwater, who is since dead, I believe.
34. What kind of lead ore was it that you were working in? Carbonate of lead ore.
35. At that date, part of the mine in which you were working was being opened up, you say? Yes; it was being opened up at the time I started.
36. What measure of ventilation had you? At that time there was only the ventilation coming down the shaft. We were not connected with any other shaft. I was working in a drive at the first level.
37. Then there was no circulation of air? No; not at that time.
38. Was there any sprinkling of the ore done at that time? No; but there was subsequently, and before I left the mine.
39. Was your second attack of leading of the same character as the first attack? No; there was less pain, but more weakness.
40. There was no distinct paralysis? No.
41. What was your custom as to meals—did you take any food below with you? Yes.
42. Do you smoke? Yes.
43. And you smoke plug tobacco? Yes, as a rule.
44. Did you change your clothes when you went down the mine? Not at the mine, that is, when we were working in the lead. We used to change at the mine when we were working in the shaft, and it was wet; but that was different altogether.
45. In wet ground you changed at the mine? Yes.
46. The wet ground obliged you to do so; but you did not think there was any necessity to do so in the lead-dust? No. I may say I was living only about a quarter of a mile from the mine at the time.
47. Were you below eight hours at a time? Yes.
48. Where would you eat your meals? Usually, a very short distance from the face in the workings.
49. I suppose you have a smoke during that time—crib time, I think you call it? Yes.
50. But not at other times, while you were at work? Well, very rarely.
51. You think some men may, or rarely, do so? Yes.
52. When you went up from the mine, would you then go straight home? Yes, I went straight home.
53. Had you wished to wash your hands and mouth before beginning your lunch, had you the means, or opportunity of doing so? No; not very well.
54. Had you wished, before going down the mine to put on a working suit, had you the means of doing that—or was there a changing-room provided for the purpose? Well, there was a very small changing-room which was usually used by the shaft-men; but, so far as I can recollect, I never saw any of the men who were working in the stopes use the room. In fact, it was very small.
55. Was it the same room as is there now? I think not, because the one I alluded to was pulled down, when heavier machinery was put up. I have never been in the changing-room they have at the present time.
56. When you began this work, did you know that if you worked in lead you would be liable to suffer permanently? Yes; I was always led to understand that by the experience of other men.
57. Have you any idea of the way in which the lead gets into the system? I was always led to understand, that, it was by inhaling the fine dust that flies about.
58. Did it occur to you, or the other men with whom you worked, that you could do something yourselves to prevent the effects of lead? I can only give you the opinion of the medical man I quoted just now, who attended me. He told me that washing was the main thing, that is general cleanliness, and not to cut up tobacco, or rub it up fine with dirty hands. He led me to understand that lead was not so much absorbed through the pores of the skin as by respiration.
59. Still after being leaded, you went back to the mine and suffered a second time? I did.
60. Did you take any special precautions after that, against the effects of lead? None other than taking opening medicine, occasionally, to prevent constipation.
61. Have you any knowledge yourself—that is something more than hearsay, of any persons, say, among your friends, or acquaintances, not at all connected with the mines, who have been leaded? I have not of my own personal knowledge—I have as a member of the hospital committee. I gave a certificate the other day to a man whose case was represented by a medical man to be one of leading, and he had not been working in a mine.
62. *Mr. Hamlet.*] You say your first work in these mines here was in the early days, when the British first opened? Yes.
63. Was there only one shaft down about that time? It was what was known as No. 2, and we started to sink the main shaft.
64. *Mr. Howell.*] You were working in lead, and the ventilation was very poor—is that so? There was no connection between the shafts at the time I speak of.
65. The mine was very dry and dusty, was it not? Yes.
66. The conditions now, as you know presumably, are very different? Yes; no doubt they are. But I have not been underground for two and a half years.
67. At all events there are three shafts in that piece of ground now? Yes; there are three now, in that same extent of ground.
68. But it used to be considered a close mine in the early days? Yes.
69. *Mr. Hamlet.*] How did you usually carry the food that you took down with you—did you have it wrapped in a cloth or paper? It was usually wrapped up in paper.
70. And it was then put aside with your clothes, I suppose? Yes; it was left in the coat pocket and stowed away in as clear a place as we could find, so that it would be free from the dust, or the effects of any explosion that might take place.
71. And did you ever experience any metallic taste in eating your food? Yes.
72. And before eating it and after? Yes, always. In fact, there was always a peculiar taste in the mouth after a man had been working in the mine a little time—between a sweet and a bitter taste on the lips.
73. Did you try in any way to wash or clean your hands before eating your food? Well, as a rule there was no opportunity of so doing.

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74. But, I suppose, every man would have his own way of cleaning his hands, in some manner, before beginning to eat his food? The only way possible, in the stopes, would be if he had a handkerchief to brush the dust off. That is taking the general run of workers in the mine—particularly in the place where they were working, at the time I speak of.
75. But, that was at the very outset—in the early days? Yes, at the commencement. But I do not think it was a bit more dusty than it is now, when the quantity of work done and the number of men employed in a small space are taken into consideration. At the time I speak of, in the early days, there were perhaps only three or four men working altogether. There were two as a rule working in a drive, or cross-cut, and they had only their own smoke and dust to contend with.
76. Did you see on any occasion any persons visibly affected by lead down below? Yes; I have known several cases of men falling down in fits, and I have seen two cases, of men going to their work. In each case the man was walking in front of me, and fell down in a fit.
77. Did you ever hear a man working with you say, "I cannot stand this any longer," and then go up to the surface? Oh, yes. I have seen men have to lay up. One of my mates had to go home on one occasion, and was away from his work eleven weeks.
78. Had you pretty good health before you began silver-mining? Yes.
79. *Mr Sleath.*] You say you were working in lead, but you were principally engaged in driving? Yes; in the early days.
80. And you were not connected with the other shaft in any way—were there any artificial means of bringing the air into that part of the mine? No. We had no air but what came down the shaft.
81. There were no air-pipes? No.
82. Had there been such provided, do you think it would have been beneficial to the men working there? Yes; no doubt it would have been, to draw the smoke and dust out.
83. The changing-house you had at that time, was it connected with the engine or boiler house, or was it apart from those? At that time there was no changing-house at the British Mine.
84. No changing-house at all? At that time I was driving. When I was working in the shaft, a small house was built round the vertical boiler.
85. When you were working in the shaft, could those working in dry ground—the stopes and drives—have had an opportunity of changing, if they so chose? Not very well, because the changing-house was not sufficiently big for all of them, although it was very suitable for the shaft-men.
86. There was not room for all to change there? No.
87. Were they in the habit of sprinkling the drives or stopes with water during that time? When I worked in the British stopes last they were. That was just before I got into the position which I occupy now. At that time Mr. Howell was general manager, and they had air-pipes in and the water laid on, and the stopes used to be sprinkled with water. That, in my opinion, was a very good thing for the men, because it laid the dust, and kept the place pretty sweet.
88. From your personal knowledge, do you think less cases of lead-poisoning took place after that was done? I think so. Personally I know I felt the benefit of the sprinkling, and the air coming in.
89. You have not worked in any other mine than the British, have you? I worked for a very short time in Block 14 before the stopes were opened up.
90. Did they have air pipes and water pipes for sprinkling in Block 14? Not at that time, because there was no stoping done then.
91. Were the men in the habit of changing their clothes when they went to work in Block 14? Yes, at that time; but they were principally engaged in shafting.
92. In any case was there opportunity of getting water to wash your hands if you wanted to do so before eating your crib? Not as a rule. At the time I speak of, when the water was laid on to the British, possibly the men might be able to do so, but probably the water was cut off further back. There was one man told off to let this water on.
93. Then the conditions were changed between the time when you began to work and when you finished? Yes; a good deal changed.
94. As secretary of the underground branch of the Miners' Association you must come in contact with plenty of men working underground in the different mines? Yes.
95. Have you seen many men suffering from lead poisoning since you left off mining yourself? Yes; I have seen many cases.
96. I suppose in most cases the men come and report themselves to you when they are sick? Yes; as a rule they do. But some of them go straight away to their homes in South Australia, Victoria, or elsewere.
97. *Chairman.*] During your second term of working in the lead did you take advantage of the improved conditions which you have spoken of? Yes; where they reached.
98. Did you wash your hands, and did you regularly wash out your mouth before eating? No; unless to take a drink of tea out of the can.
99. You said just now that as a rule the men reported themselves to you when they were sick. But you did not keep any record of the nature of their illness? No; not particularly. They might have been suffering from some internal complaint other than leading. We never made a distinction between the two, but just marked them down as being sick.
100. Then you would adhere to what you said first, that any evidence you have to offer as to the number of men leaded in your society during your term of office will be rather a matter of opinion than of fact? Yes, sir.
101. But for that opinion you have this ground—namely, that the men usually report themselves to you? Yes.
102. I did not ask your opinion as to the kind of occupation or place of occupation which seems to cause most leading—whether underground or surface work, and the kind of ore, for instance? Well, underground, I consider that the British, Block 14, and the northern part of the Proprietary Mine are the worst as regards the effect upon the miners. Of course there are other mines in which the men may suffer more or less, but these three I consider are the worst. As to the smelters, I could not reasonably say, as I have not worked on them.
103. Very well, we can get that from the other branch. And are Block 14 and the British still called dangerous mines in that respect? I think so, but from personal knowledge I cannot say. I have been very little on either of these mines, or any mine during the last two years.

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104. Still you do know where the men who are members of your society work, and they do report themselves to you when they are sick? Yes. I know of two cases where men fell down in fits last week—that was in Block 14. I can bring them before you.
105. *Mr. Sleath.*] What mine is considered by the miners on the Hill absolutely the worst as regards lead? Block 14 is, in my opinion, considered the worst by the miners.
106. It is considered the worst? Yes.
107. You do not know what provision is made there against the effects of leading? No; I cannot speak from practical knowledge.
108. *Mr. Howell.*] When you were sick, did you notice a peculiar feeling in your knees and joints? Yes. Sometimes more than others.
109. Was there any swelling? No swelling, but sometimes in walking down the hill I would suddenly lose control of my legs.
110. Have you noticed it among other miners? Yes, I have heard them complain to a great extent, more or less. Some complain of it in their arms, and others in their legs.
111. Had you any discolouration of the gums at the time? Yes.
112. What part of the system is generally affected? It affects you in the form of colic in the first instance.
113. Does the peculiar feeling in your knees and arms come on at the same time? No; it comes on subsequently.
114. *Mr. Hamlet.*] Do you suffer from loss of appetite, or is your digestion affected? Sometimes there is loss of appetite for two or three days, and then again there is a great craving for food, perhaps almost immediately afterwards.
115. *Chairman.*] Were you on day shift when you were working in the mine? I used to work three shifts round.
116. That is round and round? Yes.
117. Used you to make a point of having a meal before going down? When working on day shift I always had breakfast before going down. When working the afternoon shift I would have lunch between 12 and 1 o'clock and go to work at 4. On the night shift I would usually have something, perhaps about 11 o'clock, according to the distance we had to go to the mine.
118. Then the longest time between meals and work would be on the afternoon shift? Yes; that would be the longest time.

[The witness withdrew.]

Mr. Josiah Thomas called and examined:—

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119. *Chairman.*] What office do you hold? I am President of the District Branch of the Amalgamated Miners' Association.
120. Can you give us any figures touching the prevalence of lead-poisoning among the miners, and so on? Do you mean the exact number that have been leaded?
121. Have you any official record from which a comparison might be made between the number of men enrolled on your books, and the number of men who have been leaded? No; we do not keep any.
122. *Mr. Sleath.*] Mr. Thomas, as President of the District Branch, holds simply an honorary position. He is employed on the mine, and can, therefore, speak only from his personal experience.
123. *Chairman.*] Very good. Which mine are you employed in, Mr. Thomas? I have been working in the Broken Hill South, but for the last two months I have not been working anywhere.
124. How long have you been working in the mines here? I have been a little over four years on the field. But I have been two years underground working as a miner on the Hill. I have had other positions in the mines. I was assaying at Umberumberka.
125. Have you yourself been leaded? Yes.
126. More than once? No, once only.
127. Under what circumstances were you attacked? It was at the South Mine, I was in the lead for about six weeks. I became leaded, and had to give up work. I left the place for a little while, and then I went back again, but I have not worked since, as I was unable to get work at the South when I returned.
128. Had you never before worked in lead ore? Not very much—I had a little.
129. And six weeks' continuous work in the lead-ore in the South Mine terminated in your getting leaded? Yes.
130. What form of illness did you have? Well, I vomited a good deal, and I was unable to take food, and felt very sick; I was very loose in the bowels.
131. That was rather unusual, was it not? I do not know. Mostly, I believe, they are constipated. It is more violent, I believe, in that form.
132. Did you suffer from paralysis? No.
133. Had you the blue line on your gums? Yes, a little.
134. And how long were you laid off with this illness? As soon as I found I was ill I gave up work; the doctor said it was necessary for me to go away for a little while, and I did so.
135. How long did you stay away? From the time I went away till the time I came back—it was about four or five weeks.
136. During the six weeks' work you have spoken of, did you work on all the shifts all the clock round? Yes.
137. When you were on the morning shift, what time did you get up, and what was your custom as to taking food? I used to get up a little before 7, and we began work at 8. I would have breakfast before I left home. At 12 o'clock we would have crib, or lunch—a piece of bread and cheese, or meat. Then I would go home about half-past 4.
138. Then, as to the next shift, at what time would you have to be at the mine for that? At 4 o'clock.
139. And you would have your lunch at what time? When I was on that shift I would have my breakfast at about 10 o'clock in the morning, and my dinner at about 2 o'clock, or half-past 2.
140. And at what time does the next shift begin? At midnight.
141. At what time would you get up to go on this shift? Oh, at all times—it would depend upon how I could get my sleep; whether the weather was hot or cold.

142.

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142. At what time did you have your meal before going to work at night? At about 11 o'clock.
143. Immediately before going on shift? Yes.
144. And I suppose you would take something below to keep you going? Yes.
145. Used you to smoke about that time? No, I do not smoke.
146. Where did you eat your crib? It would depend upon where we were working in the mine. We would generally leave the exact working-place, and go in a level, or something like that. There is generally a place where the men go.
147. Used you to wash your hands or your mouth before eating? When working in lead, yes, generally. I would rinse out my mouth with water, and gargle my throat, and generally wash my hands.
148. Then the men had the means of washing their throats? We would do that with the water we fetched from home in our billy-cans.
149. Was sprinkling carried out in the mine at that time? No.
150. What was your custom as to changing your clothes before going on duty? Well, I did this. I generally brought two flannels with me, that is, I wore one, and the other, being the one I used to work in, I would put on when I got to the mine. When knocking off work I would change this flannel for the clean one, or put the clean flannel next my skin and the dirty one over it.
151. And when you got home, I suppose you would reject the outside one? Yes; I would take that off.
152. Was any changing-room provided at the mine? Not for the ordinary miners. They have a small room at the South, where the shiftmen change their clothes when they get wet.
153. Do you mean that the other men could not go to that room and use it? I cannot say that they would be objected to—I never knew anyone who went there and was refused. But it was not the custom. They might possibly use it, occasionally for all I know, but I do not know of anyone having done so, except the shiftmen.
154. And, therefore, it was not the general custom? No.
155. You have a good deal of general knowledge about the conditions of work in the mines, I suppose? Yes.
156. What kind of work do you consider the most likely to cause leading—mining or smelting? I should say mining.
157. Have you a strong opinion about it? Well, it seems natural, I should say. In the first place a large proportion of those working underground in the stopes get leaded, and, naturally, the men who work underground get considerably less ventilation than those working on the surface.
158. I mean are you speaking from observation and experience, or are you telling us now what you think would be probable? That is all.
159. That is what you think would be probable? Yes.
160. Do you regard one mine as being more dangerous than another, and if so, which? Do you mean as regards the leading?
161. Yes? There is certainly a good deal of difference in mines, because some of them have more lead ore than others.
162. Have you observed that men who go to work in certain mines are more likely to fall ill than they do in other mines? I do not know—I should think so.
163. But have you observed that they do, that is what I want you to tell me? I was about to explain why it necessarily must be so. For instance, in Block 14, and the British, the workings are nearly all lead stopes, and the men who work there—especially in Block 14—will have to practically work the whole of the time in lead. In the Proprietary there is a part of the mine—McCulloch's—where there would be a good deal of lead. But in another part of the same mine—Jamieson's—it is mostly kaolin. The men are shifted from McCulloch's to Jamieson's, and consequently each man works a fortnight out of the lead. If he works in Block 14, he will work in the lead right through while he remains there. Consequently he stands a greater chance of being leaded. In another part of the big mine (the Proprietary)—I refer now to Block 11—there are, I understand, certain portions of lead there. But it is mostly ironstone and kaolin, and consequently a man works there perhaps two weeks in the lead and may be six weeks out of it. Block 11, I should say, furnishes very few cases of leading, on account of their being able to change. At the South, where I was working recently, the cases have been few, as far as lead poisoning is concerned, on account of the men working in the stopes, where there was no lead, turn about, so that they were able to change the men continually. Now, however, at the South these stopes are filled in, and nearly all the mine is in carbonate ore, and the cases of leading are more than in the past, simply because the men have to work in the lead all the time.
164. That is a very reasonable argument, but what I ask you is, have you observed that it is so? Well, I will give you one instance. I am a member of the Hospital Committee, and I moved some time ago that the doctor should give us a return every month of the names of the patients, and also from what mines they came. In one month, from Block 14, it was over eleven or twelve, and from the Proprietary, in the same month, it was over thirty or forty. I cannot give the exact figures, but I should say there were three or four times as many from the big mine as from Block 14.
165. Can you make any practical suggestion as to the steps that should be taken to reduce the amount of leading among the miners? Of course that is difficult, but I have no doubt if the stopes were watered it would make a great difference. When the stopes are wet there is not that likelihood of leading that there is in the dry stopes.
166. What I mean by my question is this—you know that cleanliness on the part of the men is a great aid to preserving health;—in the mines you have had experience of, have there been the means of keeping yourself clean? Yes. Of course the mines I have been most accustomed to are the Cornish mines.
167. I am speaking about the Barrier mines? I do not know of any mines here where means are provided for washing. There is a place where the men could change, I think, at the big mine, but I do not know of any facilities for washing.
168. Do you know among your own acquaintances or friends any persons not at all connected with the mines who have become leaded;—I do not mean from hearsay, understand, but cases that you have a personal knowledge of? Would you include children?
169. Yes, any persons? Well, I have a child, and whether she was leaded or not I cannot say, but she was extremely healthy when we lived at Silverton, but when we came to live here, after about three months, she became very ill—so ill, that I thought she might die. I, therefore, sent the child with my wife to Adelaide, and she has recovered wonderfully since she has been there. I put the child's illness down to the lead, and that is the reason I do not bring them back. 170.

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170. You consulted a doctor probably? No, I did not.
171. *Mr. Howell.*] Do you not know, as a matter of fact, that there is a water-pipe running through the whole length of the Proprietary Mine? No, I do not.
172. I may say, for your information, that there is;—have you worked in the Proprietary Mine? Yes; I worked there for about a month.
173. When was that? About twelve months ago. I left Silverton in May, and started in the South. I worked there from six to eight weeks at least, and then a certain number of men were put off on account of shutting down. I went among the number, and afterwards new men were put on. I went to the big mine then. I had a chance to go back to the shaft, which I did. I must have worked there part of July and part of August, if not more recently. I was in McCulloch's and Jamieson's two weeks each.
174. We began to put the pipe in in June, and it probably took six weeks to complete the work;—you say you worked in McCulloch's? Yes; in what we call the north end.
175. In what levels did you work? I think it must have been between the 300 and the 400.
176. What shaft did you go down? That near the Block 14 boundary.
177. Wilson's shaft? Yes.
178. I suppose you know there is a good changing-house at McCulloch's? I have seen one at Jamieson's.
179. Was the ore you worked in that portion of McCulloch's shaft a dusty ore—it was a lead-ore, of course? Yes. I may say I was there a fortnight. In the place where we were working there was a good deal of lead and dust. I think it is a little extra bad perhaps. They had a system there of changing the men into Jamieson's. I believe the understanding is that new hands coming to the mine generally work in McCulloch's a month. I was there only a fortnight, when I went back to Jamieson's.
180. Was it a fine grain of ore there, or a lumpy ore? It was very fine.
181. Did you ever work in the south end of the mine? No; not in Block 11.
182. I suppose you are aware that north of Block 11 it is dry kaolin and silicious iron ore? I understand that a large portion of it is. As I have already said, I understand that in Block 11 the men can stay out of the lead from six to eight weeks.
183. *Mr. Hamlet.*] You say you had the blue line on the gums—how long after you started to work was that? Well, I did not notice it a great deal, until I was too ill to go to work. You see, I had been working in the lead about six weeks; then I stayed at home. As a matter of fact, I worked there after I was leaded. I was feeling unwell a week before I gave up. I had never been leaded before.
184. What were the indications you experienced? I began to vomit, and I felt weak, and felt generally unable to go to work. I had no relish for my food, and was altogether out of sorts. When I was going home on the Monday I said to the shift boss, "If I am not well to-morrow I shall not come to work." I stayed away on the Tuesday, and sent for the doctor, who told me I was leaded, and that I had better go away for a change as soon as possible.
185. Did the doctor attend you for your illness? Yes.
186. After working at what mine was that? At the south.
187. And that was the mine you preferred to go back to? Yes. You see, at the South, at this time, I refer to, most of the work was being carried on at the north end, which was mostly dry kaolin ore. Since then they have discovered a body of ore away to the south, and that is mostly carbonate.
188. Then, with regard to your child, is that the only instance you know of a supposed case of lead poisoning in the town? Well, the people send away their children. The same day I was at the station, sending my wife and child off, I was speaking to a miner, who told me that Mr. Prior, the editor of *The Barrier Miner*, had sent his wife and child away also, for the same reason.
189. Then you do not speak from your own knowledge, and in the case of your wife and child you did not seek medical advice, but merely sent them away for a change? Well, the child was extremely unwell; so much so, indeed, that it was fully expected she would have died by the time she reached Adelaide. She was a very young baby.
190. What was the age of the child at the time of your sending her to Adelaide? About eighteen months.
191. How far did you live from the South Mine where you worked? I lived at the south township, about a half-mile from the South Mine.
192. *Mr. Sleath.*] What sort of changing-room have they at the South? I should say it is a place about half the size of this room here; say, about 20 feet square.
193. Was there any provision made for the men to wash if they wished? Well, there was water in the trough, and the men could get water there and bring it round in a kerosene tin, if they liked. But whether the men were allowed to go to the changing house to get a wash I could not say. I never heard of anyone being prevented, at the same time I never heard of anyone trying it except the shiftmen. It was not looked upon as a general changing-place for the miners.
194. It was generally looked upon as a changing-place for the shiftmen alone? Yes. But of course whether the men did right to look at it in that light I cannot say.
195. At all events, that was the general impression among the men? Yes.
196. Do you know whether the room was kept clean, and in a good condition generally? I was in it twice, I think. I believe it was when I went to see one of the shiftmen, or to see if he was there, but I could not say whether anyone was appointed to keep it clean.
197. I think you said, that in the South Mine, they have no water underground, nor any air-pipes to carry the ventilation into the places? When I referred to that I did not understand the Chairman to mean forced ventilation in the case of driving a level a long way from the winze for instance, that is carrying in the air to help the men. I have seen that done.
198. *Chairman.*] I meant ventilation effected by a machine to supply the place of the natural draught, that is, if you are in a long drive you must force your air in by some means or other? I thought you meant a forced ventilation throughout the mine. Oh, yes; I have seen that. When the men have been a long way from the shaft an air-pipe has been brought in to them.
199. That is what I mean? I misunderstood you, sir.
200. *Mr. Sleath.*] Did they have any water-pipes for sprinkling purposes? No.
201. As a practical miner, do you think any better means of ventilation for the men could be provided than they have at present? Well, I may say that the part in which I was working when I became leaded was well ventilated—splendidly ventilated in fact, as I was working very near to the winze.

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202. What is your opinion of the general ventilation of the South Mine as a whole? I think it is fairly well ventilated. Of course some of the places are not. If you are driving a place a long way from the winze it naturally does get hot.
203. What do you think would be the best means of assisting the men to guard against becoming leaded, or do you think anything could be done to minimise the number of lead-poisoning cases that take place? I fancy the liberal use of water would be a measure of some benefit. It would also be a good thing if the men were careful to wash their mouths before eating. I noticed they did that when I was working at McCulloch's end in the big mine. I think it is a system adopted by the men generally when working in lead, to wash out their throats.
204. Is it a general custom amongst the management to make provisions against leading by changing the class of employment, and do they take you back again in case you have been laid off, when you are sufficiently recovered to resume? My opinion is, that it is practically understood in most of the mines that when a man is leaded underground, and has to go away, he notifies the fact to the shift boss or time-keeper, and when he returns as a rule I believe he is put back to work again if he is fit to go underground. That, I believe, is the general understanding.
205. Was that your experience? I did not find it so myself. But still I understand that it is the custom of the mines generally. As I have said, my experience was not so. At the same time I have known of a case where a man was taken back again after being laid off. The mate I had with me was leaded at the same time as I was. He remained at work two or three days longer, but eventually had to go off, and when he came back he was allowed to go on again.
206. *Chairman.*] Did that man return to the same class of work? To the same mine.
207. But did he return to the same place;—that is the same class of ore? No; he was put on in another part of the mine then, but I presume in his turn he would have to go back again to where he was working before.
208. Are you a temperate man? Yes; I have been a teetotaller for about sixteen years.
209. Is there any one mine that you know which gets the credit of being worse than others for leading the men, or are they all considered alike? Block 14 is considered to have the worst name, that is to say, there are supposed to be more cases from that mine in proportion to the number of men employed.
210. You have not had much experience outside of the South Mine, I understand? No.

[The witness withdrew.]

Mr. J. Triplett called and examined:—

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211. *Chairman.*] What office do you hold, Mr. Triplett? I am secretary to the Barrier Ranges Smelters, Concentrators, and Surface-hands Union, affiliated with the Trades and Labor Council of Sydney.
212. Do you keep all the books? Yes.
213. Have you referred to your books in connection with this inquiry? With regard to one or two cases I have.
214. Do you admit only men as members of your association? No; we have some boys.
215. Men and boys. What are the limits of age—how young and how old will you take them? We have no limit. The condition is, that they must be employed at that branch of work.
216. How many members have you on your books? About 800.
217. And does that number include all the workers of the same class on this field? All work on the surface—yes.
218. It includes all the surface workers on this field? Yes.
219. How long have you been secretary to this branch of the association? A little over two years.
220. Your society is not a sick fund? No.
221. When any of the men fall sick are you made aware of it? Not in all cases.
222. Then you cannot give us any statement of the number of your members who have been laid off from leading? No.
223. Is it your opinion that a large proportion of those who are laid off are laid off from that cause? Well I would not like to venture to say that. Certainly a large proportion of them have been laid off, and a number of them do suffer from the effects of lead.
224. If the men did not work in lead is it your opinion that a considerably less number would be laid off in the course of the year? Yes.
225. Have you yourself worked in the mines? Yes.
226. Have you been leaded? No.
227. Will you tell us how long you continued to work in the mines from the time you first began that class of work, confining yourself to the Barrier? I cannot say to a month, but it is something like three and a half years since I started work on this field.
228. And you continued working until when? Until about two years and a month or two ago.
229. And did you work continuously all that time? Yes; with the exception of about a month.
230. What kind of work were you doing? Part of the time I was working at the Block 14 concentrating mill, and later I was on the bullion at the smelters of the Proprietary Company's mine, although I was not recognised as one of the smelter hands.
231. Then you have had opportunities of forming some opinion as to the relative dangers of this class of work. Are the men working at the concentrators liable to get leaded? Yes.
232. Are the smelters liable to get leaded? Yes.
233. Is there any difference in the liability, so far as you have observed, between these two kinds of work? I think the percentage would be greater in connection with the smelters.
234. You keep in mind, of course, that a different number of men might possibly be employed at one class of work as compared with the other, and you think the percentage of cases of leading would be greater at the smelters? Yes.
235. Are the smelters all equally exposed to the danger? Yes.
236. The removal of flue-dust is the work of another set of men, is it not? Yes; I may say I worked a little in the removal of flue-dust myself previous to going on the bullion at the Proprietary Mine. I forgot to mention that.
237. Do you think the removing of the flue-dust is a more dangerous occupation than attendance on the smelters or concentrators? It might perhaps be more dangerous to the men working there if they received no instructions when going on.

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238. Then you are of opinion that a man can do something to protect himself at that work, at all events? Well, I am of opinion that he can last longer at it by taking precautions.
239. But you are of opinion, too, that he must eventually suffer from it? Oh, yes; he must eventually suffer from it.
240. On the concentrators, would you say that the men employed at the screens are in greater danger of leading than those employed at the tables? Yes; I should say they would be more liable to be laid off than the men at the tables.
241. Do you speak from personal observation—did you notice that? Yes; I noticed that when I was working there. I happened to be working on the top floor, at Block 14, driving the stamp engine, and I noticed that the feeders were more frequently laid off than any of the other men.
242. Does the stamp engine work dry? No; the water goes in, but it is fed dry.
243. Have you noticed that some people are more liable to fall ill than others, apart from their occupation? Yes; I have often thought some men were more liable to be laid off from the effects of lead than others—it is something in the constitution, I think.
244. Now, supposing a man had been laid off from the top floor of the concentrators on account of leading, would the management make any objection to the return of that man to the same kind of work, or would they make any suggestion as to his taking some other kind of work? In all cases, I believe, when a man is leaded and goes off, he has the privilege of returning to his work. He might, by asking, perhaps, be removed to some other kind of work, but that is granted as a privilege only.
245. He does not get that concession by a planned arrangement or as a right, but only if he asks? Yes.
246. In the work of removing the flue-dust, what do you think ought to be told to men who first go on to clean the flues? He should be told, in the first place, of the danger liable from it, and then that he should be careful in taking his shovel out from the flues when he is putting the dust in his barrow, because it is very light, and may be scattered by the draught coming through the smelters, and so affect his neighbour by carelessness.
247. No printed instructions to that effect are issued for that or other branches of work on the mine, I suppose? No.
248. To what do you ascribe your own escape from leading for over eighteen months? Well, I do not know; perhaps it is constitutional.
249. You do not, yourself, observe any particular rules of health? No; only general carefulness.
250. Do you think you were more careful in changing your clothing or washing your hands than other men? I do not know; but I was always careful to wash on the mine. You may notice the majority of the hands do that, especially on the smelters. There are some tubs of water there for dipping the iron into which they plug up the smelter taps with, and the majority of the men will wash in that. If there is any wound on the hands, and there is poison in the water. I suppose it would penetrate the skin that way. I myself have had the skin knocked off my hands when working in the bullion, and when I washed them in that water at the mine they did not heal at all, but I stopped washing my hands there and then it was not very long before they healed.
251. Used you to smoke at any time? Oh, yes.
252. But I suppose you did not smoke at your work? Oh, yes.
253. And you smoked plug tobacco, of course, and ground it up in your hands? Yes.
254. Have you ever heard of any other men who have worked as long, or longer than yourself without suffering from leading? Yes; I have heard of men working two years, and two years and three months without being leaded;—I should say, without being laid off, although they have suffered a little.
255. I think you have said that you never had any of the ordinary symptoms of lead poisoning such as colic, for instance; do you know whether you have had the blue line on the gums? I have not.
256. You never observed it, at all events? No.
257. I suppose you think it important, where men are working among lead fumes, that they should wash frequently, and so on? Certainly.
258. But of course, during the drought, and under the conditions of life here, there would be considerable difficulty in getting baths? Yes; great difficulty.
259. And, as a matter of fact, I suppose, there must be a considerable portion of the men who do not set much store by baths; do you think it a provision that would be taken advantage of by the men if the management, having water for the purpose, did establish baths, and warm them, as they very well might do, with the waste steam, that would be a useful provision? I think so, certainly.
260. And do you think the men would take advantage of such accommodation in appreciable proportion? Yes; I think the majority of the men would take advantage of it.
261. It would be a matter of comparatively small expense to the companies, I presume? Well, yes, without taking into consideration the water; but in the past the water has been a consideration. The cost of erecting the baths and keeping them clean would not be great.
262. The mineralised water is not fit for drinking purposes, of course, but the men have always had sufficient water for washing, I suppose? I think there has been sufficient, but, having heard so much about the shortness of water, I would not like to say they had too much at any rate.
263. I suppose that bathing is important to the health of the men, and one would be inclined to recommend that means should be provided specially, as the men cannot easily make provision of the kind for themselves at home? Yes; I think the mines should provide it, not only for the sake of the men, but for themselves, because they have men who get used to the work, and it would save a lot of sickness.
264. Quite so; would it be a small thing to the companies and a great thing for the men? Yes.
265. In regard to the removal of the flue-dust, I suppose it would be quite out of the question to wet it before removing it from the chamber at the back of the furnace? It could not be done.
266. Do men at that work fall ill more quickly than those engaged at other work, or would you have any choice between drawing off bullion and removing the flue dust? I think it would be a hard matter to tell whether the men fall ill from the effects of the flue-dust, although it is put down to that, because the same men do not always stay at that work.
267. They do not remain at flue-cleaning? No; not more than three days.
268. Is the ventilation at the Proprietary smelters what it should be; is the roof open at the top? No.
269. Then you think the ventilation is not good, except when the wind happens to be favourable? Then it is good.
270. At other times the fumes do not clear off as they should do? No.

271. Do you think the fumes penetrate to the feed floor? I think so; but they also have the bad fumes that rise from the feeders.
272. Do any fumes rise there when the furnaces are is full blast, and all is going well? No; not when it is going well.
273. How often do the fumes get a chance of rising from the feeders? Well, from one furnace or the other, every day, and sometimes every few hours.
274. Do you know of your own knowledge of any persons living in the town, and not connected with the mines, who have been leaded? No; not for a fact.
275. But you have heard of such cases? Yes.
276. Have you heard of many such? Yes; I have heard of several at different times.
277. Now, can you make any suggestion to the Board as to the measures which you think ought to be adopted outside of what you have already spoken of—that is, the provision of proper bathing and changing rooms? No; I think not.
278. In the course of your eighteen months' experience did you work all round the clock? No; only on day-shift.
279. At what time did you start? At 8 o'clock.
280. You had your breakfast before starting, and your dinner you would have at 12 o'clock, I suppose; would you take that on the mine? No; I invariably took my dinner off the mine, though not at my own home.
281. You went off the ground? Yes.
282. How long had you for lunch? One hour.
283. Is that a common practice for the men to go away? No.
284. I suppose they would sit about in the sheds and eat it? Yes.
285. You would then have another four hours' work? Yes; from 1 to 5.
286. And you then went home? Yes.
287. *Mr. Hamlet.*] I think you said you were at Block 14, Mr. Triplett? Yes; I worked there for a time.
288. And you used sometimes to be employed getting out the flue-dust at the Proprietary? Yes.
289. What quantity of flue-dust did you get out daily? About sixty barrow-loads.
290. You find that generally a dusty operation, I suppose? Yes; especially if there is any wind at all.
291. Did you ever experience any ill effects at the time of getting out the flue-dust? Well, yes; I have felt queer once or twice, but it has worked off in the course of an hour or so.
292. Which do you consider the most dangerous work, that on the charge floor or tapping the smelters? I should think the men on the bottom floors would be the most likely to suffer from the effects of lead.
293. I think you said you have not seen any fumes rising on the charge floor, except when the furnaces were not drawing, or if they were being shut down? Yes; or when they were just starting.
294. Do you remember whether there were any mining regulations posted upon the mine where you were working? Oh, yes; there are mining regulations posted, but no regulations as to how you should do certain work.
295. No precautions? No precautions.
296. *Chairman.*] As to the regulations, the witness might be asked whether a printed copy of the rules was ever delivered to him.
297. *Mr. Hamlet.*] Page 148 of the "Mining Acts and Regulations" says: "A printed copy of these rules shall be posted in the office and on a building or board in some conspicuous part of the mine, and a copy shall be supplied to each man in any mine to which they shall apply." Were you ever supplied with a free copy of the rules? No.
298. *Mr. Sleath.*] What sort of regulations did you see posted on the mine; were they Government regulations or those of the company? The only regulations I have any knowledge of were posted on the smelters, and also on the concentraters by Mr. Schlapp—the rules and regulations governing the work.
299. Were they issued by the company? I suppose so; but they were not regulations as to how you should do certain work, or what precautions should be taken to save yourself from the ill effects of the work, or anything of that kind.
300. Do you consider, upon the whole, that the work you were engaged in while you were working on the different mines was dangerous, so far as lead poisoning was concerned;—for instance, while you were working at the bullion? Certainly.
301. Do you know of any one apart from yourself who worked for twelve months continuously on the mine without suffering from lead poisoning? No. I never knew of any man that I came in contact with, but had suffered more or less from lead poisoning, or what was said to be such. I know the case of a man working on the smelters only four months who was leaded, and was in the local hospital for seven months. He had to be taken to Melbourne, and will never be able to do any work again, so the doctor was telling me. Maroney is the man's name—he was a strong able-bodied man when he came here.
302. If proper baths were provided for the men, the water could be used again for the concentrators, of course? Yes; or for the smelters to run through the jackets.
303. Then the water would not be any cost at all to the company? No; it could be used again.
304. When the jackets are leaking what do they generally use to stop the leak? They use bran, or they did when I was there.
305. Do they still use bran for that purpose? I do not know what they use now. It is two years since I was there. That was the general thing, however, and I believe it has been used since. That is, of course, when they can get it. It is the simplest way of filling the cracks.
306. Is it a customary thing for the men who are working on the smelters, either on the top floor or the bottom floor, to take their crib in their hands to eat while they are working? Well, I have seen it done but only in case the furnaces are going very quick. Sometimes one of the furnaces will run twenty or thirty times as quick as another, and if the slag is on hand it must be tapped.
307. Then, there is really no specified time allowed since the work has to be done in that way? They are supposed to have a stated time for their crib.
308. But there is no cessation of work to enable them to have their lunch—they have to do their work one way or the other? Yes; of course, if the furnaces are working fairly the men have time to take their crib by helping one another.

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309. Have you ever noticed whether the men engaged in ladling out the bullion, or those wheeling slag, or men employed in other work were the most likely to suffer from lead poisoning the quickest? That would be a difficult matter to decide, because the men working on the lead to-day, say, would be off two days, and other two men would take their place. There are two slag wheelers, and two running off the lead. They change about.
310. *Chairman.*] What is the object of that change? To take them off the lead.
311. For that purpose only? Yes.
312. *Mr. Sleath.*] Ladling out the lead is considered the most dangerous? Yes.
313. *Chairman.*] By lead, I suppose you mean the bullion—that is the lead and silver which is run off into the moulds? Yes. It is the term freely used among the men.
314. You would want plenty of water to drink on work like that, is any provision made to supply you with water? Yes; there are water-bags, but it is often put in hot, and the men have to wait until it cools.
315. Does that arise from it being taken out of the rain-water tanks? No; it is condensed water.
316. Then you think there might be a better arrangement for supplying the condensed water cool? Yes.
317. Would it be an impracticable rule with regard to the men on the smelting floor that no one should eat his crib while at his work? I believe it would be better for the men working, but it would be a rather arbitrary proceeding to stop them from eating for eight hours.
318. We have already spoken of providing bath-rooms? Yes.
319. Suppose a bath-room and dining-room were provided together—they ought to have a place to wash their hands—would it be well to make a rule that the men should eat nowhere except in the attached dining-room? I am afraid it would not, especially with the smelters. You never know how they will run, and the feeder might have to start charging the furnace at any moment.
320. In fact, there are not a sufficient number of men on at that work to allow of the men having a quiet time for taking their crib? No.
321. Why should there not be? That is a question the directors might be able to answer a great deal better than I can.

[The witness withdrew.]

Mr. P. O'Donnell called and examined:—

Mr. P. O'Donnell. 27 June, 1892.

322. *Chairman.*] What office do you hold, Mr. O'Donnell? I am secretary to the Smelters' Branch of the Amalgamated Miners' Association.
323. What class of work is represented by your branch? The general surface hands and smelters.
324. How many members have you? About 1,000.
325. And do they include all men engaged in the same class of work on the field? They include the unskilled labourers and smelting hands.
326. There are not many workers who are not members? They are all mining members that I have mentioned. There are about 250 who work at different kinds of employment outside the mines.
327. However, the men you are going to speak about number 1,000? Yes.
328. Are they all men in your society? There are a number of boys among them.
329. How many have you got, do you know? I should say about fifty boys.
330. Up to what age—what do you call a boy? So far as I am able to judge, I should say they would range from about 7 to 15 years of age.
331. And what are they employed at? On the mine principally, or sorting.
332. Have you really boys as young as 7 years on your books? Well, we do not take the age; but, in my opinion, the age of some of them would not be more than 7.
333. You judge by appearances, and some of them look quite young. What mines are these boys employed on principally? On the Proprietary Mine principally, and some of them are employed on the British Mine; but the British Mine has not got many boys.
334. Do you think at the British we should find some boys looking as young as 7 or 8 years? I cannot say. There are not more than three or four boys in the British.
335. Your knowledge of the boys is rather general. Have you seen them working there yourself? Yes; I have seen them.
336. Your society is not a sick fund, and therefore I want to ask you if you are informed when any member falls ill? Whenever a member falls ill it is reported to us. Some of his friends report the fact to the office; but we do not keep any record of those who are sick from natural causes. Statistics in that direction could be obtained from the Friendly Societies.
337. Exactly. We hope to get some particulars from them. In the meantime I will ask you this question—I do not wish you to answer it unless you have good reason for doing so one way or the other: Is a considerable number of your membership laid off on account of lead poisoning? Yes; a considerable number.
338. What proportion should you say? Well, I cannot speak from the records—I can only go by my daily intercourse with the men, and I find that a considerable number of them have had to knock off work from time to time in consequence of that, and they have often had to go away in order to get rid of the effects of lead.
339. Have you formed any opinion of the kind of surface work that is most dangerous, or which is most liable to result in leading the men engaged at it? I think the work in connection with the smelters is certainly the most dangerous.
340. That is certainly, in your opinion, more dangerous than any other kind of surface work? Yes. In connection with the smelters generally, I mean. The men employed about the flue-dust are liable to get leaded as well.
341. You include them in the class of workers who are engaged on the most dangerous kind of work? Yes.
342. Have you yourself been employed on the smelters? Yes; and have been leaded.
343. What mines have you worked on? I have worked on the Proprietary.
344. Only at the Proprietary? Yes; only there.
345. When did you first begin to work there? I began to work on the Proprietary Mine just six years this month.
346. And when did you leave off? About three years ago.
347. What work in particular were you doing—were you feeding the smelters, or drawing off the bullion? I was for a time feeding; but I was at all work round the smelters—feeding, wheeling, and on the surface for a time.

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348. Did you remove flue-dust? No.
349. Then how long were you at work before you fell ill? About six months, I should think.
350. What was the nature of the illness—what kind of symptons did you have? Well, there was a general loss of appetite, and a kind of "all gone" feeling.
351. Colic? Yes, sir.
352. Did you suffer from paralysis—dropped-wrist? No; I did not have that.
353. Did you consult a doctor? Yes.
354. Do you remember who? There were two doctors here then—I forget the name of the doctor now.
355. At all events, you did consult a doctor;—how long were you off? About a month.
356. Then did you return to work? Yes.
357. To the same kind of work? Yes.
358. And did you suffer again? Yes; I had to leave off then, and go to surface work, away from the smelters.
359. How long after you returned to work did you stay at the smelters? About a week.
360. And you found you were getting ill again? Yes.
361. What other kind of surface work did you go to? I worked in what they call the rigging gang—constructing the rigging.
362. How long did you continue in that work? I was in that gang about eighteen months.
363. Did you suffer any more from leading afterwards? No.
364. Can you tell me when a man has been employed at the smelters, and has become leaded, is he allowed to go back to the same kind of work, or is it suggested to him that he had better take up some other kind of work, to prevent him getting leaded again? It is generally understood when a man is laid off through leading, that when he recovers he will be allowed to take the same place as before.
365. That is, if they apply to be allowed? Yes.
366. Your work at the smelters is pretty hot and hard, is it not? Yes.
367. What provision is made for water for you to drink there? When I worked there it was condensed water put in bags and left to cool—open water-bags.
368. Was there a good supply? Yes; a fair supply.
369. Was the water always cool enough for you to drink? No; I remember when we have had to wait a long time for it to get cool enough to drink.
370. Were you on the day shift, or the night shift? When I was in the rigging gang, I was generally on day-work; on the smelters it was shift work, of course.
371. You kept going round on the three shifts? Yes.
372. Did you on every shift take food to the mine with you? Yes.
373. Where did you eat your crib? We just sat on the handle of the barrow at the work.
374. Used you to wash your hands before you took your crib? Yes; I always took that precaution.
375. Where did you get the water from? The water from the furnace, which was used to sprinkle the charges with.
376. What time did you have for eating your crib? The time supposed to be allowed is twenty minutes, but we had not always that. A man working at the furnaces has to take ten minutes whenever he can get it. It depends upon the way the furnaces are running. Sometimes he may be able to get the full twenty minutes on a stretch; but sometimes when they are working differently he has to take it as he can.
377. Is that a necessary arrangement? It is certainly necessary for the faithful carrying out of the work.
378. On the other hand, if there were more men engaged on that work, you could have the full twenty minutes? Oh, yes; we could do it then.
379. Were you engaged in removing flue-dust at all? No.
380. Do the men in general, who are engaged at the smelters, change their clothing when they go to work? They never do so, as far as I know.
381. Have you ever been told about the dangers of lead poisoning, and the little things you might do to save yourself from the effects of lead? No, sir.
382. However, you must have heard, and you know it is important to wash and keep yourself clean? I am sure it would be a great preventive.
383. The great proportion of the men have not the convenience for washing in their own homes? No; it is a luxury unknown to the working men here.
384. In your opinion, would it be an expensive matter for the mines to have bath-rooms and hot water laid on? I should not think it would be expensive.
385. Do you think it would be a reasonable provision—one, that is, which might be reasonably asked for? Well, about the reasonableness of such a request I am not prepared to express an opinion; but as to the necessity of such a provision being made, of course I would say that it is an absolute necessity.
386. Have the men ever asked for it, do you know? Not to my knowledge.
387. Why not, do you think;—the necessity seems clear, and yet you have never sought to get it? Well, I suppose we are supposed to act under instructions, and not to make requests of this kind to the employers.
388. From whom would you get your instructions? From meetings of the Miners' Association.
389. How would your instructions be conveyed to you? By resolution of the branch.
390. Then, no resolution has ever been proposed that such provision should be asked for? The matter has been discussed, but no resolution passed; and, as far as I can remember, the reason of it not being further dealt with was the feeling generally that it would be hardly any use making such a request.
391. You are clearly of opinion that the men should have a clear twenty minutes for their lunch? I think the time is little enough for them to eat their crib, yes.
392. And you think there should be provided a proper place for them to eat their crib, with provision for washing their hands, so that they might be able to take their food away from the smelters altogether? I should think so, certainly.
393. Have you any suggestion of your own to make on any point? No; I cannot think of anything further.
394. *Mr. Howell,*] At what time do you say you worked on the Proprietary Mine? I worked on the smelters first about six years ago this month.

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395. That was the time the old style of water-jackets were in use, was it not? Yes.
396. And the smoke-stacks were low then as compared to what they are now? Yes; the small stacks where I was working were lower, I think.
397. The draught was not quite as good? I do not know about that. Of course, if it follows on account of the stacks being lower then, it was so.
398. Were they the old style of water-jacket furnaces, or had they open throats like they are now? On the feed-floor, they were the old-fashioned ones, going up to the roof.
399. And were fed through a door at the side? Yes.
400. Did not the fumes come out of those doors? Yes; the same as they do now from the present ones.
401. Did you ever see fumes come out of the present ones? Yes.
402. Did you notice any more fumes about the lower portion of the furnace than there is now? I cannot say if there was. There are always fumes even now, especially if the furnace is not going as it should.
403. If there is sufficient draught to carry the fumes off, there cannot be much coming on the feed-floor? No; there may be some dust, but not much fume.
404. And if the draught takes it all away, there cannot be any left? Of course not.
405. As a matter of fact, does not the draught take the fumes away from the present furnaces well? Since the higher stack has been built I have seen the fumes coming out on the feed-floor.
406. Would that be when the furnace is burning regularly? No; it would be when the furnace was not running as it should be.
407. But that does not often happen, I suppose? I am not often on the mine. I only go on the mine when I have business there, as secretary to my branch of the Association. I am not on the feed-floor now more than once in three weeks.
408. Are not the conditions much more favourable now than when you were working there? Yes; I must certainly say that.
409. That is, in every respect, so far as the chances of the men getting leaded round the smelters are concerned? The conditions are better now than they were in my time, no doubt.
410. Have you, of your knowledge, known of a considerable number of men, or any men, being leaded on the feed-floor of late? Yes.
411. At the Proprietary furnaces? Yes; I can name two.
412. What length of time elapsed between the first case and the second? There was a case about a month ago, and the man was off for some considerable time. It was through a friendly society that I found that out, because he happened to be a member of the same society as I am. It is very exceptional if a fortnightly branch meeting night passes without our having a certificate from the doctor describing some case of illness as plumbism.
413. You remarked, in answer to the Chairman, as to the suggested changes which might be made for the benefit of the men, that you did not think it would be much use to make any application for any change that might be required, such as providing bath-tubs, for instance;—have you any personal knowledge of any such application having been made to the management of the mines here, and of it being refused? No; I think I said that I understood such an application had not been made.
414. I thought you said that it would be of no use to make such an application? Well, the discussion that took place on the subject led to that conclusion.
415. That is what I understood;—then, I ask you the question; have you, as secretary of the association you belong to, made any application to the principal companies here for changes of that kind, and which application has been refused? I have not made any.
416. *Mr. Hamlet.*] I think you mentioned that colic was one of the symptoms you suffered from? Yes.
417. What would you generally call colic? Well, pains in the chest and stomach.
418. You have experienced it yourself, and have seen it in your mates? Yes.
419. You have spoken of cleanliness as being, in your opinion, a preventive;—do you know, as a fact, that some men get very little time or opportunity for washing? I can hardly say that.
420. It is no great disgrace, I think, under the circumstances? I should think it would be a disgrace for a man to go a long time without washing.
421. What I meant was, that a man, during the drought, would be forced to go a longer time without washing than he would under happier circumstances? Well, I think that some men go longer with dirty clothes than they ought to.
422. From what you have heard or seen of the men, how long should you think some of them would go without having a bath all over? I think I have said that a bath is a luxury unknown to the working men here.
423. So that they might go for a whole twelvemonth or more without one? Yes, or perhaps two years.
424. And work hard all the time? Yes, very hard.
425. You also mentioned, I think, that your association had discussed the question of adopting some measures to give the men opportunities for observing cleanliness? The matter was discussed, but they never came to any resolution.
426. Why was that? It was simply mentioned in the course of a general discussion.
427. Perhaps they thought it not important enough? Oh yes, they thought it important, but at the same time they thought it would be useless to make the request.
428. *Chairman.*] I think you might explain that; it seems curious: here are people who have power to give you what you need; you acknowledge you do want it, and at the same time you say you think it of no use to exert yourselves to obtain it? There are persons certainly that we have to depend upon for many little matters, and as we so frequently have requests to make and often meet with refusals it was thought to be useless to move in such a matter.
429. *Mr. Sleath.*] The water, you say, at the smelters, is kept in open water-bags? Yes.
430. Do you think that a proper thing, where there is so much dust flying about? No. I have often had to push the scum away with my pannikin before drinking the water.
431. *Mr. Hamlet.*] You dip in a pannikin to take the water out of the bag? Yes.
432. *Mr. Sleath.*] Outside of your own branch, do you know of any request having been made that bath-rooms should be erected? I think the underground men made a request at one time—I do not mean as to the matter I am speaking of now. I am speaking as the secretary of the smelters' branch.
433. That might be one reason that would influence your members in not making the request, if they knew

knew that others had made a request and it had not been complied with? I think it would be a very sound reason. Mr. P. O'Donnell. 27 June, 1892.

434. What work on the surface do you consider most dangerous, or most likely to cause lead poisoning? I have stated about the smelters, and about the flue dust, and there is another class of work, filling the trucks from the bins where the lead is—that always creates a great dust.

435. For washing, what provision is made on the floor of the furnace down below, or say on the feed-floor; if you wanted to wash your hands, where would you go to find the water? I think the water comes from the jackets. There are taps running into a tub which is always full of dirty water.

436. It comes from the jackets? Yes, I think it comes from the jackets.

437. What do they put in the cracks of these jackets when they become a bit leaky? I have heard that they used to use horse manure.

438. Of course you come into contact with a great many men working in the mines. Do you know of the case of any man who has been working on any of these mines for a period say of twelve months who has not become leaded more or less during that time? Well; it is a very wide question. I may say that I have known such cases, but they are very few indeed.

439. You do not know many? No.

440. *Mr. Howell.*] How long have you known of a man to work at the furnaces without being affected by lead? Well, I can hardly say that. I think any man working on the furnaces for twelve months must be more or less affected. There are certainly some men who are all the time taking medicine, and they certainly get along for a good while—almost creeping along, so to say. But they certainly are leaded although they attend to their work.

441. We know that if a man begins to suffer from leading he will be laid off very soon. He would not be able to creep along very much—do you think he would? As I have said, they keep on taking medicine to stave it off.

442. Do you think it really does stave off lead poisoning? Well, it seems to me that it does—of course I am not a doctor.

443. Is it not a fact there are a number of those men who have been working on the furnaces say for twelve months, who will tell you they have not been affected by lead poisoning? If there were many who told me they were not affected by it I would not believe them, because their very appearance would belie them.

[The witness withdrew.]

Mr. S. Alker called and examined:—

444. *Chairman.*] You are Inspector of Nuisances for the municipality of Broken Hill? Yes. Mr. S. Alker. 27 June, 1892.

445. How long have you held that post? For four years, or nearly so. Ever since the municipality was formed.

446. You are well acquainted with every part of the town, and many of the inhabitants? Yes.

447. Are you Inspector under the Dairies Supervision Act? Yes.

448. How long have you held that office? Within six months of the Council being established—I should say about three years, or a little over.

449. Have you noticed any illness among the milch cows that you have attributed to lead? Oh, yes; I have seen several that have been leaded.

450. Would you describe the symptoms—what happens to them? My attention was first directed to some cows belonging to Mr. Lane, of Block 14. They seemed to lose condition, and their hair was all on end, while their mouths seemed to have a blue or purple tinge. They lost flesh rapidly, and did not eat. They had also a slight frothing at the mouth, and gradually sank. At that place they could not keep a cat or dog. My attention was then directed to the cows in the township. At Mr. Brenton's, in William-street, all his cows died exhibiting the same symptoms. Some of these cows in the township being taken out to the Race-course gradually recovered; but not completely for a long time afterwards.

451. Are those the only two persons whose cows were affected in that way? Oh, no. All the cows in the township were affected—Craig's, and also Schomburg's.

452. Do you say all the cows in the township were affected? Well, no; I cannot say that exactly, because some of them removed their cows. Those that I have spoken of were the cows that came particularly under my notice, and which I can speak of with some degree of certainty. The others I cannot, because the owners removed them shortly afterwards for fear of losing them.

453. Are you quite clear that those symptoms which you have described were not due to poor feeding? Quite clear. As an old farmer, I have had some experience of cattle, and I never saw any cattle attacked that way. Those that have died at Stevens' Creek have not shown the same symptoms—they were quite different altogether.

454. Has the number of cows in the town diminished lately? Yes.

455. What is the cause of that diminution? Probably death. There are very few cows in the town now.

456. You think the cause of death has been principally lead-poisoning? I hardly know how to reply to that question, because I have not seen them all. But it is from the disease peculiar to cows in the town that the people have got rid of their cows. They would not retain their health here.

457. Can you think of any other cause of unhealthiness to cows which are kept in the town? Well, there are one or two cases that I have not alluded to, notably Reddleford's, of Railway Town. They used to allow their cows to run about the town and eat and drink matter not fit for cattle to consume, and I attributed the falling off of her cows to that.

458. That was an exceptional case? I think so. The other people fed their cows properly, that is, on bran and chaff, and good water, and yet they have exhibited the symptoms I have mentioned.

459. Now, can you tell us anything as to the effect of position or situation in producing or avoiding the lead-poisoning of cattle. The people live at varying distances from the hill, and they also live at different points of the compass? Yes.

460. What is the farthest distance from the hill at which you have known cows to suffer as you say? The farthest dairy we have here is something like 7 miles from the town, and the next farthest from here is about 5½ miles, and then there is one about 4 miles. Those are all the dairies in that direction.

461. In which direction? The north-east. Due north there is one at Stevens' Creek. I saw the cattle there

Mr. S. Alker. 27 June, 1892.

there within the last fortnight, and they were looking in splendid health. The same with Craig's and Wilson's, and Renton's.
462. Those are all south? Yes.
463. But what I want to know is what is the farthest distance from the hill at which you have seen cows suffering from this peculiar disease? I should say about 2 miles and a half.
464. In which direction? More particularly south-west and west.
465. And whose cows were those? Schomburg's, Craig's, Renton's, and Block 14.
466. The last was on the side of the hill? Yes.
467. What places are there close to the hill now? Craig's and Wilson's.
468. How far away are they? About a mile and a quarter—it depends upon which point you start from. Going westerly I should say between a mile and a quarter and 2 miles.
469. Do the horses suffer? We have had a tremendous number of dead horses removed. But I think they suffer more from starvation than lead-poisoning. They do not get a fair chance here. They do not seem to suffer so much as the cows.
470–473. You go about a great deal into people's houses, and so on. Do you ever hear of any persons not connected with the mines who have become leaded—something more than hearsay I mean? No. I have known of several cases of lead-poisoning; but none except persons working in the mines.
474. *Mr. Hamlet.*] What water do the cows get to drink here? At that time we got the water from Berg's well.
475. The cows about town, where did they get the water from? Those that were in the town got the water from Berg's well, and we got it from the Imperial dam while it lasted.
476. Is it not a fact that you got water out of the mines for the purpose of watering the cattle? Yes, certainly.
477. Was that water good? We used to drink it. There was no other water to use.*
478. Did you ever get water from Silverthorne's well? No; that was strictly prohibited.
479. What other wells were there from which the cattle were watered? At M'Laughlin's and at the Sportsman's Arms—they got water from there.
480. What was the quality of that water? It was fairly good stock water. A large number of horses and travelling bullocks were using that water.
481. It was mineralised water, was it not? I believe so.
482. Do you know what minerals it contained? No; we had no estimate of that.
483. Silverthorne's well is not used now? No.
484. Can you give me the names of any other wells that are being made use of? No, sir, I cannot. One or two were being sunk; but whether they have been finished or have come into use during the last week or two I cannot say.
485. At the Sportsman's Arms, are they using that well there? Yes; they use it for stock purposes.
486. Are there any other wells you know of in use? There are M'Laughlan's and Berg's.
487. Can you manage to get a pint bottle of each of these waters for me? Yes.
488. With regard to Mr. Lane's cows, they were at his stables, I suppose, that is within about two or three hundred yards of the mine? Yes, about that. His place is right under the stack.
489. What feed did the cows usually have? The same feed as the horses—bran and chaff—which came from South Australia.
490. Then if they got leaded it would be from something in the air or the water? Yes.
491. *Chairman.*] Unless their food happened to be exposed? Yes.
492. *Mr. Hamlet.*] Would you have any difficulty in finding me a dog or cat, or some other small animal which has died from lead poisoning here? In the summer time we should have no difficulty whatever, In the winter time they seem to recover their vitality.
493. *Chairman.*] Do you observe the same variation in the health of cows between summer and winter? Do you mean on the hill here?
494. Yes, within the sphere? I have observed that the cows are not affected alike, either in summer or winter. For instance, in a mob of cows perhaps two or three would take bad, and the others would show no sign of leading. Then when those cows were disposed of others would become ill. With regard to the seasons I cannot say, because on the hill during the dry seasons we have had them pretty much alike for heat. At the same time in the summer undoubtedly the mortality is greater among the animals generally.
495. Except as to the cows, you say you do not distinguish any difference in the effects upon them? Well, I have not followed it closely enough to say. Among the smaller animals I have noticed it.

[The witness withdrew.]

TUESDAY, 28 *JUNE*, 1892.

Present:—

DR. ASHBURTON THOMPSON (CHAIRMAN).

W. M. HAMLET, ESQ. | R. SLEATH, ESQ.

J. HOWELL, ESQ.

Mr. George Howard called and examined:—

Mr. G. Howard. 28 June, 1892.

496. *Chairman.*] What office do you hold? I am Secretary of the Lodge Court Stuart, Ancient Order of Foresters.
497. When was that lodge established? The 27th November, 1889.
498. What we hope to get from you is material for forming some idea of the prevalence of lead poisoning among the members of your society. I suppose you enroll men only? Yes. We do take their wives.
499. They pay extra for medical attendance only on their wives and children? Yes.
500. What is the limit of age for children—fourteen? Yes.

501.

* NOTE (*on revision*):—I did not wish it to be understood as here given. I never heard of mine-water being used for domestic purposes; but I and others used the water from McLaughlin's well for drinking purposes.

Mr. G. Howard. 28 June, 1892.

501. But the women and children are not noticed in any way in your books? No.
502. What is your limit of age for entrance as a member? Forty.
503. That is the downward limit—how young will you take them? They must be over seventeen.
504. Do you appoint a medical man? Yes; we have two doctors, they are Dr. Thompson and Dr. Korff.
505. When a member is laid off do you require from him a certificate of the kind of illness he is suffering from? Yes.
506. And I suppose you require that certificate to be signed by a doctor? Yes, he must be the surgeon of the Court.
507. In this certificate you require the nature of the illness to be stated? Yes.
508. What do you do with these certificates—do you record them? Yes.
509. And you record also the nature of the illness? Yes.
510. Also the number of days the sick man is away, I suppose? Yes.
511. Have you had charge of the books of your lodge since it was established? Not from its establishment originally; there were secretaries before me.
512. Have you access to them, at all events? Yes.
513. Have you referred to them at all in connection with this inquiry? Yes.
514. You will have among your members men of all classes of occupation? Yes.
515. Can you tell me what proportion of them are employed at the mines? There are not many of our members employed on the mines. We have a few engineers, and one or two miners.
516. One or two only? Yes, there are not many miners in our society.
517. Can you give the Board the actual number of your members who are employed about the mines? No, I cannot state positively. If I had known I could have looked it up.
518. You can give that information? Yes, I will do so.
519. What is your total number of members? Up to 1891 we had eighty-eight.
520. Do you know how many have been laid off by leading? We have had one case only.
521. Only one case—during what period was that? During 1891. That was the only case we had.
522. How long have you lived in Broken Hill yourself? Nearly five years.
523. Have you formed any opinion as to whether lead poisoning is a serious cause of illness here? No, I have not.
524. Is it within your own knowledge that any persons unconnected with the mines have been leaded? No; I have no knowledge of any cases personally.
525. Do you think you can make any suggestion that may be useful to the Board in pursuing this inquiry? I do not know that it is in my power.
526. Nothing especially occurs to you? No.
527. *Mr. Howell.*] Have you been in your present employment for the last five years? No; not until next November;—about four years and a half
528. Your place of business is close to the Proprietary Company's mine? Yes; right in the middle of the mine I may say.
529. It is close to one of the principal lead ore bins, too? Yes.
530. How many men and boys have you in your employ? One man and one boy.
531. Have they been with you all the time you have been there? No;—that is, the man has; the boy we have had for eighteen months.
532. Have you had any complaint from them as to any ill effects of the lead? No.
533. Your work is in about as dusty and dirty a place as there is on the mine, is it not? It is.
534. *Chairman.*] What is your occupation then, Mr. Howard? I am storekeeper on the Proprietary Mine.
535. Whereabouts is your place of business? It is between the two smelters; on the line of the feed floor.
536. Between the south and north-west? Yes.
537. Is it a specially dusty place? Yes; it is one of the dustiest parts of the mine, being so close to the bins where the ore is tipped down.
538. And you have never suffered from the effects? No.
539. Nor the man who is assisting you? No; nor the boy.
540. How long has the boy been with you? Eighteen months.
541. Have you taken any particular precautions? No; I have never been ill myself, except it might be to have a cold.
542. Do you live on the premises at the mine? No; I used to.
543. Tell us how long you lived there? I lived on the mine about twelve months, I think.
544. How many hours a day are you employed in your store? Eight.
545. Always in the day time? Yes.
546. Where do you get your meals? I get them at my brother-in-law's.
547. That is away from the mine? Yes.
548. Will you have the goodness to look at your books, and tell us how many of your members were employed in the mines in any capacity during the years 1890 and 1891, and include with that the statement that you have only given sick-pay to one member of your society for lead poisoning during those years? Yes; I can furnish you with such a statement.

[The witness withdrew.]

Mr. J. Hynes called and examined:—

Mr. J. Hynes. 28 June, 1892.

549. *Chairman.*] What office do you hold, Mr. Hynes? I am secretary to the Hibernian Australian Catholic Benefit Society of Broken Hill.
550. Do you enrol only men? Yes; only men; that is, in this branch. We have family branches.
551. In Broken Hill? No.
552. We have only to do with the Broken Hill Branch, and in that you enrol men only; do you limit the ages of those you admit to membership? Our scale of entrance fees runs from 16 years to 40.
553. But do you take them over 40 years of age? We have not done so as yet. Of coure a man over 40 would have to pay more.

554.

Mr. J. Hynes. 28 June, 1892.

554. Then there is provision for taking members over that age? Yes; for 40 years the entrance fee is £4 10s., and over that a fraction in addition for every year over that age.
555. You load them for coming in after 40 years of age? Yes.
556. Are they allowed medical attendance for their wives and families by paying an additional fee? Yes.
557. And do you appoint the medical man? Yes.
558. When a member is laid off, do you require a certificate of illness? Yes.
559. Do you require that it should be written by the medical man whom you appoint? Yes; we provide our own forms, and the doctor signs them.
560. Do you accept certificates from other medical men than those you appoint? No.
561. Who are your medical men? Dr. Blaxland and Dr. Korff.
562. Do you require the nature of the illness to be stated in the certificate? Yes.
563. Do you record these certificates in any book? Yes; they are all kept in the books.
564. Do you preserve them? Yes.
565. And they are in your charge, I suppose? Yes.
566. Will you produce them? Certainly.
567. Have you referred to the books in your possession in connection with this inquiry? Yes.
568. When was your branch established? On the 4th October, 1888.
569. How long have you been in charge? Eighteen months.
570. Your members follow all kinds of occupations, I suppose? Yes.
571. Can you give us the number who are employed in the mines? Well, I daresay I could, but I have not gone into that.
572. What is your total enrolment? On the 1st January it was 205.
573. Has your membership greatly increased since the 1st January, 1891? Yes. In January, 1891, we had 151.
574. Do you know how many members you paid sick pay to for sickness induced by lead during 1890 and 1891? I have not the certificates to hand from 1890; I have them only from July, 1890, to July, 1892.
575. Will you be kind enough to draw up a statement showing the number of members of your society who were working on the mines during 1890 and 1891–2, and also a list of the members who were leaded during the same period? Does that mean a statement showing the number initiated during that period, or the total number of members in the branch employed in the mines?
576. The total number? Very well.
577. Do you know if any of your members not connected with the mines have become leaded? Not to my knowledge.
578. You have not given sick pay to any such? No; but all the men I have on that list as having received sick pay from my branch were on the mines.
579. The question is whether among the members recorded in your books as having received sick pay there are any tradesmen who are not employed about the mines, such as carpenters, bricklayers;—do you know of any cases of lead poisoning among that class of persons? No.
580. You know that persons who work in lead are likely to fall ill? Yes.
581. That is a matter of common knowledge? Yes.
582. Do you admit them to your society on the same terms as other members? Yes.
583. You know, also, that if a man has been once leaded he is very likely to be leaded again? Yes.
584. Still there is no rule of your society which regards such cases as special in any way. You do not load them—make them pay more on that account? No.
585. And have no special rule touching them? No.
586. You are a smelter hand yourself? Yes.
587. Have you been leaded? Yes.
588. What mine are you employed at? The Proprietary.
589. How long have you been employed there? About four years.
590. Have you worked on any other mine? On no other mine.
591. What is your particular branch of work at the smelters? Feeding the furnace.
592. How long had you worked before you fell ill? A little over four years.
593. You worked four years before you fell ill? Yes—that is, from leading.
594. How old are you? Thirty years of age.
595. Do you account for your illness in any way—that is, after working for four years without falling ill, and then becoming sick so suddenly? No; I cannot.
596. Were you very bad? Yes; I think so.
597. What were your symptoms? I had pains in the bowels.
598. Colic? Yes.
599. Had you any paralysis, weak legs, or dropped wrist? No.
600. How long were you laid by? I lost fifteen shifts.
601. And then you went back to your work, I suppose? Yes.
602. To the same work? Yes.
603. How long ago is it since you returned to work? At the latter end of March or some time in April.
604. You are not suffering now? No.
605. You have no sign of it? Well, I would not like to say that. I may have it on me for all I know.
606. At all events, it does not interfere with your work? No.
607. I suppose you have wondered why it was that you should fall ill after having escaped so long? I certainly did wonder a little.
608. And you could not think of anything? No.
609. No change in the conditions of your work, for instance? Well, there was a slight change, perhaps.
610. What was that? We had more fumes coming from the furnaces than what there had been previously.
611. What was the cause of that? I cannot say. The furnace used to blow up terribly on us, and cause the place to be full of smoke.
612. How many months before you became ill did that begin to be the case? Some four or five months.
613. And it continued until you actually did fall ill? Yes. We have had occasional bursts of it since, but not so bad.
614. Did anybody else on the same floor fall ill? Yes.

Mr. J. Hynes. 28 June, 1892.

615. Were they men who had hitherto escaped? I would not be quite sure. I think they may have had an attack once before.
616. Do you often get much fume on the feed floor? Not a very great deal.
617. As a rule, there is a strong downward draught. When do they begin to rise? Well, at the present time the floor on the furnace where I am working is slightly open, and the fumes from the bottom floor come through the cracks rather more than was the case in the earlier days of the smelters.
618. What shifts do you work on? I work the three shifts.
619. That is, all round in turn? Yes.
620. And how long do you remain on one shift—a week? Yes. Seven shifts a week.
621. Do you always have a meal at home before you go to work? Not always.
622. Do you not have a meal before going on each shift? No. Sometimes I am on the afternoon shift, and then I do not, as a rule, have anything before going on.
623. What time do you go on, then? At 4 o'clock.
624. And you have your dinner about 1 o'clock, I suppose? Yes.
625. Do you take some food with you to the mine? Yes.
626. And how long are you allowed for your "crib"? Sometimes we have a reasonable time—twenty minutes.
627. But you are not sure of having twenty minutes clear? No; not at all times. It depends upon how the furnaces are working.
628. Do you take your own tea with you, or do you drink the water provided on the mine? We get the water from an iron tank.
629. Is it condensed water? Yes.
630. Is it always cool? No; sometimes it is quite warm.
631. When you are going to eat your "crib," do you wash your hands first? As a rule, I tear a piece of paper off, and eat it from this paper. I do not use the water there on account of it coming from the water-jackets.
632. Do you wash your mouth first? No.
633. Do you live far away from the mine? About twenty minutes' walk.
634. Is any precaution taken by the men in general against leading, or are there any rules which they observe themselves? I cannot say anything as to the other men. I can only speak for myself.
635. Very well, what do you do? I change my clothes immediately on going from work. I divest myself of shirt and flannel, and put on fresh ones. I also have a fair wash all over the body—that is, every time I come off shift—and two or three times a week, perhaps, I wash my legs. Of course, we cannot get a bath here.
636. I understand—you do what you can under the circumstances? Yes.
637. Do you take an aperient regularly? Yes.
638. What do you take? As a rule, salts and senna.
639. How often do you take a dose? I take a wineglassfull every morning.
640. You find it necessary to take it? Yes.
641. Could you not get on without it? I do not know that. I make it a rule to take it.
642. You take it purely as a matter of precaution? Yes.
643. Are there many other men who take as much care as yourself in that respect? Well, I believe the men in general who work the same shift as myself do. From conversing with them I should judge so.
644. Are there other men on the feed floor who have been continuously working there as long as you have—that is, three or four years? Yes.
645. Is there any one of them who has never suffered from leading? I do not think so.
646. Do you smoke? No.
647. The others do, probably? No; not all.
648. Do you think you ought to have your full twenty minutes for "crib" free? I do—certainly.
649. Do you think it would be an easy matter to establish warm baths at the mine? Yes. Considering that they have lots of machinery, I think they might be able to do that for us.
650. Do you think if they were provided that the men generally would take advantage of them? Yes.
651–3. The baths would require to be warm as much in the summer as in the winter months, if not more so, I suppose? That is more a question for a medical man to answer, I should think.
654. You never wash yourself in cold water when your object is to have a thorough clean up, I presume;—have you never had any printed instructions reminding you of the little things which might be done and precautions taken to avoid lead-poisoning? Yes; I have had them.
665. Where did you have them? On one occasion I saw them at the pay office of the Proprietary Mine.
656. You have lived at Broken Hill five years you say;—have you ever known yourself, as an acquaintance or friend, of any person not connected with the mines who has become leaded? No; I am not acquainted with any. I have heard of them, of course.
657. But you have not heard of a great many, have you? No.
658. Now, what is your opinion of leading;—is it a cause of a serious amount of illness here? Yes; I should say so.
659. I mean a serious amount in proportion to the number of persons employed? Yes.
660. *Mr. Howell.*] You say you have been working at the Proprietary Mine for four years? I said four years and a half, sir.
661. That takes you back to the early days, when the smelting arrangements were different from what they are at the present time? Yes. I was a short time on the old furnaces.
662. But the arrangement of the furnaces and the general conditions of working are very much better now than when they first started, are they not? Oh, yes.
663. Do you of your own knowledge know of any men who have worked on the smelters as long as you have without being laid up by what is termed lead poisoning? I have known of one man who worked as long without being leaded.
664. Only one? Yes; only one, to my knowledge.
665. But there might have been other cases, I suppose? Yes; there might have been.
666. Did you ever notice any fumes rising directly out of the feed-throats of the furnaces when they were running? Yes.

Mr. J. Hynes. 23 June, 1892.

667. What was the cause of it, do you know? I cannot give you the cause of it. I think, from observations that I have heard, that it gave Mr. Schlapp a good deal of anxiety.
668. Have you ever seen smoke rising from the furnaces when they have been running regularly? Yes.
669. Is it not a fact that when smoke does rise from the throats of the furnaces it is caused by their being under repair? No; I do not think so.
670. But you say you worked for three years on the furnaces—part of the time when they were in a much worse condition than they are now, as regards the chances of lead poisoning, without feeling any bad effects from it? Yes.
671. *Mr. Hamlet.*] I think you said that you found it necessary to take medicine, and made a practice of it every day? Yes.
672. If ever you left would you continue that;—would you still take a wine-glass of salts and senna every day? Not every day; perhaps once or twice a week.
673. And did you find by this means you kept yourself all right? Yes.
674. You spoke of the difficulty of workmen obtaining warm baths;—are there warm baths to be had at Broken Hill at all—I mean by paying for them? Not to my knowledge; there may be, but I do not know of them.
675. You also said the fumes sometimes rise from the throat of the furnace when it is running regularly? Yes.
676. Do you mean by that from the furnace itself? Yes.
677. Not from down below? No.
678. Is it not a fact that when a furnace is running regularly there is such a powerful draught that it actually carries all the smoke and dust and fumes with it? Yes. When I say that smoke rises from the throats I do not mean to say that it is continually so; but I have seen the smoke rising from the throat of the furnace when it was running—that is, in occasional puffs.
679. Would that be if the blowing-engine suddenly stopped? No.
680. You have known it to occur when the blowing-engine was at work and the furnace was running regularly? Yes.
681. But I suppose the worst cases of smoke and fume rising were on occasions when they were repairing the furnaces? When the furnaces have been down for repairs I have seen very little fumes rising from them.
682. I do not mean when the furnace is actually shut down, but (say) when the jackets are under repair? Oh, of course there would be in that case.
683. What I particularly meant was, when anything in the shape of repairs is going on, such as Mr. Howell referred to, there would be more fumes then? Oh, yes.
684. Considerably more than if the furnace was running as it should be? Yes; of course. But the furnaces at the present time, on account of the material that is going through, get clogged round the corners, and the blast from underneath then makes its way through the easiest place, and occasionally comes on to the feed-floor. We have to use bars to clear it.
685. *Chairman.*] Can you give us the name of the man you referred to just now who has not suffered from leading at all? He is not working on my floor at the present time. He might have been leaded for all I know. I have known him to be off through sickness, but not from lead, so far as I know.
686. *Mr. Sleath.*] You have been asked about the time you spent on the new furnaces? Yes; what I meant was the 80-ton ones.
687. Were the conditions when you started to work on the new furnaces much worse than they are now? Yes; I was referring then to the 30-ton furnaces.
688. I am talking about the new furnaces? There was less trouble from the fumes than since the new furnaces started.
689. And the conditions were really better then than they are now? Yes.
690. You only worked a short time on the 30-tonners? Yes; only a few weeks.
691. And you worked on the new furnaces the balance of the time? Yes.
692. And the conditions were better then than they are now? Yes.
693. Are water-bags used at the smelters? Yes.
694. The ordinary open water-bags? Yes.
695. Does the dust get into the bags? Yes.
696. Do you think it would be better if some provision were made to keep the dust out of the water-bags? Yes; certainly.
697. *Chairman.*] The information the Board desires you to furnish is as to the total number of members in your society from the 1st August to the end of 1890, the number who were employed in the mines in any capacity, the total enrolment for 1891, and the number in that year who were employed in the mines in any capacity, and the same for the two quarters of 1892. [*Witness here produced certain medical certificates and handed them in.*]
698. These are the certificates referring to the members you have on your sick list? Yes.

[The witness withdrew.]

Mr. R. B. Brittan called and examined:—

Mr. R. B. Brittan. 28 June, 1892.

699. *Chairman.*] What office do you hold? I am secretary of the Broken Hill Branch of the United Ancient Order of Druids.
700. On what date was your branch established? On the 3rd May, 1888.
701–3. How long have you been secretary? About three years.
704. You enrol men only, I suppose? Yes; men only.
705. But they can pay for medical attendance for their wives and families? Yes.
706. In your books you do not take any notice of the wives and families? No.
707. What are your limits of age for entrance? From 16 to 45.
708. Do you admit persons over 45 years of age except by transfer from some other branch? No.
709. Do you appoint a medical man? Yes; we have three doctors—Dr. Thomson, Dr. Blaxland, and Dr. Korff.
710. And when a member is laid off, do you require a certificate of illness? Yes.

711. Do you require that it should be written by one of your appointed doctors? Yes.
712. Will you accept a certificate from any other medical man? Provided a member is absent from home we do.
713. In that case, if he is taken ill he must supply a certificate from a duly qualified medical man? Yes.
714. You require that he should be duly qualified? Yes.
715. Do you record the nature of the illness in any book? No.
716. Do you preserve the certificates? Sometimes, yes, and sometimes, no. It is referred to in the minute-book.
717. Is the nature of the illness mentioned in the minute-book? No.
718. Then you have no written record of the nature of the illness? No; only sometimes the doctors put it in the butt of the certificate. [*Certificate produced in illustration.*]
719. As a general rule you have no record of the kind of illness that the members suffer from? No.
720. Your members include persons following all kinds of occupations? Yes.
721. Can you fill up for us a short form, showing your total enrolment for the last two or three years, and the proportion of members during the same periods who have been laid off by lead poisoning? Yes; I dare say I can if I have a little time to do it. I shall have to look up all the certificates of declaration on the funds, and then compare them with the doctors' book.
722. You may not have the record complete? I may not be able to complete it thoroughly, but it would give a very good idea, I think.
723. Then can you say off-hand whether any of your members, not being mine workers, have suffered from lead poisoning? I do not think they have.
724. There is another question bearing on the same point;—you know that persons working in lead are very likely to fall ill? I believe such is the case.
725. But your society does not find it necessary to compel miners who do work among lead, and who are consequently more likely to fall ill than others, to pay an increased subscription? No.
726. Then the number of patients in your society who have suffered from lead poisoning has not been so great in proportion to the other members as to embarrass the funds? No.
727. What is your own occupation? I am a clerk in the employ of the Broken Hill Proprietary Company.
728. Are you in the office? I am in an office by myself in connection with the smelters.
729. Where is the office situated? On the south dump of the Proprietary Company.
730. Is that near the smelters? Oh, yes; close to them.
731. Do you walk about among the men, or do you stay in your office all the time? I have a sort of roving commission, as it were, from north to south.
732. And does that occupy you mainly at the smelters? Yes.
733. Would that be above or below? Level with the tapping floor.
734. How long have you been working in that way? A little over five years.
735. Have you ever been leaded? No.
736. Of course you do not handle any of the materials;—if you were exposed to any danger at all it would be from the fumes? Yes.
737. However, you walk to and fro, and are inside and outside, but you are not continually in the fumes? Exactly.
738. Do you know, among your friends and acquaintances, any persons not connected with the mines who have suffered from lead poisoning? None whatever.
739. Is lead poisoning in your opinion, as a resident, a cause of illness to any important extent among the population here? Well, I can hardly say that. I can only go by my books, that is, the proportion shown there.
740. Very well, that is the best answer;—have you any knowledge of the mines at which the men were working who were laid off from leading—that is, members of your society, of course? I think principally the Broken Hill Proprietary.
741. Then you would be able, of your own knowledge, to name some of the mines at which the men were working who were laid off by lead poisoning? Yes.
742. You have, I suppose, some members who work at Block 14? Yes; at all the mines.
743. Have you any reason to form the opinion that working at one mine is more dangerous than working at another? According to report—I can only speak from hearsay as to that; in fact, I am quite ignorant about the underground workings.

Mr. R. B. Brittan. 28 June, 1892.

[The witness withdrew.]

Mr. W. R. Stewart called and examined:—

744. *Chairman.*] What office do you hold? I am Secretary to the Loyal Silver City Lodge, M.U., I.O.O.F.
745. When was the lodge established? On the 11th April, 1889.
746. How long have you been Secretary? Nine months.
747. Have you access to the books of the society previous to that period? Yes; but there were no books kept in which the cause of sickness was entered previous to that period.
748. Then will the information you have to give us be confined to the nine months during which you have held office? Not altogether. I can give you the number of members on the books, and several other items of information previous to that period. But the evidence I have to give on the subject will be from the time I took office.
749. You enrol men only? Yes.
750. But they are allowed medical attendance on their wives and families by paying something extra? Yes.
751. You do not notice the illness of the wives and families in your books at all? No; there is no entry made at all of the wives and families.
752. What is the limit of age for admission to your society? Well, thirty-seven is the limit under one rule, but they can join at any age provided they pay a yearly subscription beyond the age of thirty-seven. Suppose a man enters at forty, he has to pay for three years in addition to the initiation fee.
753. And how young do you take them? From sixteen years.

Mr. W. R. Stewart. 28 June, 1892.

754.

Mr. W. R. Stewart. 28 June, 1892.

754. Do you appoint doctors? Yes.
755. Who are your doctors? Dr. C. E. Thompson and Dr. Blaxland.
756. When a member is laid off, do you require a certificate which mentions the kind of illness from which he is suffering? Yes.
757. Do you record the certificate in any book? Yes; I do. It had not been done previous to my taking office.
758. Do you keep a record of the kind of illness in your books? Yes.
759. Your members are of all kinds of occupations, of course? Yes.
760. If we furnish you with a few questions referring to your membership—as to your total enrolment, the number of members who are employed about the mines, and two or three other questions of that kind, can you fill it in for us? I think so.
761. Can you fill it in for a period before you became Secretary? I can give you some information I have no doubt; but some of the men have changed their occupations, and others have left the district.
762. From the other societies we are to get a statement of the kind for 1890-91, and part of 1892. If we send you such a table, will you be good enough to do your best to fill it in? Certainly.
763. What is your own occupation? I am an engine-driver at the Proprietary.
764. Have you ever been leaded? No.
765. You are not exposed to any risk in that direction, except from dust? No.
766. Do you know among your friends or acquaintance, of any person not connected with the mines in any way who has become leaded? Well, I have heard complaints of the townspeople feeling the effects of lead—that is, losing their appetite and colour, and showing signs of lead-poisoning generally. I suppose it would be from drinking the water from the roofs.
767. Have you heard of many such cases? No; I have not heard of many—perhaps four or five.
768. Of course, in going about the streets we keep our eyes open, and we do not see many people who look very pale? You do not see many as a rule, I admit.
769. Then, so far as you know from your experience as a resident, you would say that you believe if there have been cases of slight derangement from lead poisoning among the townspeople, such cases must be rare? Yes; they are not very common to my knowledge.

The witness withdrew.

Mr. E. A. Archibald called and examined:—

Mr. E. A. Archibald. 28 June., 1892.

770. *Chairman.*] What office do you hold in connection with any of the Friendly Societies? I am Secretary of the Broken Hill Branch of the Grand United Order of Oddfellows.
771. When was your branch established? On the 17th November, 1886.
772. How long have you been secretary? I have been secretary nearly the whole of the time.
773. You appoint medical men, I suppose—who are your doctors? We have only one doctor. We had the late Dr. Schinzinger, and his place has been taken by Dr. Korff.
774. Do your certificates of illness state the cause of illness? Yes.
775. Do you make an abstract of them, and record them in any book? No; we simply get the certificates and pay the sick pay on those certificates.
776. You have not during the past years kept any record of the illness which was the ground of granting sick pay? Only by keeping the doctor's certificates.
777. The doctors have to fill in the butts of their certificate-books, I suppose; do you keep the certificates yourselves? Yes; they are regularly filed.
778. Well, we want you, if you will be kind enough, to give us certain figures showing the total membership of your branch, the percentage who work in the mines, and so forth? I can supply that.
779. But first, as to your occupation, what is that? I am Accountant to the Municipal Council of Broken Hill.
780. You have nothing to do with the mines? No.
781. Do you know, among your own friends and acquaintances, of any person not connected with the mines who has been leaded? No; not to my knowledge.
782. That is among your own circle? No.
783. But you have heard of such cases, I suppose? Yes; I have heard of them.
784. Is it your impression that such cases of lead poisoning are numerous? I do not think they are.
785. *Mr. Sleath.*] Will you be able to estimate the number of your members who are employed in the mines? Yes; I can almost tell you that from memory. More than three-quarters of our members are employed at the mines. I can say that for a certainty. They follow various occupations, such as smelting, and underground and surface works.
786. What would you estimate the average age of your members to be? I cannot tell you that with certainty just now. I have the papers at home. I keep a record of such particulars. So far as I can remember, the average age is about 32 years. We do not admit them over 40 years of age as full members.
787. Has every member on joining to go through the usual medical examination? Yes; and of that examination we get a certificate from each medical officer, filled in in the same way as this. (*Produced.*)
788. So that no one suffering from any complaint would be admitted? No.
789. *Chairman.*] I have omitted one question: People working in lead are very likely to fall ill, and have, according to common repute, a greater proportion of illness than people who work at other trades; but the result of your experience has not been to lead you to think it necessary to alter the usual terms of subscription to your society, in other words to make the lead-workers pay more? No. (*The witness produces certificates, and undertakes to supply a tabulated statement containing the information asked for by the Chairman.*)

[The witness withdrew.]

WEDNESDAY,

WEDNESDAY, 29 JUNE, 1892.

Present:

DR. ASHBURTON THOMPSON (CHAIRMAN).

WM. M. HAMLET, ESQ. | R. SLEATH, ESQ.

J. HOWELL, ESQ.

Mr. Thomas P. Uren called and examined:—

Mr. T. P. Uren. 29 June, 1892.

790. *Chairman.*] What office do you hold, Mr. Uren? I am underground manager at the Proprietary Mine.

791. How long have you held that office? I have held the office for nine months.

792. Were you employed at the Proprietary Mine before that? Yes.

793. What were you doing prior to your filling the office of underground manager? I was foreman, or, rather, boss of the timber men.

794. Are you prepared to give some evidence with regard to the conditions of the underground work? I will give you whatever information I can.

795. A statement is produced which shows the number of men employed in the different branches of work;—do you say that in 1891 there were 984 miners employed underground, 76 brace and plattmen, and 318 truckers and labourers, making a total of 1,378 men employed underground during that year? I am willing to accept that statement as correct. [*Statement put in. See Appendix.*]

796. Is any record kept of the number of men who get leaded underground? No; not to my knowledge.

797. Have you yourself any knowledge as to whether men do become leaded more frequently at one kind of underground labour than another? No; I have not.

798. Do not men who work in the lead stopes suffer when men in the kaolin stopes do not suffer? During my time, of all the men I have noticed there have been just as many at the kaolin stopes as at any other part of the mine.

799. Is it your practice to shift the men backwards and forwards between the lead and kaolin stopes? They are changed every fortnight.

800. The rule is carefully adhered to? Yes.

801. What is the object of it? Well, the rule was made before I came here, and, as I understand, in the early days what are termed M'Culloch's stopes were mostly lead ore, and that was supposed to be the worst part of the mine; the men therefore wanted a change, and I believe the rule was made according to their wishes. That, I believe, is the foundation of the practice of changing the men from one part of the mine to the other.

802. You say you suppose the men wished it? No.

803. You know nothing about that? No; I do not.

804. Is it a mere matter of practice, followed in accordance with a verbal rule, or is it printed or written anywhere? Do you mean as to changing the working places?

805. Yes? I really do not know.

806. If a man has become leaded and is laid off, when he recovers is he allowed to return to the same class of work again? When they come to the mine again they can return to work again if they wish to do so.

807. Is it a recognised rule that if such a man, on returning, requests to be given some other kind of work that it will be found for him if possible? We have always done that if possible; but not in all cases, because perhaps two-thirds of the cases would be of men not working in the mine two days before they were sick. I cannot find a place for every one who comes back after being sick.

808. Can you give us any idea of the number of cases you meet with among the underground hands? No; I have not the least idea.

809. But you are clear, from your observation, that two-thirds of the cases occur when the men have not been working at the mine very long? Yes; I find that to be so in two-thirds of the cases.

810–1. After they have been working, say, for a fortnight? Yes.

812. Have you noticed that some persons are especially liable to suffer? No; not in particular.

813. Have any rules or instructions been drawn up to inform the hands in general of the little precautions they could take for themselves, and which no one else could take for them, against leading? I know the men have been advised, in many instances, how to take care of themselves against these dangers as much as possible.

814. In what form has such advice been given? Well, they have been instructed to observe cleanliness for one thing.

815. But how has it been given? Simply as a matter of advice, not as a rule of the mine.

816. You mean it has been given orally, and not in a printed form? No; there are no rules printed to that effect, as far as I know.

817. Do you think it would be a useful, or, at least, a reasonable and proper think to do, to draw up and print and post, in some conspicuous place, or distribute among the men, a leaflet drawing attention to these little matters? Well, really, I do not think it would be of any use.

818. Why not? Simply because, as it is, they understand what should be done, and they have every opportunity of doing it; but they do not seem to take any notice.

819. What guarantee have you that they do thoroughly understand? Well, I can give you one instance to illustrate my meaning. Take the matter of wearing their ordinary clothes in the mine. We put up changing rooms, and had them there for about eighteen months, so that the men could go there and change their clothes, and not wear their working clothes to their homes; but they failed in almost every case to go into these rooms.

820. They did not use them? No.

821. How many of these rooms were there;—what were they built of, and what was the size? There were three. I cannot tell the exact size.

822. Say approximately? Well, about 60 ft. x 25. or 30 ft., I should say.

823. Each of them? Yes.

824. What do they contain? There are seats, and hooks to hang the clothes on. That is all, I think.

825. And where are they placed? There is one in each section of the mine, where the men get their candles to go below.

Mr. T. P. Uren. 29 June, 1892.

826. The blocks of the Proprietary Company are 40 acres, I believe? Yes.
827. And they are square? Yes.
828. How many shafts are there in each block—shafts in use, I mean? There are three shafts in Block 13, three in Block 12, and, at the present time, there are two in Block 11.
829. How far away from the changing-room is the most distant shaft? About 30 feet to 35 feet, I think.
830. That is from where the men go down? Yes; they are all within about 50 feet, I think.
831. Are the three shafts you mention in Block 13 within a radius of 50 feet? Not each shaft. We do not change our men at every shaft.
832. Do you mean that they descend and ascend by one out of the three only? We have working shafts, but do not allow the men to ride through them.
833. How many are they allowed to ride through in Block 13? One in each block they ride through.
834. And you say there is a changing-room within a few yards of each of them? Yes.
835. What precautions against leading would you recommend to be taken by the miners? Well, I do not know that anything more can be done than to provide them with water to wash themselves when they come out of the mine. That is all I can think of, or really know.
836. And to change their clothes, of course? Yes, certainly; and keeping the mine as clean as possible.
837. What provision is there for washing in the changing-rooms or elsewhere? We have water carried through the mine in pipes, to keep the mine clean below by sprinkling the dust. At the present time this supply is not in working order, as certain repairs are in progress which made it necessary to take out some of the pipes.
838. That is not what I refer to. Your recommendation is that the men should wash after finishing their work, and that they should change their working clothes for others; and I want to know what provision there is for them to wash, as you recommend, either in the changing-room or elsewhere? Well; I just stated that as a recommendation. I did not mean to state that we had provided these things. I am giving you my ideas of what should be done.
839. Very good. I suppose a man who is beginning to become leaded, and really is leaded to some small extent, is not quite up to his work, before he becomes really ill? That is a question I cannot well answer. That is a matter which is left to the shift bosses. If a man cannot really do his work, they are the ones to find it out. But we have men who claim they have been leaded, and who are, nevertheless, very good men.
840. Do you know anything about lead poisoning—as to its effects? I do not.
841. Do you know that the early effects of it are to make men less energetic, and a little dullish, and then to produce muscular weakness, and so forth? I have never experienced it.
842. You do not know that? No.
843. Do you employ any boys in the mine below? No; none.
844. What do you suppose is the age of the youngest man you have below? Well; I really do not know their ages. But no one is employed unless he can do a man's work.
845. There is no fixed limit of age, at which you begin to call a boy a man? No; not that I know.
846. In that connection, would you make the same remark as you made just now—that is, if the shift boss found a young man not able to do a man's work, would he tell him to go? Most certainly. It lies entirely with the shift boss, whether he keeps a man or not.
847. Have you been engaged in lead-mines, or silver-lead mines, in any other part of the world? Yes.
848. Do you know anything of the use of milk as a preventive? I have heard that it is a good remedy—they use a good deal of it in the United States.
849. Have you been interested in it to the extent of observing whether it is an effectual remedy? No; I have not.
850. But you know it bears a good reputation among miners for the purpose? Yes; it is entirely a matter of hearsay with me.
851. In any of the mines you have been connected with, has it been customary to keep medicine on hand for the use of the men? No.
852. On the Proprietary Company's mine, do they keep iodide of potassium for the men to take in their drink, if they like? Not that I know of.
853. Are you responsible for the ventilation of the mine below? Well; in a certain sense I am—yes.
854. *Mr. Howell.*] Do you consider the mine at the present time in a better condition, so far as ventilation is concerned, than it was two or three years ago, Mr. Uren? Yes, I do; much better.
855. What number of shafts, and what are called air-passes, are there in the different blocks of the Proprietary Mine, in addition to the working shafts? I think there are about six in number, although they have not all been in use for some time.
856. But they were put down for the purposes of air shafts? Yes.
857. How many main shafts are there altogether—nine, do you say? There are eight in use, and one out of use. There are two new passes, and either four or six of the old ones. I am not positive about the number; but there are five shafts in Block 11.
858. That is, working shafts and air-passes? Yes.
859. They are described along the line of lode at pretty nearly uniform distances apart, for the purpose of ventilation? Yes.
860. Is there any part of the mine you know of where there is not good air? None at all. The mine is well ventilated throughout.
861. If the natural ventilation is not sufficiently good, what means do you take to supply or improve the ventilation? We use fans to force the air in by means of pipes.
862. Then they are put in when the ground is newly opened up? Yes, invariably. The air is carried into places where there is any immediate occasion for ventilation.
863. So that if you were running a drive from a cross-cut or rise, or sinking a winze in new ground, where the natural ventilation is not good, you would put up a little air-compressing engine, and fix a fan to it, and force the air into those different places? Yes.
864. Is it not a fact that when you were working the old carbonate ore above the line of the 200-feet level, the ore was very much higher in lead, and very much drier than the ores which have been found below the 200-feet level? Yes, very much so. It required more fracture and more breaking of the rocks, and it carried a much higher percentage of lead.
865. And the ore was more inclined to give off dust? Yes.

866.

Mr. T. P. Uren. 29 June, 1892.

866. How does the breast of ore that the Board examined the other day compare in the matter of dryness and tendency to give off dust with the other lead ore stopes in the mine? I showed them the very driest carbonate ores we had.
867. Going through the mine, as you do every day, from one end of it to the other, and talking with the men, you sometimes, of course, meet with some men who say they feel badly, and wish to be let off, or something of that kind, do you not? Yes.
868. But such matters are principally brought before the shift bosses? Yes.
869. Speaking from your own knowledge, what do they complain of generally? Well, I really do not think they know themselves. Some will ask to be kept in the lead stopes, and others will ask to be kept in the kaolin stopes, but they do not give any reason, as to illness, or rather the nature of it, they simply say they do not feel well, and want to have a spell. That is the excuse I get.
870. Did you ever notice any dust in the kaolin stopes? No; very little.
871. The ore is damp? Yes.
872. In breaking into little cavities that are found frequently in mines, that are called "vughs," you meet with what appears to be foul air, do you not? Yes.
873. That is almost invariably the case, is it not? Yes; I have always found it in all kinds of lodes.
874. You do not know of any portion of the mine that could be improved by additional ventilation, do you? No; I do not.
875. Is it not a fact, that as a general thing, there is too much air in the mine? Sometimes I think it is too strong.
876. *Mr. Hamlet.*] You have had experience in America as well as on this field, have you not? Yes.
877. For how long back does your experience of underground mining extend? For twenty years.
878. Did you notice cases of men suffering from lead poisoning in America? I have known men to be suffering there from that cause.
879. And do you consider the cases of leading you saw in America worse than those you have seen here, or not so bad? I consider the cases I saw in America were worse than those here.
880. How much of your time is spent underground daily? From five to six hours—sometimes more, and part of the night.
881. You say you have been engaged for nine months on the Proprietary Mine? I have been altogether two years and nine months on the mine, in different capacities.
882. And you have worked all through the mine? Yes, in every part of it.
883. And do you say you have been leaded or not? I have not. For the first twelve months I worked in M'Culloch's stope, that is the north stope, but it is known by that name.
884. Do you think a man wearing a moustache would be better protected from lead than a man without a moustache? Well, that is a matter of opinion, I suppose. I do not really know, but I think a man with a moustache would be less liable to be affected by dust than a man without one.
885. Do any of your men shave the upper lip? I do not know.
886. I want to know whether the majority of the men wear moustaches or not? I should say the majority of them wear a beard of some kind. It is a matter I do not know anything about.
887. But you see the men every day of your life down in the mine? Yes.
888 Then can you say whether there is a considerable percentage of the men who do shave the upper lip? The majority of the men have hair on their faces no doubt. But I cannot give you any stated number, one way or the other. I know there are some men who have scrub beards, some have long beards; others wear only a moustache, and some none at all.
889. Have you always worn a moustache since you have been doing underground work in the mines? I have worn a moustache ever since I was able to grow one.
890. I think you said the cases of lead poisoning might be less if the men were habitually cleaner? Well, with regard to the cause of sickness, I am not prepared to express an opinion, but I think the cases of sickness might be less if the men were cleaner both in the mine and out of it.
891. *Mr. Sleath.*] I think you said just now, Mr. Uren, that there were as many cases of sickness in the kaolin stopes as in the lead stopes. Now I want to ask you if you do not think it is a fact that many a man may be leaded in reality, but that the effect does not become apparent—because the poison has not got thoroughly hold of his system—until he is removed from the lead into the kaolin stopes? I suppose it is possible; but I do not know. I find as many miners lay off sick from Jamieson's as from McCulloch's, and oftentimes more.
892. You change the men every fortnight from the lead stopes to the kaolin, and *vice-versa*? Yes.
893. Is it not reasonable to suppose that a man who has worked a fortnight in the lead might have the effects of it in his system, but not feel it until he is removed? It is quite possible.
894. Is it not reasonable to suppose that?———
895. *Chairman.*] That seems to me to be rather a question for the doctors.
896. *Mr. Sleath.*] Are there not a number of men who are not changed every fortnight? What we class as timber men are not changed.
897. But I mean are there not a number of face men who are not changed every fortnight? No; not a man to my knowledge. Every man that works in the face is changed every fortnight. That is the rule.
898. Is it not a fact that when the men become leaded and suffer from lead poisoning, and consequently are not able to continuously follow their work, the management give the preference to fresh men? No, sir; nothing of the kind.
899. During the last two months have there not been something like 400 new men put on the Proprietary Mine underground, while hundreds of the old hands who have been leaded are walking about the streets? (To the Chairman.) Has that question anything to do with this Board?
900. *Mr. Sleath.*] If you do not wish to answer the question I have no desire to press it. How long ago is it since the changing-rooms you speak of were erected? About eighteen months.
901. Before that there were no changing-rooms? No.
902. Do all your underground men go up and down one shaft on the block? They are supposed to. It is in the conditions.
903. Are there any regulations to that effect? There is a regulation to change at one shaft.
904. I am speaking of printed regulations? There is no printed regulation to that effect.
905. Is it just a general understanding? Yes.

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906. So that a man may go up any one of two or three shafts that may be in working-order in the block, and not break any printed rule of the company? If they go up three shafts they are most certainly breaking a rule.
907. Is there any printed rule against doing it? No; not to my knowledge.
908. Would you explain in what way they would be breaking a rule if there are no printed rules or notices posted? They would break a rule because it is my order that they should not do so.
909. And are you satisfied that your order reaches the whole of the men? Yes; perfectly satisfied.
910. Have you given these orders direct to the men yourself, or through the shift boss? Are these questions necessary for me to answer, Mr. Chairman. *Chairman:* It appears to me that they have an important bearing in this way: you tell us that the men go up or are supposed to use one shaft out of the three, and that there is a changing-room within a few yards of that shaft; the usefulness of the changing-room depends upon its being easily accessible to the men.
911. *Witness.*] I am prepared to answer any question bearing on the inquiry.
912. *Mr. Sleath.*] What I want to get at is this; whether every man has got your orders as to which shaft he should go down and ascend by; otherwise a man might feel justified in using any shaft, and, therefore, he might be 100 yards from the changing-room instead of 50 yards? I give my instruction to the foreman, who conveys them to the shift bosses, and the shift bosses see that they are carried out. The plattmen and brace-men have strict orders not to allow a man to get on the cage of a shaft which is not to be used for the day.
913. So that according to you it is impossible for any man to enter or leave the mine except by the one shaft? Yes; unless they steal a ride, and we do not know it.
914. Have you ever used water in the underground workings of the Proprietary Mine for sprinkling purposes? Yes, I have.
915. How long ago is it since the water was laid on? Practically it is within the last twelve months.
916. You go through the mine every day? Yes.
917. How often have you seen the stopes sprinkled yourself? Every day when the water is on. There is a man in each block who is told off to sprinkle the dust, and do nothing else.
918. Every day when the water is on. But how often is the water off, and how often are the drives or stopes sprinkled altogether? It would be sprinkled every day; but a short time ago we had to do some repairs, and the pipes in McCulloch's shaft had to be disconnected.
919. Have the shift bosses or underground managers, any instructions to make allowance for men who may be suffering, or recovering from lead-poisoning? Those men are all referred to myself. If a man has worked any length of time in the mine he has a chance to work on the surface. Many a case of the kind has occurred. In other cases the men will refuse to go on the surface work, preferring to work underground.
920. But in the case of a man who may be weak from the effects of lead poisoning, and who could not do sufficient work—that is, perhaps, as much work as an ordinary healthy man would do— would a shift boss make any allowance for him; or would he be sent up? Do you mean discharged.
920½. Yes? No. I do not know of a case where a man has been discharged on that account.
921. I think you said a little while ago that you used to force air into the winzes. In how many cases have you carried forced air into the winzes, or is it a regular thing? It is a regular thing in drives or crosscuts, or anywhere where we may be running for connection with the natural ventilation. We put in the fans, place them in the purest air we can get, and force it into the working place.
921½. My question was, is it a common occurrence to carry air-pipes into the winzes? Well, we have not sunk a winze over 23 feet deep since I have been in the mine—we do all our work by rises.
922. Have you carried air-pipes into all the winzes you have worked? It is not necessary at all. There is as much air in the botton of the winze as there is at the top.
923. You have never found it necessary to carry air-pipes into the winzes? I have had no winzes to carry them into. We run from one level to the other—rising up; and in every case we put a pipe up. There has not been a rise put up where that has not been done.
924. I was talking about the winzes, and you say you have not found it necessary to carry the air-pipes into them? Yes. But we have only sunk to a depth of about 20 feet, anyhow. In order to make that more plain, I will explain the exact process. For instance, in sinking a shaft, we sink a portion, and at the same time rise towards the middle, the rise having the pipes in; and if we sink about 20 feet whilst rising 50 feet we make the connection, and then get the natural ventilation.
925. My question will not affect your mine at all, if you have not sunk in winzes; so we need not trouble about that any further. You said in answer to Mr. Howell, I think, that the lode in the north end of the mine some time ago was more hard and solid than it is at the present time? Yes, very much so.
926. Would the hard, solid material, or the fine, dusty stuff, give off most dust? Yes; you have to use more fracture in dealing with it.
927. The massive, hard, compact lode, in your opinion, gave off more dust than the finer stuff? Yes.
928. You have said that some of the men wished to be kept in the lead stopes—have you known of many such cases? Yes; I have had quite a number.
929. Then, again, I think you said in answer to Mr. Howell, that there was generally too much air in the mine. Will you explain how the air could be detrimental to the men? Certainly. If you throw too much air into a very dry stope, it stirs up the fine, pulverised dust; whereas, if the stope is nearly warm it becomes damp, and the fine dust does not rise with a current of air as it would if dry.
930. You say you keep your stopes thoroughly sprinkled with water—would not that have the same effect? I am speaking of dry, dusty stopes.
931. Where water is not used? Yes.
932. Well, if the stopes were thoroughly sprinkled with water, would it not have the same effect? The dust would not rise if thoroughly sprinkled with water, certainly.
933. The sprinkling would have a beneficial effect? Yes.
934. Have you got any stopes where there is not a sufficient quantity of fresh air? Not one.
935. I think you said you were working for the Proprietary Company close upon two years before you took charge of the underground workings, and that you never felt the effects of lead? Yes.
936. In what class of work were you employed? I was employed looking after the timbers in McCulloch's for the first twelve months.

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937. You never were really working in the stopes—at the face, I mean? I was in the stopes eight hours every day.
938. That is, superintending the work? Yes.
939. I suppose you knew Mr. Harper, the late underground manager? Yes.
940. Did you hear what was the cause of his complaint after he left here. He was supposed to be sick—was he leaded, do you know? I do not think so.
941. What regulations have you as to sweeping the floors—do you make any effort to keep them free from broken stuff? We have men regularly employed in cleaning the floors, and doing nothing else, every day. That is their line of work. In some places we sprinkle all the drives, and scrape up all the waste material that may be thrown down, and have the place cleaned every day—thoroughly cleaned.
942. Would that be a useful measure—as against the chance of leading—to keep the floors sprinkled? I do not think so.
943. Why not, since it would tend to prevent the dust rising? I think by putting water on the floors it would wash too much of the dirt on to the men, and that would be worse than the dry dust.
944. I think I heard you say you had to disconnect the water-pipes in McCulloch's shaft, but you did not say for how long? It is only a temporary stoppage. The connections will be made again as soon as possible—that is, when the necessary repairs are completed.
945. How long has it been discontinued now? About three or four weeks.
946. Have you any idea when it will be renewed? I expect in about a couple of weeks; perhaps it may be longer; I cannot tell exactly.

[The witness withdrew.]

Mr. Walter J. Koehler called and examined:—

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947. *Chairman.*] What office do you hold, Mr. Koehler? I am metallurgist at the Proprietary Mine.
948. How long have you held that office? I have been acting as metallurgist for the Proprietary Company for close on five years now. I was assistant under Mr. Schlapp.
949. Are you prepared to give the Board some evidence with regard to the surface hands employed at the Proprietary Company's mine? I do not know that I can give you any definite information without having the figures to guide me, but I will give you what evidence I can.
950. I have a statement here which has been furnished by the management of your company, as to the number of men employed and the quantity and character of the ore raised. Do you say that for the year ending 31st May, 1891, you had employed on the surface 14 firemen, 41 carpenters, 5 tinsmiths, 18 blacksmiths, 17 blacksmiths' strikers, 33 turners and fettlers, 6 boiler-makers, 9 masons, 39 ore shunters and truckers, 16 horse drivers, and 250 labourers—making in all 448 men; and on the smelters, 39 tappers, 39 feeders, 132 slag-wheelers, 162 charge-wheelers, 57 labourers (on "dumps" and "bins"), and 45 labourers handling slag and bullion, &c.—making 474 men? Yes; that will be the approximate number. (For statement referred to *see Appendix.*)
951. Has the number of men employed on the surface increased to any extent from the last year? No; very little indeed.
952. Then we may take it that the figures here given for the year ending 31st May, 1892, practically represent the number of surface hands generally employed about the surface of your mine? Yes. There may have been a few more put on since, as two more furnaces have been started, but the number is about the same as shown there.
953. Then, during the same period ending 31st May, 1892, you smelted 219,145 tons ore, averaging 27 per cent. of lead and 37 ounces of silver, and you smelted that in quantities of about 50 per cent. lead, 36 per cent. kaolin and silicious, and 61 per cent. iron ore? Yes; I should say about that.
954. And the ores are generally described as oxidized and carbonate ores? Yes.
955. Do you keep any record of the number of men who get leaded? No; we do not.
956. Have you observed whether the men who get leaded have worked more frequently at one class of work than another? Do you mean on the surface?
957. I am speaking now of the surface workers only? Speaking generally, the cases of lead poisoning have been really very few; but undoubtedly there is more liability to leading in the work of tapping, and wheeling the slag on the lower floor than in other parts.
958. How is the removal of flue-dust arranged? The dust settles in large chambers behind the furnaces, and it is taken from there to the slag-dump, from which it is transferred by means of lifts to the feed-floors of the furnaces.
959. Do the men engaged in that work form a separate class by themselves? Undoubtedly. Formerly the men handling the slag and bullion attended to the flues, but for the last four or five months we have let the work out by contract, so that there are three or four men who do nothing but that; they attend to that especially.
960. During the last few months there have been three or four men who have been engaged removing the flue dust, and do nothing else? Yes.
960½. Since you say the men engaged in tapping and wheeling the slag, and so on, are liable to suffer rather more than the men otherwise engaged, have you any system of changing the men from that kind of work to the less risky kinds? If the men desire it they can have a change of employment. We change them on to the dump occasionally. But it rests with them. We try to accommodate them. We change some of the hands from time to time from the furnaces to the leaching works, and other departments like that.
961. And you consider the conditions of work at the smelters are such as to make a change in the work desirable and necessary? Yes; I should try to do everything I could to give them a change; more especially if they have been employed a long time on the works.
961½. Of course, that is a concession—it is not a formal rule? No.
962. However, if a man has got leaded, and comes back to work, you allow him to continue the same class of work as that in which he got leaded, if he chooses? Yes.
963. You make no objection? No.
964. Are you aware whether any rules have been drawn up and published for the benefit of the men in this connection, or hints or suggestions made to them in that way, as to the little precautions they could

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take themselves to avoid leading? No rules have been published, but the men have been very often cautioned about certain things. However, I am afraid the cautions given to them are not attended to as they ought to be.

965. You mean as to observing cleanliness, I suppose? Yes; and not to rub their tobacco in their hands whilst they are dirty from the work in which they have been engaged; also to wash themselves before eating their "tucker," and so forth.

966. They eat their "tucker" at their work, I suppose? Well, they have twenty minutes allowed them to eat their "tucker," and they can go away if they like.

967. Are they allowed a clear twenty minutes? Yes.

968. Are there no exceptional cases? Well, in cases of emergency they might not be able to get the full twenty minutes at one time: there might be something going wrong with the furnaces, for instance, which would require their attention at the time.

969. Then it would be only in cases of emergency when they would not be able to get their full twenty minutes for their meals? Yes. The custom is that during the twenty minutes one or two men are told off to do the work for the rest, while they are getting their "tucker."

970–1. You know that is the custom except in cases of emergency? Yes.

972. Do you think it would be a useful thing to publish a fly-sheet of the rules to be observed by the men? Well, I am afraid it would not have much effect. I may say that the men there have been spoken to very frequently about these things, but they pay no heed to them.

973. Still it would, I suppose, be a reasonable thing to do;—would it not be a relief to yourself, for instance, to feel that you had told them everything necessary to insure their safety? I have said that they have been spoken to over and over again.

974. You have told them everything about the precautions necessary to be taken to insure their safety? Well, yes, they have been told; but I may say that the precautions they should take are so self-evident that it should not be necessary to do even that. It is simply a matter of cleanliness, that's all.

975. Will you tell us in detail what you would recommend as preventive measures to be adopted by the men working in lead? Well, in the first place I recommend their washing their hands and faces before taking their meals; and then when they get home to have another wash all over. Very often men come on to work next day without the slightest signs of having washed. I do not mean to say that that is by any means the rule. But in circumstances of that kind the remedy is simply a matter of cleanliness, so far as I can see. The men cannot expect to keep in a sound state of health, in work of that kind, particularly, unless they observe ordinary rules of cleanliness.

976. You would not, in fact, make any other recommendation—is that what we are to understand, Mr. Koehler? That and keeping their bowels open, and regulations generally of that kind, I think, are the only suggestions I could make.

977. Are you aware that taking a purgative once in a fortnight or fifteen days has been recommended as a prophylactic? Yes.

978. As to the rules of cleanliness you very properly suggest, I suppose a great many of these men really have little or no opportunity of washing themselves, considering the cost of water and the conditions of life in general here? Well, I do not think water has ever been so scarce as that. We have always had plenty of water on the mines, anyhow.

979. You have always had plenty of water? Yes; we have always had plenty of water.

980. Has there been any special provision made for the men to wash themselves on the mine? I cannot say there has been any special provision made, but there have been plenty of buckets, and they could always get water.

981. Then as to the furnace-sheds, I suppose you would recommend that the men should always have nice clean water to drink? We take good care of that. There is always a good supply of condensed water to be obtained. They never run short of drinking water.

982. How is it supplied to them;—where do they draw it from? We have one boiler running off the condensed water. It runs into two large covered tanks, and from these it is drawn by carts and put into covered tanks on the different floors and different parts of the surface workings. The men can draw it from there. The shift bosses are supposed to look after the taps of these tanks, and whenever the men want water they can get the key from the shift boss.

983. Then you use no water-bags in your sheds? Oh, yes; we use water-bags.

984. What shape are they? They are just ordinary canvas water-bags; I should say about 20 inches deep and 10 inches diameter.

985. Circular-shaped? Yes.

986. Are they covered? Well, covers are provided for them, but they are very seldom on. I suppose they find it more convenient to get at the water without having to lift the cover.

987. But an arrangement of that kind, which depends upon the co-operation of the workmen, is a bad one, is it not;—in other words, would it not be better to have the covers made self-acting or permanent? I dare say that might be done very easily.

988. Are you responsible for the ventilation of the furnace-sheds? Yes. I may say our furnace-sheds are very well ventilated indeed. The arrangements in that direction are very complete indeed.

989. You would be able to explain that to the Board if they came to look at the arrangements? Yes.

990. Are you aware of any cases of metallic poisoning among the men engaged on the mines other than lead poisoning? No; I have heard of arsenical poisoning, but I do not believe in it. In fact, I have had too much experience of that myself to put any faith in the reports of its existence here.

991. But there is some arsenic found in the ore, I believe? Yes; there is some, but not enough to do any harm at all.

992. Are the effects of lead poisoning felt in the first instance on the general energies and muscular strength of a man before he is actually laid by? Well, I am hardly able to answer that question; I think it is more a question for a medical man.

993. How many boys are employed on the surface at your mine? There are no boys directly in my department. There are some on the surface, but I have nothing to do with them.

994. Can you say who would be the proper person from whom to ascertain the exact number? Mr. Hansen, one of the surface foremen, has them in his charge. I should say I have two boys employed at the furnaces sweeping floors and carrying messages

995. How long have you had the two boys you have got now? They have been on a couple of years now, I think. One of them has been on a couple of years, and the other I changed the other day, for a new boy.
996. And they have never been ill? Not that I am aware of; nothing serious, at all events.
997. How old are the boys who were engaged two years ago? I think they were about 14 or 15 years of age when they were put on; one of them was possibly 16 years old.
998. Have you been engaged in silver or lead mines in other parts of the world? Yes.
1000. Do you know anything of the use of milk as a preventive of lead poisoning? Yes; I have heard it mentioned, and its use advised.
1001. Do you only know that as a matter of conversation, or have you, from personal knowledge, drawn a conclusion of your own about it? I have not had any experience personally.
1002. Is it anywhere customary to keep medicines upon the mines for the use of the men, iodide of potassium, or anything of that kind? Well, yes. There is one case I know where they keep medicines on hand, but for a rather different purpose, that is, the mine was away from any town where treatment could be obtained in the case of illness.
1003. In that case no specifics for lead poisoning were kept? No.
1004. *Mr. Howell.*] How long have you been working at furnaces in connection with smelting operations, Mr. Koehler? About eleven or twelve years.
1005. More particularly in America, I believe? Yes; principally in the United States and Mexico, and out here.
1006. Have you, in your experience in connection with smelting operations, been in any place where there is much more lead poisoning than there is here? No; I have never heard so much complaint about it as I have here.
1007. Were the furnaces you worked on in America the same as those we have here? Yes; they were the same style, but of different dimensions.
1008. Have you ever worked on smelters in connection with which there were better arrangements for conveying the dust or fumes than those provided here? Never.
1008½. Then, you do not think there could be any improvement made in that respect in the Proprietary Company's furnaces? Not for conveying the smoke away from the furnaces themselves.
1009. Have you noticed the smoke coming up from the throat of the furnaces on the feed floor? Very seldom indeed. Occasionally it may do so, but it happens very rarely.
1010. In such a case, the explanation would be that there was something wrong with the furnace? Yes; it might occur occasionally from the running down of the furnace.
1011. Do you know, of your own knowledge, of any considerable number of men, or any men that have worked on the furnaces continuously for two or three years, and have never been laid off on account of what is claimed to be lead poisoning? Yes. I have known a very large number, indeed, who have worked for two or three years without being laid off, and some have never been laid off.
1012. That you know for a certainty? Yes.
1013. Would that apply to all parts of the furnaces—above and below? Yes. I know of one shift where no man has been laid off from that cause for two or three years.
1014. And you have heard of no complaint? No.
1015. There is always plenty of water provided for the men, is there not? Oh, yes. Of course, there was a time when there was a restriction to some extent on account of the general scarcity.
1016. But you say that the men have always been supplied with plenty of water? Yes; they have always had plenty of water.
1017. Is the water kept in covered vessels until it is put into the water-bags for the use of the men? Yes; but sometimes when they want to take the water home, they will pull off the covers, and take the water out themselves.
1018. But the understanding is that the water should be kept in iron tanks, and covered over entirely until it is drawn off into the water-bags? Yes.
1019. And the water is quite good and pure? Yes; certainly.
1020. It is not contaminated with lead in any way? No.
1021. In fact, is it not the same water we use for domestic purposes in our private houses? Yes; exactly the same.
1022. It has been remarked here in evidence, which has been already given, Mr. Koehler, that the fumes from below—that is, from the lower portion of the furnaces—penetrate through the floor, and come on to the feed floor in considerable volume; does that statement coincide with your experience? No; I do not see how it could. At all events, it would be a very exceptional case.
1023. There is a ventilator, is there not, the whole length of the smelting building, for the purpose of drawing off the fumes from below, immediately under the floor? Yes.
1024. And there is always a strong draught going up along that floor? Yes; there is an opening above the flue, and the smoke goes out there. It does not come out on the floor at all, but is carried away direct.
1025. Any fumes from the slag-tap would naturally find their way into the flue? Yes.
1026. The draught through the flue would be greater than that of the cracks through the floor? Undoubtedly.
1027. And you think the general conditions in and about the furnaces, above and below, are as good for sanitary purposes as they possibly could be? Yes; I think so; certainly.
1028. *Mr. Hamlet.*] Have you had an extensive experience as a metallurgist, Mr. Koehler? Yes; I have had something like twelve years' experience.
1029. Can you give us a short description or list of the various ores that are used in connection with your smelting operations? Well, our ores are carbonate of lead ores, and kaolin ores, silicious iron ores, all carrying lead and silver in the shape of chlorides, bromides, iodides, and compounds of these different elements, with silver of course.
1030. It would, perhaps, be simpler if you named the various elements irrespective of their technical terms? Well, the ores we are seeking carry lead and silver—the constituents we seek—besides traces of copper, very little arsenic, very little antimony, and fine traces of the rarer elements.
1031. Do you find much arsenical ore? Very little, indeed. If there were any amount of arsenic in the ore it would show itself in the way of speiss. There is very little of that.
1032. Do you find any mercurial ores? The minutest trace possible.

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1033. And, briefly stated, your process of smelting is just that of adding the flux to the ore—adding the fuel, and so much iron or ironstone to make it fuse;—that is the general process in as few words as possible? Yes.
1034. What kind of furnaces have you in use? They are called water-jacket furnaces. They have no specific designation.
1035. How many tons are smelted per day? We smelt 750 tons per day—that is the ore, exclusive of flux, of course.
1036. And what proportion of sulphides have you? Very little, indeed. We avoid dealing with the sulphides at present as much as possible. Occasionally we get a little, but it does not amount to more than a quarter of 1 per cent. of the ore put through.
1037. Have you any roasting operations? No, sir; none at all.
1038. Of course you are aware that very deleterious gases arise from roasting? Yes; but it depends upon the class of ores treated.
1039. Do you consider that more fumes arise from roasting than from the process you adopt? Yes; I should say a larger amount of fumes arise from roasting.
1040. Do you carry on any desulphurising operations? Not here—at Port Pirie.
1041. So that you never roast matte or speiss? No.
1042. Are you aware that lead fumes arise from the furnaces which you use? Yes.
1043. And what provision have you for removing the lead fumes? In the first place, we condense as much fume as we possibly can in the flue chambers at the rear of the furnaces, and the gases are carried into the air by means of high stacks.
1044. You really have in your lead fumes all the volatile elements that are in the ores, such as chlorine and iodine? Yes; except what collects in the chambers, such as sulphuric acid.
1045. Which, in addition to the lead fumes, are the products of combustion from the furnaces? Yes.
1046. And you say you have these flues to condense the fumes? Yes.
1047. Is that a well-known method of condensation? Yes; it is the only method practised on a large scale.
1048. Are you aware of the method of condensation in other parts of the world? Yes; I have a good general knowledge. Sometimes they build the flues longer, and with parallel iron sheets.
1049. What would be the total length of your condensing arrangements? I can hardly give you that off-hand. I should say between 350 and 375 feet of flue. There would be about 225 feet in the first nest, and 150 feet in the other. These, of course, are rough estimates, but I could tell you exactly by measuring.
1050. Are you aware that in some parts of the world condensing flues extend to miles in length? Yes, sir.
1051. And that to avoid the excessive length of flues different forms of condensers have been used from time to time? Yes; but the only condensers that are practically used are the long flues with wider chambers to check the velocity of the fumes.
1052. *Chairman.*] Does the length you mention include the stack? No; not the height of the stack.
1053. *Mr. Hamlet.*] There are two kinds of condensers in vogue, I think—the wet and dry condensers? Yes.
1054. Of which kind are yours? Ours are the simple dry condensers. I believe wet condensers have never proved a success in any part of the world. It has not been found a practical way of treating a large quantity of smoke to use these condensers. It has been found that the lead fume practically gets away—that is, it passes through in large bubbles, which only get wet on the outside.
1055. That is a matter of opinion? It is a matter of fact, sir, I think. It has been tried in large works in Germany and the United States of America, and has not proved a success at all. I can refer you to authorities on the subject.
1056. Would you approve of spray condensers? Not on lead fumes.
1057. You think the only practical way is to have long chambers, and to bring the smoke in contact with large surfaces—a cooling process, in fact? Yes.
1058. Is it a fact that the condensing of lead fumes would be a matter of monetary interest to the Company? That is a question which it would be hard for me to decide. We have not enough data to go upon yet—in fact, we are doing some work in that connection now, but I am not in a position to express an opinion. The question is whether it would cost more to save the lead and silver going up the stack than it is worth.
1059. But apart from the financial aspect of the question, is it not a sanitary problem of very great importance? I doubt it very much. I think the leading caused by the smoke coming out of the stacks is practically nil. All the leading that occurs as far as I know, is caused directly round the furnaces. Personally, I have never known of any case caused by the fumes. I have always lived round the stack, and have experienced nothing of it.
1060. You have resided there with your family? Yes; I have only one child, but we live in the lead smoke. I know of a whole family that live on the hill, and get the whole of the smoke from a stack a little lower down, and they are as healthy a family as you could find.
1061. Is a considerable quantity of the lead in the lead fumes condensed in your flues? Yes, by far the larger proportion.
1062. Can you tell us what proportion? I cannot give you the exact figures. I could, by referring to the books, tell you how much is collected each year.
1063. Would there be 25 per cent. of lead in the fumes? No, not nearly that. But I cannot give you an estimate without referring to the figures.
1064. You think your condensing plant, or your method of treatment is as perfect as could be under the circumstances? Well, I am not prepared to say our condensing plant here is as perfect as it could be.
1065. But you think it would be improved by using longer condensers? It might be by putting in larger chambers, or something of that kind. We are now experimenting on condensing the flue-dust by a new method, but I am not prepared to go into details. I can only say that it promises to be successful.
1066. I suppose it is a matter of fact with you that both lead and silver will be volatile at the highest heat of your furnace? At the highest heat, certainly—that is to say, the silver in conjunction with the lead, and other things that may be in the ore. The silver itself would not be.
1067. Have you ever obtained the temperature of, say, the hottest zone? No; I have not.
1068. Can you give any estimate? Not without working it up.

1069.

1069. Do you know for a fact that volatility of both lead and silver is increased by the altitude of the place? I do not know it as a fact, but judge so.
1070. Have you any knowledge of the mines of Leadville, Colorado? I know the place, but have no personal knowledge of the mines themselves.
1071. Do you know if the lead question is found to be more or less serious there than it is at Broken Hill? It would be hard to tell at present. In those days there was not much attention paid to these matters. Therefore, I cannot say.
1072. So your opinion is that the best method of condensing is the dry method? Yes. Passing the fumes through water would be useless, I know for a fact. The main factor is bringing the smoke in contact with a large surface.
1073. In the ordinary running of your furnaces, you say there are no fumes arising from the throat of the furnace? No.
1074. If any fumes did arise from the throat of the furnace, it would be caused by the furnace being under repair or something being the matter with it? It might occur through the furnace being out of order or something of that kind. It might arise from a choked flue, for instance, but that could soon be remedied.
1075. *Mr. Sleath.*] Do not the feed-floors become open through the influence of the heat, so that the fumes can pass through? No, the floor itself never gets so hot as that.
1076–8. Does not the timber contract in consequence of the heat in the course of twelve months or so? Yes; but the floor is kept in a state of repair.
1079. So that there is not much chance of the fumes coming through the floor? No.
1080. I think you have said there is plenty of water on the mine for washing puposes? I said generally. I did not specify for washing purposes.
1081. Is there any water provided for washing on the floors, or can anyone get water to wash? They can with the least trouble, certainly.
1082. Where does the water come from? It came from the Acacia Creek supply.
1083. Do the men ever use water from the furnace-jackets for washing purposes? They do occasionally, I suppose; but I think the bulk of them do not use any water at all round the furnaces.
1084. In the case of leaking jackets, what do you use to stop the leak? They use either manure or bran. There is certainly nothing unhealthy in that.
1085. Would it be a difficult or expensive thing to erect changing-rooms with hot water baths, for the employees at the different smelters? It would be quite an expense, decidedly so.
1086. I mean in comparison to the amount of work done, would it be considered very expensive? Well, under ordinary circumstances, where the water is plentiful for instance, I think it right that the men should have something of the kind. I should advocate it, that is, if you take the circumstances into consideration.
1087. I think you said there was one shift on which you did not think any of the men had been leaded? Yes; where the men had been working for a couple of years or so.
1088. Were the same men working on that shift all the time? Yes; many of them for three or four years.
1089. Do you employ the same number of men on the mine now as you did some years ago? I think the number has been lessened during the last few months. The reason for that was that the men did not have sufficient to do. I may mention that there is one other great cause of leading among the men employed in the mine. I have found men lying asleep on the flue-dust. They also go to sleep on the ore. I think a practice of that kind has a very great tendency to injure the system, especially lying down on the flue-dust.
1090. *Chairman.*] Is there any rule against that? The general rule is that if a man is found sleeping on shift he is discharged. The bosses are supposod to look after that.
1091. Would you cite that as an illustration of the general carelessness of some men? Yes. I do not mean to say it is the case with all men; but the other evening seven or eight men were found doing the same thing.
1092. *Mr. Hamlet.*] Can you supply us with an account of the quantity of flue-dust obtained from your smelters? Yes.
1093. And you will? Yes.
1094. Are you aware that Mr. Guyard, for the United States Government in America, has undertaken an investigation in regard to flue-dust? I have heard of it.
1095. And are you aware that one of his conclusions is that the quantity of lead completely lost in the atmosphere is sensibly twice as large as the quantity of lead got in the dust chambers generally recognised? I was not aware of that.
1096. *Mr. Howell.*] About what percentage of lead does this flue-dust carry? About 30 per cent.
1097. You have said there is now a contract let for the men to take out the flue-dust? Yes.
1098. How many men have you employed on the north nest of furnaces on the flue-dust? One man has taken the contract, and he has three or four men working under him.
1099. How long has that contract been let? I was away at the time. I think it was in March sometime.
1100. Those men work continuously in the flue-dust, do they not? Yes.
1101. It is quite dry and dusty when it comes out? Yes.
1102. Do you know of your own knowledge whether those men have been laid off on account of sickness? No.
1103. Would you consider that the most dangerous place on the whole of the works, so far as the liability to get leaded is concerned? I can hardly say that.
1104. There is a pretty large pile there? Yes; but it is wetted down as it is taken out.
1105. Does not the sprinkling of the dust, throwing water on it, send out a good deal of dust? Yes.
1106. And it goes round where the men are working? Yes.
1107. And yet you hear no complaints from the men working on the flue-dust about being sick or leaded? No.
1108. *Mr. Sleath.*] With regard to those men who were in the habit of sleeping on the ore—of course as you say they would be discharged, I suppose? They would be given a caution as a rule; but anyone who made a habit of it would not be employed about the furnaces.

[The witness withdrew.]

Mr.

Mr. Andrew Eddy called and examined:—

Mr. A. Eddy. 29 June, 1892.

1109. *Chairman.*] What is your business, or occupation, Mr. Eddy? I am a miner.
1110. How many years have you been working on this field? One year and nine months.
1111. Which mines have you worked at? I have worked in Block 14.
1112. For how long? For three months.
1113. And then? I then worked in the South mine.
1114. How long did you work there? I worked in the South two months.
1115. And after that where were you employed? After that I worked in outside mines. When I first came to the field I worked in the South mine. I got leaded in Block 14.
1116. Were you leaded at all while you were working in the South? No.
1117. There is lead ore in that mine, is there not? Oh yes.
1118. Were you working among it—that is in the lead stopes—while you were there? Yes.
1119. How long did you work in Block 14? Three months.
1120. Three months before you fell ill? No. I worked there three months and fell ill during that time. I may say I had six different mates in three months, and five of them got leaded. Two of them got leaded the first fortnight we worked the contract.
1121. Was your reason for leaving the South mine that you took a contract on Block 14, or because you were ill? I thought I explained I was not ill before I went to Block 14, and the first place I went to work on the field was the South mine.
1122. Block 14 is entirely silver-lead ore? Yes, it is principally lead.
1123. How long were you ill? After I was laid off at Block 14, I was two months unable to do anything.
1124. Who was your doctor? Dr. Thompson.
1125. What were your symptoms? Terrible pains in the stomach, I was not bound up—I had dysentery all the time, and cramps in the stomach.
1126. Did you have paralysis or drop-wrist? No.
1127. Did you have the blue-line on the gums? Yes.
1128. And Dr. Thompson said you were suffering from lead? Oh yes.
1129. What was your contract for in Block 14? For driving the main drive.
1130. What were the conditions of work in Block 14—the ventilation for instance? The ventilation was very bad when I was there, and I suppose that was the cause of so many men being knocked up. There was no ventilation until we broke through into the main drive.
1131. Were there any air-pipes carried into the workings, in Block 14? No.
1132. I do not mean in your drive alone, but anywhere? Well, I was not in the other levels, so could not say as to that.
1133. *Mr. Hamlet.*] Did you find there was generally a sufficient amount of ventilation in Block 14? I could not say that, because I did not work all over the mine. I understood the Chairman to refer to that part where I was working. There was none there. Of course there was a little ventilation, or we could not have lived: but the ventilation was very bad until we got through to the other shaft.
1134. Was it very dusty? Yes. There was lead all through where I was working.
1135. Was any precaution taken to lay the dust by water sprinkling? No; not anything of that kind.
1136. How did this dust seem to affect you? It used to affect me all the time.
1137. Tell me the kind of feeling—the symptoms you experienced? I felt ill with dysentery all the time; and pains in the stomach. The other two men were bound up. It took them quite differently.
1138. Did you take your crib with you into the drive? Yes.
1139. And you used to eat it there? Yes. But it was very little crib I used to eat. Very often I did not take it at all.
1140. Did you make a practice of washing your mouth out before eating your crib? Yes.
1141. Did the others do the same? I have seen some of them do it; but I do not think they all did it.
1141½. Was there, at Block 14, provision made for the men to change their clothes before going down the mine? I did not see any.
1142. *Mr. Hamlet.*] Are you aware that there are Government mining regulations, and that those regulations are supposed to be posted at the mouth of the shaft? What regulations do you refer to?
1143. Did you see any regulations at all—any printed instructions? The rules, do you mean?
1144. Yes? Oh, certainly.
1145. Printed rules posted up at the top of the shaft? Yes.
1146. You did see them? Yes.
1147. Were they rules like that (*pointing to printed copy of the Mining Regulations under the Act*)? Well, I think they were similar.
1148. You think they were something to that effect? Well, you see, we miners do not take much notice of the rules in that way—that is, no particular notice, to study them.
1149. *Chairman.*] The Act says, "A printed copy of these rules shall be posted in the office, and on a building or board in some conspicuous part of the mine, and a copy shall be supplied to each person in any mine to which they shall apply"? Then is each miner supposed to have one of these?
1150. That is what the regulation says? That is not done.
1151. *Mr. Hamlet.*] Were you ever presented with a copy? No.
1152. Did you ever know a man to be presented with a copy? I cannot say. I have worked in five or six different mines, and I was never presented with a copy of the rules.
1153. Did you ever receive any suggestion from the shift-boss, or the manager, or anyone on the mine, with regard to the possibilities of getting leaded at your work, and what steps you should take to save yourself? Yes; I have been told by the boss of the shift himself not to break up the ground too much, or shake it about too much, on account of the dust. In general, not to work too much with the pick.
1154. What you understood by that was that the dust was injurious to you? Yes.
1155. Was the mineral you were working in the mine hard or soft? It was not very hard. It was this lead ore.
1156. But it made dust? Oh, yes, it made dust. You cannot do much in lead ore without making a dust, unless it is damp.
1157. What time did you work at a stretch? Eight hours.
1158. And after you knocked off work did you wash yourself? I did.

Mr. A. Eddy. 29 June, 1892.

1159. Did you wash yourself very carefully? Yes.
1160. That was at home, I suppose? Yes; and I changed my clothes every day.
1161. How often did you put on clean flannels? Every day. I used every precaution, and still I got leaded.
1162. *Mr. Sleath.*] Was there any provision made for washing on the surface of the mine? I was never informed of any, and I never saw any. There may have been, but I had no knowledge of it.
1163. I think you have said that you did not see any changing-house on the mine? Yes; I did not. I never knew anyone to change there. It is possible there may have been a changing-house on the mine, of course, but I never knew of it.
1164. During the time you have been on the field, have you found it a common occurrence for men when leaded to leave this place for other parts and other colonies? Yes.
1165. You think there have been a number of such cases? Oh, yes; and numbers try to get into the outside mines. That is where I have been since I left Block 14.
1166. Are you aware if any one mine bears a worse name than another, as regards lead poisoning? Yes; there is said to be more leading in Block 14 than in any other mine.
1167. While you were at work there, did you go much through the stopes? No; I only worked in one main drive. I worked there for three months.
1168. Do you think if the main drive had been sprinkled with water, and air-pipes had been carried in, that such measures would have tended to prevent the injurious effects you speak of? I am sure of it. We only worked two shifts there. We could not work three. We used to leave one shift out, so that the place could get cool.
1169. That was to allow the bad air to get out? Yes, and the smoke.
1170. Do you know of many men who have worked a period of twelve months in these lead mines, and have never felt the effects of lead? No; I do not know one. In my opinion he would be of a strange constitution, who could work for long in the lead without being affected.
1171. When you found the dry character of the work you had to do, did you make application to have the air forced in, or the water sprinkled? No: we only had a couple of hundred feet to drive, and I suppose they did not think it worth while to put air-pipes through, especially as there was another drive coming to meet us.
1172. You had five mates, you say? Yes, five mates in three months. We earned £5 a week at it; but still we had to go up.
1173. How many men formed your gang? We were working two shifts with four men.
1174. *Chairman.*] But you say you had five mates in three months; how many constituted your gang? We had four in the party at the beginning of the contract; but they fell ill sooner or later.
1175. All of them? Yes; the first fortnight two of them fell ill, and had to leave the field.
1176. Then you had to replace those two with other men? Yes.
1177. That is what I want to get at; how many men were employed with you during the three months? We started with four the first fortnight. Two of them got leaded and had to leave. They went to Victoria. We then got two other hands, and they remained three weeks, when they also got leaded and had to leave. Then we got two more men, and they held on through the contract.
1178. Are all of those men here on the Hill now? I have not seen them the last six months. The other two are in Victoria. As I have said, I was earning £5 a week on the contract, still I had to go up. I would not take another one of the kind, because taking the bad time with the good, it is of no advantage.

[The witness then withdrew.]

Mr. John Warren called and examined:—

Mr. J. Warren. 29 June, 1892.

1179. *Chairman.*] You are manager of Block 10 mine, Mr. Warren? Yes.
1180. How long have you held that position? About twenty-seven months.
1181. You hand in a statement concerning the operations of your company during the last two years, and you say the total number of men employed by you in 1890 was 311? That is what we make it, striking an average for the year.
1182. Their occupations being described as shown in the list you hand in? Yes. (*See Appendix.*)
1183. And in 1891 the number was 298? Yes.
1184. Their occupations being similarly described, as shown in the list? Yes.
1185. Then, in 1890, did you raise 23,333 tons, 13 cwts., 2 qrs. of ore? Yes; we have taken that from the 31st March, 1890, to 31st March, 1891, per this statement, and then from the same period from 1891 to 1892.
1186. Then, in the first term you raised 23,333 tons, averaging 16 per cent. of lead; and in the second term 50,000 tons, averaging 12 per cent. of lead? Yes; we had scarcely got into full work in 1890, and that accounts for the discrepancy shown between the two periods.
1187. Do any of your hands get leaded? I have never heard of any complaint, with one exception.
1188. Was there anything particular about that case? Yes; he was a surface-man—an engineer—and I cannot account for him getting leaded. It was reported that he was leaded, that is all I know about it. That was the only case of leading I had brought under my notice.
1189. And an engineer would be just about the last person you would expect to get leaded? I should think so. I do not know of anything injurious to health, in Block 10, from my own experience.
1190. You are aware that men do get leaded in other mines? Well, there is no doubt that men do suffer from lead, or something else. I have seen men come to the mine looking for work, that I would not care about employing.
1191. Is there not an illness—a prevalent illness, to which the men here are liable, which is called leading; are you not aware that men do suffer from that illness at other mines than yours? Yes; I believe they do.
1192. Can you explain why they do not suffer at your mine? I cannot.
1193. Have you been employed in managing mines in other parts of the world? Yes; from my youth upwards, in England and the Colonies, and in New Caledonia.
1194. Have you in those different places seen anything of the effects of lead-poisoning? Well, at home we do not attribute the illness the men suffer from to lead. They complain of the dust which arises from the stone. In the neighbourhood I came from there is more tin-mining than lead. 1195.

Mr. J. Warren. 29 June, 1892.

1195. Of course, miners are subject to various complaints; but what I ask is, if you have worked in lead-mines elsewhere, have you not seen the effect of lead poisoning among the miners? Yes, I have.
1196–7. Do you know anything of the use of milk as a prophylactic—as a preventive? No.
1198. Can you tell us of any particular steps that are taken by miners to protect themselves against the effects of lead? I cannot.
1199. I do not think I asked you at first whether you smelt any ore—do you do so? No.
1200. *Mr. Hamlet.*] Then, if you do not smelt the ore, it is chiefly sent away? It is all sent away, or sold to the other companies. There are two companies on the hill that are smelting ore.
1201. Have you received any formal complaint from any of your men? None whatever.
1202. Not as to lead poisoning, or the want of ventilation? No.
1203. Nothing to lead you to suppose that your mine is an unhealthy mine to work in? No.
1204. I should like you to tell us the kind of ore you find in your mine? The prevailing ore is kaolin.
1205. Is there lead in it? There is a little lead—it averages, perhaps, 8 per cent. of lead.
1206. And besides kaolin? There is a little carbonate; but not in any quantity.
1207. Any sulphide? Yes. That has developed with the depth.
1208. And do you work the sulphide? Vere little.
1209. Do you find any arsenical ores in your mine? I have seen two small specimens containing arsenical pyrites.
1210. You have not found them to any considerable extent? No. One of the specimens I have referred to was found in a cross-cut, a small vein in the country rock, and I have seen one small specimen from the sulphides.
1211. And all these ores are sent away from your mine? Yes. We sell about 100 tons a week to the the British, and 50 or 60 tons a week to Block 14. The balance goes to Port Pirie and Dry Creek. I would like to say with regard to lead poisoning, that I think a great deal of illness is attributed to lead poisoning that is nothing of the kind. It may surprise you to be told that before I came to Broken Hill I had occasion to consult a doctor, and he told me I was leaded.
1212. *Chairman.*] Before you came here? Yes; and I told him I could not account for it, as I had not been working in lead.
1213. You suggest, then, that the doctors do not always correctly diagnose the illness—that they may be sometimes mistaken? Yes; and it leads me to think that a great deal of the sickness which is attributed to lead is really something else.
1214. You know, however, that lead poisoning is not uncommon among the general population, from obscure causes? I know there is something of the kind here. I merely mentioned my own case as an instance or illustration that doctors are sometimes wrong in their diagnoses.
1215. What I ask you is whether you are aware that people who do not work among lead do sometimes get leaded nevertheless. Thus, they may get lead in their wine if they drink claret; they may get lead from sweatmeats, they may get it from paint, from hair-dyes—a common source—and from a dozen different sources not at all likely to be suspected by the individual until the doctor points out that it is lead he is suffering from. Now tell me what caused you to think the doctor was wrong in that case? I thought he was wrong because I did not see how I could have inhaled, or taken the lead into my system in any form.
1216. Did the doctor adhere to his opinion? I never troubled him about it afterwards.
1217. Well then, what other kinds of illness do you say the miners suffer from on this field which may, in your opinion, be mistaken for lead poisoning? I am not speaking of my practical experience. I merely mentioned that case by way of illustration.
1218. *Mr. Sleath.*] Is the percentage of lead in your ores less than in most of the mines on the field? Yes; I believe it is.
1219. In fact your mine contains about as little lead as any mine on the field? Yes; I think so.
1220. So far as you know do your ores contain more moisture? I think the kaolin ores do usually contain a large percentage of moisture.
1220½. More than carbonate of lead would, for instance? Yes; I should say so.
1221. Where dust exists to any extent, do you think it would be beneficial, as regards the health of the miners, to sprinkle it with water? It would lay the dust certainly; but whether it might not be the means of generating other gases I am not prepared to say.
1222. Do you think it would be beneficial, where lead poisoning exists, or where strong lead ore bodies are being worked, if hot-water baths were provided close to the shafts, so that the miners could use them previous to going off? It has been understood that such baths would be an advantage. But I understand that they have been supplied here, on the Proprietary Mine, and the men refused to use them.
1223. How did you arrive at that understanding? I have heard it spoken of.
1224. You are not speaking of your own knowledge? No.
1225. You never saw such baths? No.
1226. Neither did I, and I looked very carefully for them. Do you think the expense would be too great to ask the company to incur if it would benefit the men? No; I do not think it would be, provided the men would take advantage of such a provision.
1227–8. But you never saw anything of the sort yourself? No; I did not.

[The witness withdrew.]

Mr. Wm. Strachan called and examined:—

Mr. W. Strachan. 29 June, 1892.

1229. *Chairman.*] What are you? I am a miner.
1230. How long have you followed that occupation? I have worked at mining all my life. I never worked in lead until I came to the Barrier.
1231. When did you come to the Barrier? About three years ago.
1232. Which mine were you first employed on? Well, I came here under engagement for sinking in the country, that is the main shaft of the Proprietary Mine. I was engaged in Victoria. There was no lead in the ground I was working in.
1233. Well, what did you do next? I was working in Block 14, sinking the shaft. I did not get into much lead there. It was all country.

1234.

Mr. W. Strachan. 29 June, 1892.

1234. And after that? I worked in another shaft—all country—the Silver Ring. After that I worked in the British, and there I got leaded.
1235. What kind of ore were you working in? It was carbonate.
1236. At what date did you begin to work in the British Mine? About two years ago, or a little over perhaps.
1237. How long did you continue to work there before you fell ill? I worked there for about three months before I was really ill. Sometimes I felt indisposed before that, but I did not attribute that to the lead.
1238. But after three months of working there you fell really ill, and it was from the lead? Yes; it came upon me by degrees, with pain in the bowels, loss of appetite, spasms running through me, and stiffness in the limbs; in fact, I was affected altogether, and did not feel well at all.
1239. Did you suffer from constipation? Yes, and very badly too. After some weeks of it I was forced to cave in.
1240. At the end of three months you were obliged to lay off? Yes.
1241. How long did you lay off? I dare say I was six weeks laid off; but I was ill for four or five months altogether.
1242. Did you return to work at the end of the six weeks? Yes; I returned to work after about six weeks, but I was not well.
1243 Did you go back to the same work? Something similar.
1244. Did you go back to work the same class of ore again—lead ore? Yes.
1245. At the British Mine? Yes.
1246. And how long did you continue to work there? I only worked a few weeks, when I had to knock off again.
1247–8. Because the symptoms returned? Yes, as soon as ever I went near the lead.
1249. And have you ever worked in the lead since that time? Well, I had another try at the British. The mine is better ventilated now.
1250. How long did you remain out of the lead? I stayed out of the lead twelve months or so. I started to work in the country.
1251. And then you returned to the British because you thought the mine was in better order? Yes.
1252. About what time was that—long ago? No; only a few months ago.
1253. And did you fall ill again? No. I got hurt.
1254. When you returned, did you find the state of the mine better than when you first went to work there? Yes.
1255. Better in respect to ventilation? Yes, because we had the water-hose down there.
1256. How does the water help ventilation? Well, where water is there is ventilation generally. Water will make ventilation.
1257. And during the later time did you find sprinkling was systematically carried out? Yes; they have had sprinkling in the mines, but unfortunately in some places the pipes do not lead into the face where the men are at work, and then the sprinkling drives the fumes, or small particles that are flying about into that end, and the men get the disadvantage of that. If you only water a small portion of a level, what is in one place will be driven back to another, because there is no get-away; just in the same way that you will get the smoke from a charge of dynamite which has been fired in a place below you.
1258. During your last term in the British Mine, were there any changing-rooms provided for the men? I never saw any.
1259. You said a little while ago that you were hurt—when did that occur? About ten weeks ago.
1260. Do you smoke? Yes.
1261. Do you smoke when you are below? Yes.
1262. Do you eat your "crib" below? Yes; but oftentimes I could not eat when I was leaded.
1263. But you take it below to eat? Yes.
1264. And that is the general custom? Yes.
1265. Used you to wash your hands and mouth before eating? No; we had no time to do that.
1266. No time? No; we were only allowed twenty minutes, and it took me that time to eat my food.
1267. Is it not the general custom to wash before eating? Well, they could not wash there unless they washed in dirty water.
1268. The water is laid into or near to every drive or stope, is it not? Yes; but the water is only used for sprinkling at certain times, and one has to go down to turn the tap on while another uses the hose, and you would have to go to that trouble to get your hands washed if you wanted to do it.
1269. Do you cut up your tobacco in the mine? No, I never cut up my tobacco down below; I take it into the mine already cut up.
1270. Is that the common custom among the men in your experience? No; it is customary for the men to cut up their tobacco below, and that is one of the worst things there is.
1271. If some kind of facility for washing were provided, do you think it would be taken advantage of by the men? Oh, yes, it would be used, I am sure, and thankfully received too.
1272. In the mines? Yes.
1273. What rule did you observe as to changing your clothes? The only chance I had to change was when I got home, and then I would pull off everything.
1274. You made that a rule? Yes; and I never wore the same clothes. I would also wash my hands and face when we had water; but sometimes we had not water. Then I would dry sponge myself all over with a towel.
1275. You are a careful man in respect to what you could do to save yourself? Yes.
1276. Which of the mines has the worst reputation as regards men getting leaded? Block 14, I hear; we were working on the boundary of Block 14.
1277. Do you think you got leaded by the dust in the stopes? Yes; I think so.
1278. Was the dust generally very bad? In some places it would be worse than others, but there was dust more or less all over. It depends upon the surroundings. In loose ground where you have to get timber, and there is much dust flying about, that is where you get leaded. I have seen it so, when you could not see the candle for dust, and I have seen the dust burning in the candle.
1279. You approve of the plan of sprinkling? Yes; it lowers the dust. Unfortunately for us, when I was working there they did not do that in all the places, and it was worse for those who had not the benefit of it, because the water drives it down on to the bottom levels.

Mr. W. Strachan. 29 June, 1892.

1280. Suppose the stopes were thoroughly ventilated, and water sprinkled over them, would you, as a miner, have any objection to go down and work there? Of course, if there was proper ventilation, and plenty of water I would not. But I would not work in lead for £1 a shift, because I would be only losing my life by it. I have seen hundreds of men here from Victoria and other places, strong, powerful men, who have had to leave again after twelve or eighteen months, actually ruined for life.
1281. Have you ever seen a man fall down from the effects of lead? I have seen a man take a fit supposed to be from the effects of lead.
1282. How long did the fit last? The man was taken away; I cannot say how long it lasted.
1283. Did you ever fall down when you were suffering from the effects of lead? Yes, through my legs being weak at the ankles. I was walking one day near the "Grand Hotel," when my right leg suddenly gave way and I went down—fell on my face.
1284. Is that a frequent occurrence? Oh, yes. It takes some men in the ankles and knees, and some suffer more in the bowels; others about the back of the neck and arms.
1285. You think that a sign of lead-poisoning? I should think so. At all events a man suddenly collapsing, and falling down in the street, would show there was something wrong.
1286. Do you think it would be a good thing to have baths on the mine for the use of the men? I do. It is a great mistake that they are not able to keep themselves clean. They should be able to wash all over, the same as coal miners. I may say I worked in the coal for years.
1287. Have you ever known of lead-mines where they have baths for the use of the men? I never worked in lead elsewhere.
1288. And you have never seen any on Broken Hill? No.
1289. Did you provide for yourself all the medicine you ever took while working at the mines? Yes; and it cost a good sum of money altogether, too.
1290. During the time of scarcity of water here, how much water would you have to wash yourself after you came from the mine? Do you mean where I was living?
1291. Yes; your home? Well, during the hard times, we might have, perhaps, a pint, or perhaps two pints of water.
1292. And you came home dirty from the mine? Yes.
1293. You could not wash all over then? No; we could not often wash clean our hands and neck, let alone all over.
1294. How often could you get a good wash all over? If I paid 1s. for a bath I could.
1295. Then you could get a bath? Yes; by paying 1s. or 1s. 3d. for it, but I would not say much for the water.
1296. Still, that was better than none? Oh, yes; but then we cannot afford to give 1s. 3d. a day for baths out of the money we get.
1297. Do you ever get a bath all over? Oh, yes.
1298. How often? I used to have a bath regularly every Sunday morning once.
1299. But not in the time of scarcity, of course? No; we could get little or no water at all then.
1300. So that you did not get a bath during that time? No.
1301. *Mr. Sleath.*] You are what is generally termed a shiftman, are you not? Yes.
1302. The first work you did in the stopes was in the British? Yes.
1303. So that you had no chance of getting leaded previous to that? No.
1304. Are you a temperate man? Yes. I am a teetotaller.
1305. Have you seen water laid on in any other mine than the British? No.
1306. You have worked in the Proprietary mine? I have worked in the shaft of the Proprietary, sinking.
1307. In what part, as a rule, did you first feel the effects of lead? In the stomach.
1308. During the scarcity of water here, could you get a bath for 1s. 3d.? I never tried myself. I do not think anyone could.
1309. Have you observed a copy of the Mining Regulations posted at the various shafts of the mines where you have been working? I have on some of them. I would not like to swear that I have on all of them.
1310. Did you ever see them at the British? I cannot say positively.
1311. Did you ever have a copy handed to you? No.
1312. I suppose you know a good number of the miners employed here? Yes.
1313. Do you know many who have worked a considerable time in lead, and who have not suffered from lead-poisoning? I have in my time met one or two who have not been affected, but in my experience mostly all of them have been affected more or less.
1314. Do you know any man who has worked here any length of time without being leaded? No; I cannot name one.
1315. *Chairman.*] How old are you, Mr. Strachan? Fifty-one.
1316. Is there anything that makes it a little easier to water the British Mine down below as compared with the other mines that do not water the stopes to the same extent apparently? Well, I think from appearances, and taking everything into consideration, that they all have the means, so far as carrying the water round. But I think the British is better in that respect than any place I have been in. There is a lot of lead there.
1317. What I asked you was this: has the British any advantage over other mines that would make it easier for them to lay on the water? I do not think so; that is, I think they have the same trouble that other places have.
1318. Have they the same expense—that is what I want to know? Yes; I think so, certainly.
1319. Do you know the cause of the death of the late manager of the British? I do.
1320. What was the cause of his death? Well, I went to see him off; I believe I was the last man that shook hands with him in the train. I knew him in the old country. I said to him, "I shall have the pleasure of seeing you at Christmas"; and he answered, "You will never see me again; I am going home to die."
1321. But did he tell you the cause of his illness? Yes; he said he was leaded; and the doctors told him he would have to clear out. You could see it in him. But I may say he was continually down below.

[The witness withdrew.]

FRIDAY,

FRIDAY, 1 *JULY*, 1892.

Present:—

DR. ASHBURTON THOMPSON (CHAIRMAN).

W. M. HAMLET, ESQ. | R. SLEATH, ESQ.

J. HOWELL, ESQ.

Mr. J. B. Doolette, called and examined:—

Mr. J. B. Doolette. 1 July, 1892.

1322. *Chairman.*] You hold office under the Municipal Council of Broken Hill, Mr. Doolette? I am Chief Rate Collector and Treasurer.
1323. You have lived at Broken Hill a long time, I believe? I have been five years a resident of Broken Hill altogether.
1324. Have you observed anything peculiar in the course of life among the animals in this district? Yes; I have made it a study as regards animals, particularly ever since I have been here.
1325. Then will you be good enough to give us the result of your experience? Well, I find, from my experience, that it is impossible to rear a dog here on the Barrier. I have had a great many dogs, and the only ones I have been able to keep are those I brought from South Australia, over twelve months old. Dogs that have reached that age seem to stand it better.
1326. They get hardy when they reach that age? Yes.
1327. You are speaking now of dogs you have kept yourself? Yes; and dogs that I have had pupped here.
1328. How far away from the hill and towards what point of the compass have you tried to keep dogs? Within a quarter of a mile of the hill, north-easterly.
1329. And does all you may say about dogs apply to the dogs kept there? Yes.
1330. Your own dogs only? Yes. In fact, I have a dog now that I brought up here when I came to the place five years ago. He was then four years old, so you know what his age is now, and that dog is quite well.
1331. He never suffered at all? No. I also had sent up to me, about four years ago, a couple of full-grown cats from South Australia. One of them I have alive now; the other met with an accident; a dog got at it in the street; but the kittens do not thrive. I have been able to keep them up to about three months old; in fact they seem to flourish up to that age, and then they take fits, and go off.
1332. Is that invariably the case with all the kittens you have tried to rear? Yes; and I may say dozens. We are fond of dumb animals. I may also remark that we have found it impossible to keep parrots.
1333. In cages? Yes. I have never been successful in keeping them in cages; that is, the Gallard parrot-cockatoo; they will not live on the Barrier. You will not find one of them in town to-day.
1334. What other kinds of birds have you tried to keep? I have had all the ring-necked parrots, and they take fits and go off. Only the white cockatoo seems to survive. As regards poultry, I have never been able to rear poultry there.
1335. At what age did you get those parrots that died, as a rule? About six months, I should say. I bought them outside, and brought them into the town.
1336. What do you mean by ouside? Beyond Steven's Creek.
1337. And how long have you been able to keep them? Not more than three or four months.
1338. What happened to them; how did they die? Well, they take these fits, and go off, as I have said.
1339. Do they die after one of these fits? No; they may get over one of them, but they die eventually, and these are birds that are kept in cages, and fed out of a pan in the usual way.
1340. What kind of water do you give them? The same water that we drink ourselves.
1341. You get the water out of an iron tank as a rule, I suppose? Yes; and of course we have to give them the gravel which comes from the yard and gutters. It is necessary to give it to the parrots.
1342. Did it never occur to you that you were giving them material that disagreed with them? No; it did not.
1343. The poultry would run about the yard in the usual way, I suppose? Yes.
1344. And feed off the ground? Yes. I have a place for them as large as the Council Chamber, netted in 6 feet high. Just before last Christmas I bought three geese to fatten. But they began to pine away at once, and went off within three weeks.
1345. Have you noticed whether the laying of the fowls was interfered with? Yes; I have never been successful in getting them to lay. I have had a splendid lot of hens too; but have never been successful.
1346. Do you mean that, literally, you never had any eggs? I have had a few, but nothing to speak of. I went in for an expensive lot of Leghorn fowls, and had them for a couple of months, when they began to drop off one by one. They were quite healthy and well when I brought them here.
1347. And during those two months did they lay less eggs than they ought to have laid? Yes; they began laying, but soon pined away.
1348. Did the fowls get fits? No.
1349. Did they waste? Yes; they seemed to waste away, and mope about, getting into corners, and dropping off.
1350. Then as to horses, can you tell us anything about them? No; I cannot say much about the horses, but I have seen the effect of the place, apparently, in cattle.
1351. We have heard something about the cattle;—what do you think affects them? I put it down to a poisonous weed. I pointed out to a couple of persons who kept cows, that they had the weed in their place, and both of those cows died.
1352. Did you recognise a poisonous weed in the paddock? I did.
1353. What is it? It lies very close to the ground. In fact, I do not think a beast would pick it up unless the feed was very short.
1354. Can you get us any of it? It is not in season now; but I will endeavour to get you some.
1355. How were the cows affected that you saw? They began by running round the paddock. One of them had a bell on, and I was awakened one morning by the noise. I saw the cow racing round the whole section, and stood looking at it until it fell down and died.
1356. Have you seen cows affected in any other way? Yes. I saw a cow at one of the dairies out here one Sunday afternoon. I thought it was affected by pleuro, and I drew attention to it. I have seen that in South Australia.

Mr. J. B. Doolette. 1 July, 1892.

1357. Have you seen cows kept within a mile of the Hill affected in any way? This cow I have spoken of was in Iodide-street; and there was another one not 100 yards off died in the same way.
1358. Have you seen cows suffer in any other way than the illnesses usual among cows? No; I cannot say that.
1359. Are you of opinion that the cows are not affected by the same cause as your birds, and dogs, and cats? Well, in the case of cattle, I have always been of opinion that their illness was caused by the poisonous weed I speak of. I do not think they get leaded.
1360. You do not think they suffer from the same disease as carries off the dogs and cats? No, I do not. I think they are affected by the weed. At the time I asked the papers to caution the public about it, and there was in one of them a long article on the subject.
1361. *Mr. Hamlet.*] With regard to these birds that died in their cages, you always had earth or gravel in their cages? Yes.
1362. And, of course, the geese you had were free to pick up anything they liked from the ground? Yes; they had a place as large as this chamber to run in.
1363. *Mr. Sleath.*] How did you find out that the weed you speak of is poisonous? I was told so; it is called the poisonous weed.
1364. You had heard so? Yes.
1365. *Chairman.*] Have you any special point to add to what you have already said, Mr. Doolette? I do not think so. I did promise to bring some cats which are peculiarly affected, by way of illustrating how the smaller kinds of animals suffer here. I was not able to get them to-day; they are not mine, but I can get them. They are deformed in every way.
1366. What age are they? They are about 4 or 5 months old. They keep having fits. I will bring them for you to look at.

[The witness withdrew.]

Mr. S. Brenton, called and examined:—

Mr. S. Brenton. 1 July, 1892.

1367. *Chairman.*] What is your occupation? I am a miner.
1368. How long have you been so engaged; I mean on this field? About four and a half years.
1369. What mines have you been employed upon? The Proprietary, Block 11, Block 14, and the British.
1370. Have you been leaded? I have not been thoroughly leaded. I have taken care to avoid the lead as much as possible; but I have felt the effects of lead, and when I do feel the effects of it I take a spell at other work.
1371. Then tell me at which place were you first engaged in, and how long did you stay at that? I was at the Proprietary first.
1372. At which Block? I was at Block 12 and Block 13.
1373. And how long did you remain at that? I was there eighteen months, and I then left for about six months.
1374. Was that because you felt you were going to be leaded? I left for a spell because I felt the effects of the lead.
1375. Did you not work at any mine during that six months? No.
1376. Then, what did you do at the expiration of the six months? I went to the mine again—the same mine.
1377. How long did you stay there the second time? About ten months.
1378. Did you leave again, then? I asked for, and got, a shift on the surface.
1379. That was at the end of the ten months? Yes.
1380. How long did you stay on the surface? I stayed about six months on the surface.
1381. And why did you leave on that occasion, when you had surface work? Well, I went to work down in Block 11, as a matter of change.
1382. How long did you stay at underground work from that time? I have been at underground work ever since. I was only in Block 11 four months, I think; and then I was in Block 14 about ten weeks, or three months, and then I shifted to the British.
1383. You have told us that you felt the effects of lead in the first instance after your first term of work in the Proprietary, and that you took a spell in consequence;—when did you commence to feel it the second time? In the Proprietary.
1384. Then you took a spell on the surface? Yes.
1385. Well, when did you next feel it after that? In Block 14 I began to feel the effects, and I left about ten weeks or three months, I cannot say exactly how long to a week.
1386. You never suffered from a fully-developed attack of leading, you say? Well, it was evidently the effects of the lead, because I had all the symptoms—weakness in the legs, pains in the knees, and loss of appetite.
1387. Any other symptoms? No other symptoms. The only thing I noticed was that when I worked in lead it came on more often than when I worked in other places.
1388. It came on worse while you were at work? The more lead there was where I worked the worse it seemed to be.
1389. Which place do you consider the worst or most dangerous of those in which you have worked? Well, the north stope, at the time I worked there, in the Proprietary Mine, that was a very bad place; and Block 14 also was a very bad place. They are about the worst places still, I think.
1390. Do you belong to any friendly society? Yes.
1391. Which society do you belong to? I am a member of the "Silver Star" Branch of the Grand United Order of Oddfellows.
1392. Did you consult a doctor when you were affected in the way you have described? Yes; Dr. Schinzinger.
1393. *Mr. Howell.*] You say you worked in Block 11 about a year? About four months I say.
1394. It was in the northern stope you worked? Yes.
1395. At what depth, or about what level? I considered the worst part from about 150 feet up.
1396. That was in the old workings? Yes; of course there was a good deal of lead there from 216 feet up, but that was the dustiest part.

1397.

Mr. S. Brenton. 1 July, 1892.

1397. The ore was dry carbonate of lead ore? Yes.
1398. Did you leave Block 11 to go to Block 14? No; I did not leave it for that purpose. I left Block 11 because I had the offer of a better situation.
1399. You left there of your own accord? Yes.
1400. You do not know anything about the workings of the 216 feet level in the Proprietary? No; I just know down about the intermediate. I do not know how many feet down it is. I cannot say positively.
1401. You say that the only bad effects you felt from what you considered to be lead-poisoning was weakness in the knees and pains in the legs a kind of lead rheumatism;—did you suffer from colic? I had colic at the same time. I had to be constantly taking opening medicine.
1402. *Mr. Sleath.*] Was provision made for keeping the dust down by sprinkling it with water in any of the mines you worked in? Only in the British. That was the only mine in which I have seen sprinkling.
1403. Do you think sprinkling is a measure of advantage to the men to prevent them getting leaded? I think it is a very good plan—superior, in fact, to anything I know of, with good ventilation.
1404. Have you seen changing-houses in all the mines you have been employed on? No; I have never been in the habit of changing. There used not to be any. I believe there is in Block 11 (M'Culloch's) a changing-house at the present time. I do not think there is at the British. I have never had occasion to go in them; but I have never seen them there.
1405–6. Do you think if hot baths were provided for the men it would act as a preventive of leading? Well, it would go a considerable way towards it, I should think.
1407. Do you think the men would use such baths if they were provided? I think so, most of them would.
1408. In the different mines you have worked in have you been presented with a copy of the Mining Regulations by any of the mining authorities? No.
1409. Have you seen them posted up at the mines? In some places I have seen them.
1410. Do you drink? No.
1411. Have you taken great care of yourself as far as cleanliness is concerned? Yes; I have been very particular so far as that is concerned.
1412. *Chairman.*] What kind of precautions as to cleanliness did you take—used you to regularly change your clothes when you went to and left your work? Yes; I used to put on fresh clothes, and wash all over.
1413. You changed your clothes at home? Yes.
1414. And you washed all over? Yes; in most cases, very nearly every day.
1415. You took something to eat with you when you went to work, I suppose? Yes.
1416. And did you eat it down below? Yes.
1417. Did you wash your hands and mouth before eating? I used to wipe my hands as clean as possible, and wash my mouth out with tea before eating. I did not touch my tucker with my hands. I used to hold it with the paper.
1418. Used you to smoke? No; I never smoked.
1419. May the men smoke below during crib time? I do not think there is any rule to bar them from smoking during crib time.
1420. But they do not smoke while they are working, I suppose? I have seen them smoking while they are working.
1421. Do you think your precautions were effectual in preventing you getting leaded sooner than you otherwise would have been? Well, no doubt the precautions I took had a good deal to do with it; but I think I have a very good constitution.
1422. In your opinion, do a great many miners suffer from leading in comparison with the total number employed? Yes. I think it is very much a matter of constitution. I have not formed any decided opinion. One man is different from another, you understand.

[The witness withdrew.]

Mr. Cecil C. Morgan called and examined:—

Mr. C. C. Morgan. 1 July, 1892.

1423–4. *Chairman.*] What is your office, Mr. Morgan? General Manager of the British Broken Hill Proprietary Company.
1425. How long have you held that position? Since last February.
1426. Can you give us some evidence about the conditions of work both above ground and below at your mine? Yes.
1427. Do you bring with you the statement which we asked you to be good enough to prepare? I was not here during the two former years, so that I am personally unable to speak of that period. But I have made a note of the men who were working in the mine from the books. With regard to the nature of the ores and the class of work done during that time, of course I could only speak from hearsay.
1428. Was the average number of hands employed by you in 1890, 240? Yes.
1429. And their occupations are described as shown on the list produced? Yes; I got those particulars from the books.
1430. Similarly the average number employed during 1891 was 415? Yes.
1431. And then we asked you a question as to the amount of ore that was smelted, and you say you are unable to answer that? Of course I can only answer from hearsay as to the time prior to my taking charge.
1432. You can tell us how many smelters you have running? Two.
1433. And they have been running how long, as far as you know? Since I have been here.
1434. Were they running for some time before? Yes; some short time before.
1435. Do any of your men get leaded? I have never personally known of a case.
1436. If a man desires to leave his work, does he state the reason? Not to me. No one has done so yet.
1437. If a man became leaded, and was obliged to give up work, or fell ill of a fever, or any other disease, and was obliged to leave, you would only know that he had left his work? Of course he would have full right to let me know, but I have never had any case brought before me by any man personally.
1438. Do you wish us to understand that your personal knowledge does not enable you to say whether or not your miners do get leaded? Yes? I have never had a case of lead poisoning brought before me—that is, of one of our men—since I have been at the mine.

1439.

Mr. C. C. Morgan. 1 July, 1892.

1439. Do you take any precautions against leading? Yes; we do take every possible precaution; for instance, we take very great care in regard to ventilation. We also take great care in regard to keeping our faces sprinkled, so that the dust shall not fly around. Of course, as you doubtless know, there is great trouble in getting men to be strict in the observance of cleanliness. We always impress upon our men the necessity of changing their things when they go home, and especially warn them against sleeping in the garments they have worn all day; because, as they perspire freely, the dust will enter the system through the pores of the skin. I have had a great deal of experience in lead mines during the past twenty years; and have found the main thing, as well as the great difficulty, is to get the men to keep themselves clean, and change their clothes regularly. I may say, Mr. Chairman, that since I saw you at the mine, I have had a rather severe attack of rheumatism, and I was afraid that I would not be able to attend to give evidence personally, so I wrote out a statement of what I consider worthy of attention in regard to the conditions of work, &c., and with your permission I will make that statement here now.

1440. If you please? In the first place, with regard to the lead fumes, the smoke from the smelting furnaces consists of the gaseous products derived from the combustion of the fuel, and the oxidation of the ore, the nitrogen of the atmospheric air which supports combustion with more or less of free oxygen or of lead, or certain compounds of lead partly sublimed, *i.e.* brought into a state of vapour by heat, and when cooled changed to a solid state, and partly carried off in mechanical suspension. The contact of these lead vapours with atmospheric action, causes immediate sublimation, and what is generally known here as flue-dust, is so formed. Now, this flue-dust, which is formed immediately the vapour leaves the furnace, contains, as you all know, a very high percentage of lead. The weight of lead is so well known, that it requires no scientific calculation to consider, even in the event of the highest wind, that the actual flue-dust must settle, owing to its well-known gravity, within a maximum distance of 500 yards from the stack it is emitted from. The so-called fumes or smoke that escapes, is therefore chiefly derived from the carbon consumed; the pungent smell is mainly due to sulphurous acid and gases, such as is caused by consumption of ordinary coal, or any other carbon, and unpleasant as the smell is, it is in nowise injurious to human beings, although it unquestionably affects vegetation. There is no manufacturing town in the world free from it, and people who choose to reside in manufacturing towns, know they will have its unpleasant odour to put up with. The long horizontal chimney or flue that this "fluedust" has to pass through, the length of same at the British being 135 feet, and the vertical stack 125 feet high, it has to ascend before it can escape into the open air; and, taking into consideration that sublimation commences immed ately it enters the flue, has 260 feet to pass through; and also that it being a commercial product, as a matter of course every precaution is taken to save as much as possible of it, so that by having these long horizontal and vertical stacks, what escapes beyond this 500 yards radius is so finite that I can positively assert that in no smelting district of the world has anybody ever been injured by the smoke, living outside of the maximum circle. It is a well-known and acknowledged fact, that here at Broken Hill nearly every ailment is put down to "lead poisoning," and the argument—"well, it is either lead or arsenic"—is being constantly heard. To prove the absurdity of this, I will now give the result of the analysis made—1st, of the general average taken from our smelting floor for twelve days,—24th May to 11th June—of our "British" lead ore, produced from our daily sample, taken for assay and analysis of the ore we are smelting.

Daily assay result, and arsenic determination of our carbonate ore, taken from smelter floor.

May 24th, lead, 35 per cent.; arsenic, trace.
,, 25th, lead, 34 per cent.; arsenic, minute trace.
,, 26th, lead, 32 per cent.; arsenic, trace.
,, 27th, lead, 33 per cent.; arsenic, trace.
,, 28th, lead, 38 per cent.; arsenic, 0·025 per cent.
,, 30th, lead, 29 per cent.; arsenic, trace.
,, 31st, lead 33 per cent.; arsenic, trace.

June 1st, lead, 32 per cent.; arsenic, trace.
,, 3rd, lead, 30 per cent.; arsenic, trace.
,, 4th, lead 35 per cent.; arsenic, 0·018 per cent.
,, 7th, lead, 35 per cent.; arsenic, 0·018 per cent.
,, 11th, lead 28 per cent.; arsenic, 0·015 per cent.

Full analysis of the ore.

Lead, 36·2 per cent.

Lead oxide	39·18 per cent.
Silica	41·70 ,,
Iron oxide	7·25 ,,
Manganese oxide	1·33 ,,
Alumina	0·49 ,,
Copper oxide	0·20 ,,
Zinc oxide	1·40 ,,
Magnesia	traces.
Lime	trace.
Arsenic	0·018 ,,
Carbonic acid	7·74 ,,
Silver	
	99.308

Secondly—Of careful analyses made of the flue-dust taken from the flue, resulting as follows:—

No. 1 sample—lead, 38·0 per cent.; arsenic, trace.
No. 2 sample—lead 38·0 per cent.; arsenic, 0·08 per cent.

By these analyses, the Commissioners will see how impossible it would be for this small amount of arsenic to have an injurious effect upon health. On the contrary, the medical experts, who I hear are to come before the Commissioners, will assure them that such a finite amount of arsenic could only act—if it could possibly act at all—as a light tonic, and could by no possible means be injurious to health.

Lead in the mine.—In the British Mine, every face in every floor is kept moist and sprinkled, and in my connection, so far with the mine, since the early part of the month of February, I have not yet heard of a man being injured by lead effects. It must be remembered that in consequence of the porous state of the carbonate ore, certain gases are confined naturally in it. Carbonic acid gas, for instance, in more or less volume. If an unusually large volume is freed, it sometimes acts as a narcotic, causing asphyxia and unconsciousness. I myself, in America, have more than once been rendered unconscious by inhaling irrespirable gases, and carbonic acid gas is so dense and heavy that it can be bottled, and not only bottled, but poured from one bottle to another. Then again, the nitric and other fumes and gases caused by the explosives used are more or less unhealthy, but the great cause of all illness is lack of cleanliness. I am sorry to say that in my experience of over twenty years, I have not found miners to use the precaution so needed, to keep their bodies clean. If the men would only give themselves a good washing, from top

to

Mr. C. C. Morgan. 1 July, 1892.

to toe, with soap and water, and get out of their mining togs as soon as they got home, there would rarely be a case of lead-poisoning known. Many of our men do this—you can almost pick them out by their healthy appearance; but many do not, they get the dirt off their hands and face and that is about all the washing they do from January to December; they keep their same clothes on, and some of them sleep in the same shirts they have used underground. Only recently my esteemed and honoured friend, the Catholic priest, of this district, has told me how often he had begged men working in the mines to pay more attention to cleanliness. It is a well known fact, that some men are far more susceptible to foul gases and fumes, than others. Many of our men in the British have worked in lead-faces since the mine started, now some four years ago, and I claim that, as a rule, a healthier lot of miners can rarely be seen anywhere in the world. Now, it must be remembered that working underground in more or less close atmosphere makes one perspire freely, and that all the pores of the skin are thus thrown wide open. These pores as a matter of fact absorb far more lead and take it directly into the system, than inhalation does; that which is inhaled passes into the stomach and is thrown off to a great extent by nature, whilst that which gets into the pores, if not carefully washed out, gradually works its way into the system. If miners would, therefore, take my advice and change their clothes as soon as they get off shift, especially their shirts, and under clothes, they would do far more towards abating lead poison, than this honorable Commission can ever dream of doing. By keeping as good ventilation as possible in the mines for gases to escape by, and by having a bountiful supply of water (which the British has always done, notwithstanding the cost) to sprinkle the faces and floors with; we are doing everything in our power for the comfort and safety of our men, and anything that I was convinced would add to their comfort and safety, and I should be recommended to adopt, the miners can rest assured that our Directors would not, for one moment, hesitate to provide as soon as possible.

1440½. We are obliged to you for your statement, Mr. Morgan. There is only one question I will ask you upon it, that is as to the statement that the flue-dust must settle within 500 yards from the stack it is emitted from, on account of its specific gravity. I should like to ask you whether you made that statement as the result of your observation and experience? Yes; that is the result of observation and experience at Leadville, Colarado. We were rather anxious in regard to the matter, and from the tests made at Leadville it was proved conclusively that the amount of flue-dust beyond that region was inconsiderable. My opinion is that the flue-dust beyond that region is so freely dispersed through the atmosphere that it could have very little effect upon the human system.

1441. I should like now to refer to the first part of the evidence you gave, which rather gave me the impression that you were not aware that any of your men at the British mine had suffered from lead poisoning. You then pointed out that you took a good many precautions against lead poisoning by ventilation and sprinkling, and urging cleanliness upon the men. Are we to understand from that evidence, that you think without those precautions there would be danger of the men getting leaded? I think there should be as much ventilation as possible for the escape of the gases that are given off in mines, and especially carbonic acid gas. I think good ventilation is most necessary in heavy lead-faces, especially in carbonate ore.

1442. A precaution as against carbonic acid? Yes: against that principally.

1443. Not against lead? Not so much against lead. If you keep the dust down by sprinkling you will get little lead, I think.

1444. Then I repeat the question, you think but for precautions of this kind your men would run the risk of getting leaded? Yes.

1445. But you do not mean to say that you think your mine is an especially leady mine? No. Those are the precautions taken in America; and I may say the manager of the British before my time thought such precautions necessary, and I quite agree with him.

1446. You lay great stress upon the point of personal cleanliness of the men? Yes.

1447. But under the conditions of this town you know it is very often difficult for the men to get the conveniences for washing, or even the water itself for washing in the ordinary way; probably they cannot afford to do it? I do not mean necessarily to take a bath frequently, but at least to sponge themselves down. What I consider the main danger is sleeping in the clothes they have been sweating in all day; a great many of them do that. I am speaking from hearsay, of course, but I have made enquiries, and I am positively assured they do.

1448. Do you provide a changing-house for the men on your mine? Yes.

1449. Do they use it? Well, they generally change underground. They take their upper garments off underground—they prefer it. They say they catch cold unless they have a jacket or something else on when going up.

1450. Can you describe your changing-house? It is a wood and iron building at the back of the shaft.

1451. It is quite true that the men who work underground do feel cold when they come to the surface, is it not? Yes; that is what they say. They would rather take their things down, and put them on when they are coming up.

1452. I suppose if they had a changing-room warmed by a waste steam-pipe running through it, they would be more likely to take advantage of it. You do not, I suppose, yourself recommend that their outer clothes should be hung up in the stopes, underground? Well, it certainly would be best if they kept their outer clothing away.

1453. What provision at the mine do you make for helping the men to carry out these rules of cleanliness which you think are of the first importance—what provision, for instance, have they for washing? We have no washing-place at the British. The fact of the matter is, directly the men reach the surface they rush away to their homes as fast as they can. I do not think they would use a convenience of that kind if they had it. Nor should I advise them to wash at the mine, because they ought not to put on their lead clothes again afterwards.

1454. That is what I have in mind. Of course, if every man could have a nice bath in his cottage, and have it suitably warmed in winter, I think I should recommend that he washed at home. But we know, as a matter of fact, that the majority of the men cannot make that provision for themselves; and therefore, it occurs to me, if cleanliness is of such importance, that the mine-owners might reasonably do something to provide for it. If, for instance, they provided warm baths—which might easily be done, with plenty of waste steam—perhaps there would be a considerable proportion who would not rush away from the mine as soon as they reached the surface; what do you think upon that? Well, I think we might

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try it; but I did not mean that it was necessary for the men to take hot baths regularly. I think if they sponged themselves down on leaving their work it would be all that would be required.

1455. But you know, perhaps, that in some lead works it is considered necessary, and the men not only take hot baths provided for them, but also medicated baths? I know it is frequently done in America; that is, that baths are provided for the men.

1456. Can you cause us to be furnished with the names of any men who have worked in the lead faces of your mine for long periods without having suffered? I will.

1457. You have had a great deal of experience in lead works;—can you tell us of any general precautions that you have noticed to be effectual against leading; do you know anything of the use of milk as a preventive, for instance? I do. I was in charge of a mine in Utah for some time, which contained a very poisonous kind of carbonate ore, and we found unquestionably that milk was a great benefit. But I must tell you there was a great deal more arsenic in that ore than in our ores here. We bought cows on the recommendation of a medical man for the purpose of supplying the milk; we found it a great benefit.

1458. I suppose you did not find it an absolute safeguard? All I can tell you is this: When first we got our cows there we experienced great difficulty in getting the men to take the milk, and we made it compulsory. We said to them, "If you do not drink the milk you cannot work here." They used to have two or three drinks a day. Formerly we sent a great many men to the hospital, suffering from lead and arsenic; but after that it was a rare thing to send one to the hospital.

1459. Did you cause any particular quantity of milk to be taken, and make a rule of it? No. Simply, a man would drink a glass at each meal, having three meals a day, and after that they got to like it. They would generally drink about a pint at a meal.

1460. Did you make it a point that they should have their milk before beginning the work of the day? They had milk at breakfast.

1461. And they did no work before breakfast? No.

1462. Was it all day work there? No; there were three shifts. The mine was some distance from the town, and we had our own boardinghouse there. So that at all their meals when they came off the night or afternoon shift they had their milk. Supper was provided at midnight.

1463. Then in cases where men are likely to get leaded it is to the interests of the proprietors to do what they can to prevent that? Yes. I am sure they would be only too glad to. I know our company would be.

1464. *Mr. Howell.*] You were employed in other lead mines in different portions of America before you came here? Yes; in Utah, Nevada, and Colorado.

1465. Generally, what was the character of the ores you were employed on? Principally carbonate ores.

1466. Was it a dry sandy carbonate? Yes, in Utah especially.

1467. A good deal of hard carbonate? In the Flagstaff mine in Utah it was a yellow ochre, a very soft carbonate.

1468. From what you know of the mines here on the Hill, do you think they are as well ventilated, and that as many precautions are taken to avoid the effects of lead, as in the mines in other parts of the world you are acquainted with? The mines here are the best ventilated I have seen in all my experience. Of course, in deep mines, where the shafts are long inclines, and drives off them, it is almost impossible to get proper ventilation. They have artificial ventilation, which is very different from what we have here, with our series of shafts and winzes.

1469. Artificial ventilation in any form is not as good as natural ventilation? No; because you have a current of air with a natural ventilation.

1470. It is now about six months since you took charge of the British;—have any of the men left your furnaces to your knowledge from the effects of lead, during that time? No, not to my knowledge. I think I should have heard of it if they had. The bosses would have told me.

1471. Have you ever, in your experience, seen furnaces better constructed, or freer from lead fumes than the furnaces on the Barrier? No. They are tremendously ventilated; in fact almost too much; the men complain of the draughts.

1472. Have you ever seen any smoke coming up through the feed-floors of your furnaces? No. We have been very successful in that way; we have had no leakage, I mean.

1473. Have you draught sufficient to carry off the fumes and prevent any from coming out of the throats of your furnaces? Oh, yes. I may say that in the British the average class of our ore being of a low grade, we are not so anxious to save a large percentage of lead. We lose a good deal of lead in the smelters, and find we get through a much larger amount of lead in that way; and, moreover, our blast is as heavy as we can possibly get it. We lose it in the slag. Our slag itself gives us the return of lead that we lose. It contains very often as much as 9 and 10 per cent. of lead.

1474. Then can you suggest anything that would improve the working of the furnaces, or prevent any more dust or fumes coming out? No. I may say we are very careful to keep the ore on the smelter-floor well damped.

1475. The British ores are dry, are they not? Yes; and for that reason we take particular care.

1476. You are working altogether past the 200-ft. level? Yes.

1477. *Mr. Hamlet.*] You have told us the different kind of ores you have to deal with;—do you find any arsenical ore—mimetite? No, very little. Strictly speaking, I have not seen any in the British.

1478. Do you find antimonial ores? No.

1479. The smelting process at your mine is the same as at the other mines here, I suppose? Well, I can hardly say that. The only difference, I think, perhaps, is that we smelt with a heavier blast. I think our slag contains more lead than most of the others.

1480. Have you any roasting process? No.

1481. What happens in the roasting process, with regard to noxious fumes? Of course we should have a good deal of sulphuric acid escape from the sulphur in our ore. You mean, I suppose, in roasting the sulphide ores?

1482. Yes? Of course we should free the sulphur to some extent, and get the sulphur fumes.

1483. Have you ascertained the velocity of the fumes in the flue chamber, and what is the diameter of your stack? I can get you that afterwards. I would rather give such information exactly.

1484–5. I should like you to get the diameter of the stack, at top and bottom, and the sectional area of the flues. What provision is made for condensing the fumes? Simply long flues, or stacks.

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1486. The object of lengthy flues is to collect and put to use what would otherwise be a nuisance? Yes.
1487. And you save the flue-dust, so that it serves two objects? Yes.
1488. How are the fumes generally dealt with in lead works? Well, our stacks here are the highest I have ever worked with. I have never worked in lead works in England at all. There, I believe, they have simply lengthened flues.
1489. And in Germany they have flues miles in length—is that not so? Yes, I think so, but I have never seen them in Germany.
1490. I understand you have had considerable experience in Leadville, in America. What condensers have they there? Do you mean smoke condensers?
1491. Fume condensers? I do not think they go in for condensing there at all.
1492. Are you not aware that Mr. Guyard, for the United States Government, has been specially engaged examining the question of lead fumes, at Leadville? No. I have not been there for the last few years.
1493. Would you agree with Mr. Guyard's conclusion that the quantity of lead lost in the atmosphere is sensibly twice as large as the quantity of lead got in the dust chambers? Well, I do not think I would. It is very hard to calculate. I do not know what they are doing at Leadville to-day in that direction. But I know that things were done there in a very crude way at first for some time. Instead of flues the same as we have here, they have a straight stack going directly from the surface through the roof of the house about 25 feet high. Then there is usually what they call a downcast flue, conical shaped, and looking like a funnel, which is put into the stack above the roof of the building, and it is made in such a way that there is a back current of air passing through this funnel, the stack being wide at that particular part. The dust spreads when it comes out, and a portion of it falls to the bottom. The stack is only 25 feet high, and as a rule showers of dust go over the town close to it. There is only one case that I know in which the flue and stack are connected as we have here, and that is at Selby's works. That is the method followed in all the mining districts throughout the mining districts of Nevada, and Utah, and what I saw in Colorado.
1494. *Mr. Howell.*] Have they got condensers at the Richmond works, Eureka? No; nothing but what I have described. Their works are situated at the base of a high hill. They run an underground flue, about 6 feet by 8 feet, up to the top of the hill, an incline of about 70 degrees, and at the top of that is the stack. Their neighbors, the Eureka Consolidated, run four or five furnaces with only the stack, and as a result of this peculiar system of working, after they had run about five or six years, the lead had accumulated to such an extent on the ground that it became a commercial commodity. There were hundreds of thousands of tons, and it was sent to San Francisco for treatment. The works were right under the town.
1495. *Mr. Hamlet.*] Are you acquainted with the Bartlett smelter system? Yes. I know Mr. Bartlett personally.
1496. Is that an effective means of condensing fumes? That is a matter of opinion. I saw him about a year and a half ago, and at that time he did not consider his process was complete at all. He was making many changes. So I can hardly answer that.
1496½. Do you know of the existence of any water condensers? Yes; I have seen them in operation.
1497. Have you heard whether they are successful? It is claimed that they are. I should judge that they would be pretty fair settlers.
1498. Which in your opinion would be the most effective method of preventing the fumes? I rather like the wet process myself.
1499. Do you think it likely that a man would become leaded through raking out the flue-dust? Well, I do not know that the chance of leading at that work is especially great, because a man is employed to thoroughly saturate the dust with water from a hose, and it comes out as mud from our flues.
1500. Can you satisfactorily account for all the lead that passes into your furnaces? Yes; we do account for it all.
1501. To within what percentage, including the slag and the flue-dust? Well, if you want me to go into that I should prefer to make the calculation properly for you. It would be far more satisfactory to have it exact.
1502. Of course, it is a well-known fact that silver and lead are volatile at the high temperature of your furnaces? Yes.
1503. And you think the lead is condensed in your flue and stack? Yes, the main part of it.
1504. Do you also recognise that lead is more volatile at a higher altitude, than at a lower one? I do, most certainly.
1505. Do you agree with this as an authority on lead condensation: "In the flue-gases, lead and other metallic substances are suspended together with the products of combustion from the furnaces: this is termed the flue-dust. The longer the flue the more the dust is collected; if, however, the draught be too strong, then the dust becomes imperfectly deposited, and may be carried up through the stack into the atmosphere"? Well, I do not quite understand that. Of course, sublimation starts immediately the atmospheric connection is struck—immediately it enters the flue. I suppose you could get such a tremendous draught that you would blow the whole thing up. You have to regulate your draught to a certain extent.
1506. But the substance you speak of as being sublimated is the lead oxide? Yes.
1507. And that is exceedingly volatile? Yes; it is very volatile.
1508. So that with increased draught it would be possible for the lead oxide to escape? Yes.
1509. I think you have given the quantity of arsenic in the flue-dust? I have.
1510. And with regard to the gases relieved from nitro-glycerine and dynamite in the stopes, have you, in your experience met with men who have suffered from that? Yes, I have; but not here. It generally happens in long, tight drives, and long cross-cuts.
1511. *Mr. Sleath.*] In regard to gases, do you think cleanliness would prevent poisonous gases taking effect upon the men? No; I should say not. I was speaking more particularly of the lead getting into the system through the pores of the skin.
1512. On that account it is admitted that lead-poisoning does take place? I think there is no question that fine lead-dust is more or less injurious to one's health; but what I claim is that more are affected by the lead-dust through the pores of the skin than there are by inhalation through the stomach.
1513. Just so. And do you think the men, as a rule, are careless with regard to cleanliness? I think a great

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great many of them are very careless. I do not say they all are. But I think the men who wash themselves thoroughly—that is, make a habit of it—are the healthiest men we have.
1514. Do you consider the cost of erecting baths on the mine would be excessive? No; I do not. I may say in Virginia City we had large swimming and plunge-baths for the men.
1515. In America is it customary to make any provision for baths on the mines? It is very often done in the large mines in America.
1516. You are of opinion that water-sprinkling underground is a beneficial measure? Yes; I think, as a means of keeping the dust down, it is of great benefit.
1517. In regard to sprinkling underground, what arrangements do you make in the British Mine? We carry a water-pipe to the top floor, and attach a hose to it.
1518. Let us understand, please; do you bring the water from the surface, carry the pipes along the different drives, and then again up to the different stopes? Yes.
1519. And at each floor you have connections with a hose? Yes; and the men have strict orders to keep the faces well sprinkled—in fact, if they do not, the bosses have orders to draw attention to it.
1520. In your opinion, does sprinkling improve the ventilation? Yes; to a great extend it would.
1521. The water would force the hot gas up? Yes.
1522. Do you use any air-fans in your mines? We do in places; but only very rarely. We try to get the natural air circulation to every place. We have air-pipes in all our workings; but it is mostly in cross-cuts, and when we are driving these we use means to force the air in. At the present time there is only one place where we are driving a cross-cut.
1523. But you have the air-pipes there in case they are required? Yes; in case of a stoppage, or anything of that kind.
1524. How many shafts have you got in the British altogether? There are nine air-shafts.
1525. And you are quite satisfied that the provisions made for ventilation in the British are quite complete? Yes; the mine is as well ventilated as it can possibly be.

[The witness withdrew.]

Mr. J. R. M'Kay called and examined:—

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1526. *Chairman.*] What appointment do you hold, Mr. M'Kay? I am acting manager of the South Broken Hill Mining Company, Ld.
1527. You are acquainted probably with the conditions of work both underground and on the surface? Yes.
1528. How long have you been at the mine? Three years.
1529. We asked you to be good enough to draw up a statement for the information of the Board;—have you done so? I have drawn up a statement. I did not exactly know in what form you wanted it.
1530. What we wanted was the average number of workers in each department, and the quantity of ore raised, &c.? Yes; I have it here. [*Statement handed in. See Appendix.*]
1531. There were only about fifty men employed at your mine during the early part of 1890? Yes.
1532. But by the end of the year the number increased until about 130 men were employed? Yes; for the year 1890 that was.
1533. And during the year 1891, did the number increase to 300? Yes.
1534. In August, 1891, the number had further increased to 400? Yes.
1535. And what are the approximate numbers employed in each department at the present time? Practically, the same as in the latter part of 1891. The figures are—miners, 205; truckers, 55; platmen, 12; smelters, 86; ordinary surface men, 42.
1536. What class of work do the surface hands represent? They include blacksmiths, surface labourers, and mechanics.
1537. The ores broken from various parts of the mine are of similar character to those of the other mines, consisting of carbonate, oxidised and sulphide ores? Yes.
1538. Is the carbonate generally of a massive nature, breaking freely in blasting, with comparatively little dust? Yes; the carbonate face is very solid.
1539. Do the average contents of silver and lead vary considerably, namely, from about 10 to 40 per cent. lead, and from 15 to 50 oz. silver? Yes.
1540. You do not include the sulphide average in that statement? No; not in that.
1541. Can we obtain the quantity of ore raised from the half-yearly report? Yes. At the end of that year. I may mention that the ores were sent to Dry Creek for treatment, and all the results were sent to Melbourne, they have the figures there now.
1542. How many smelters have you in work now? We have three on at the present time. The third was started last Saturday.
1543. Then until now have you had only two at work? Yes.
1544. Can you tell us whether your men do ever become leaded? From what we can learn our mine is very free from lead. The miners prefer the South to almost any other large mine on the field.
1545. Still, I suppose, you do not mean to say that your men do not suffer at all, since you say you have between 10 and 40 per cent. of lead in the ores you are working? Well, we never have these matters brought before us in the office; but from examining the books in the mine, we find very few men indeed lose any time.
1546. When a man is laid off from sickness, do you record the nature of the complaint? No.
1547. Do you make a note of the fact that a man is sick? Yes; that is noted in the books.
1548. How many young people do you employ, of, say, 14 years of age or under? On the whole of the mine, I think, we have about five boys, and they are all employed on the surface.
1549. What do they do? Run messages, and that kind of thing. They are not engaged in ordinary labour at all.
1550. Have you any boys employed in ore-picking? No.
1551. And you never did? No.
1552. Then, in point of fact, what you would wish us to understand, I suppose, is that you have never had any occasion to turn your attention to such measures as are usually taken against leading? No, we have not.

1553. May I ask if you have been employed on other lead or lead-silver mines? Not on silver-mines. I have been engaged in copper-mines.
1554. So that you have no general information about leading? No.
1555. Do you care to express a personal opinion, as to whether upon the whole, lead is a cause of much illness among the miners, as a body, on this field? I think that would be more a matter for a medical man to speak upon. We have not got the information to go upon. We know, of course, that cases of lead poisoning do occur.
1556. Do you say that work was never impeded from that cause? No; not with us. I cannot speak regarding any other mine whatever.
1557. Do you consider your mine well ventilated, Mr. M'Kay? I consider it very well ventilated on the whole.
1558. What means do you adopt for ventilation? Just the ordinary connections between the various levels by means of winzes and rises.
1559. And from the character of the ore, do you think that it is a good thing to have the face regularly sprinkled? That depends upon the character of the ore—speaking generally. The ore in the South Mine is dense and damp, and breaks with comparatively little dust, and there is not the necessity for it.
1560. And what measures do you take to abate, as far as possible, the fumes coming from the blast-furnaces? Well, we have never taken any measures at all, but just allow the fumes to pass off as they come from the flues. We have never had any complaints of the fumes from the furnaces.
1561. What is the total length of your flues from the blast-furnaces to the stack? No great length. The iron flue itself would be about 15 feet, or 16 feet long, and that leads directly into the stack-flue.
1562. Is the stack-flue of any length? It runs the whole length of the shed.
1563. Can you give us that length? I can furnish you with it later on.
1564. The total distance the fumes have to travel from the furnace to the base of the stack, and the height of the stack? The height of the stack is 130 feet.
1565. And do you consider these precautions are ample as regards the fumes? Of course a certain quantity of the fumes is bound to escape even after all that.
1566. *Mr. Hamlet.*] Do you know whether there are any ores in your mine which contain arsenic? There is a little arsenic in some of them.
1567. What would be the mineral chiefly? In our case it is in the sulphides.
1568. In the sulphide ores? Yes.
1569. What is the quantity of lead in the flue-dust from your furnaces? About 20 per cent.
1570. And it is to your interest to collect as much as possible of that? Yes. We do collect it. It is not allowed to accumulate in the flues at all.
1571. It would impede the draught? Yes; we have a man specially employed keeping the flues clear—he does nothing else.
1572. You keep a man constantly on that work? Yes.
1573. What precaution do you adopt to prevent him inhaling the flue-dust? He has the use of a water-hose there, and as the dust comes from the escape doors, the water is mixed with it till it becomes of the consistency of mud.
1574. Has this man ever complained of lead poisoning? No. He has not been away from his work since he has been on the job, and that is five or six months—not from that cause at least; he was away from other causes.
1575. In an ordinary blast-furnace, if the furnace is running properly, would there be any escape of fumes from the throat of the furnace? No; there should not be. You would get the fumes if the stack or flue was not drawing freely.
1576. Or if the furnace was under repair I suppose? Yes.
1577. And about what is the length of life of one of your furnaces? From eight to fifteen weeks.
1578. So that repairs would be necessary about every eight or fifteen weeks? Yes. To give them fair play at all they should be repaired every eight or nine weeks. It does not do them any good to run them longer.
1579. At the time of shutting down or making repairs to your blast-furnaces have you had any unusual complaints from the men? No; none whatever.
1580. And have you ever had complaints from the men on the charge-floor? No.
1581. Have you a knowledge of any method of condensing in any other parts of the world? Not personally. Before we had all reverbatory-furnace work.
1582. Do you consider if you had a greater draught than was necessary that it would be possible to convey the lead fumes outside the stack? With the blast-gauges, the man in charge is not allowed to run the engine above a certain speed. We have a gauge for each furnace, and one in the engine-room. The air-pipes are so arranged that the blast is equal all over the furnace, and they judge of the speed by the pressure displayed in the gauge. Eight ounces of the mercury is the general working pressure.
1583. Have you ever exceeded the 8 ounces? No; it does not pay.
1584. Because you would be blowing away silver and lead? Yes.
1585. Have you ever ascertained the velocity of the gases in the flues? No.
1586. You have not found it necessary? No.
1587. Will you give us the area of the flues when you give us particulars of the length—the sectional area I mean? Yes. I may say our main flue is much longer, considering the number of furnaces, than any of the others on the line. It was built for four furnaces, and until this last week there were only two running.
1588. Are there many sulphides used in your blast-furnaces? We use one-tenth in our charges.
1589. Have you any other than the ordinary blast-furnaces? No.
1590. Do you conduct any operations from which there would be much arsenical fume? No.
1591. You have no roasting? No; not any desulphurising operations.
1592. *Mr. Sleath.*] You said your lead ore is mostly massive in character? Yes.
1593. Do you consider massive lead ore would be more or less liable to raise dust, and thus cause lead poisoning than the soft, friable ore? The soft, friable ore would produce the most dust. If you put a shot into a solid face it would not cause half the dust.
1594. Do you think using the water for sprinkling in the stopes, not only lays the dust, but tends to improve the ventilation—makes the air purer? The very fact of reducing the dust would improve the ventilation. In the close places in the mine we can blow the smoke away with compressed air.

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1595. Have you any water-pipes underground? Not for the purpose of sprinkling.
1596. Have you got any air-pipes underground? We have air-pipes leading to the various faces in the mine, as they are required, to blow the dust and smoke away.
1597. But you have not got pipes for the express purpose of ventilation, have you? Well, we have had them in places where there was no chance of ventilation otherwise.
1598. I suppose a man might become leaded in your mine without you knowing anything about it? Well if a man were away for any length of time we would be apt to inquire; if he were away only for a couple of days we would make no inquiry at all.
1599. Is your ore body all of a similar character, or have you some which contain less lead than others? Our dry oxidised ore contains little or no lead.
1600. I suppose the men are not always kept at the lead faces—they are changed occasionally? Yes.
1601. *Chairman.*] Are they changed systematically? You cannot always regulate it; sometimes a man may be longer on the lead than at other times.
1602. *Mr. Sleath.*] Do you always make an effort to give them a change, as far as possible, to avoid all risk? Yes.
1603. In case a man is leaded do you give his case any particular consideration? In what way do you mean?
1604. Supposing any of your men left through the effects of lead-poisoning, would you give them an opportunity of resuming work when they came back to the mine? If such had been the case we would have done that, certainly. Whenever a man gets ill in the service of the company and has to go away for the benefit of his health we always make a point of taking him back if he is anxious to come.
1605. And if a man who had been working underground was laid off through lead-poisoning would you give him the opportunity of doing some other kind of work if you had it? Yes; we have done that before, even in cases where, perhaps, the man had not contracted the sickness with us. If he had been working with us when he laid off we would give him the chance of working at some other job when he came on again.
1606. What sort of a changing-house have you got? It is a stone building.
1607. Have you any idea of the dimensions? About 15 feet by 20 feet.
1608. Is there any accommodation for the men in the changing-house, such as seats, for instance? Yes, there are seats, and nails all round the walls for them to hang their clothes on. There is also a place for them to wash.
1609. You have accommodation for them to wash? Yes.
1610. In the shape of a water basin? Yes.
1611. Is the water laid on? No; but there is a tank close by. I would not say, however, that they always use it.
1612. I was about to ask you, is it taken advantage of—do many of the men use it do you think? Some of the men use it, but I should say that the majority of the miners do not use it.
1613. Are you sure that they all know of it being there? They ought to know it.
1614. You do not know that any of them think it is specially reserved for the shiftmen? They could not become imbued with that idea, because the place is always open for them to go into.
1615. Can you tell us as an actual fact that anyone outside the shiftmen ever make use of it? I cannot.
1616. Do you think it would prevent lead-poisoning to a great extent if, on all the mines, provision were made for the men to have a thorough wash on leaving their work? It would undoubtedly be better for their general health if such opportunities were provided; but as to whether it would prevent lead-poisoning is another matter.
1617. Would it involve much expense to the companies to provide such accommodation? I do not think the expense would be very great, provided they had the water; but the question is whether the employees would use it; they are generally in a great hurry to get home.

[The witness withdrew.]

Mr. B. B. Hoddinott called and examined:—

Mr. B. B. Hoddinott. 1 July, 1892.

1618. Are you secretary to the Broken Hill Lodge No. 65, I.O.O.F.? Yes.
1619. When was the Lodge established? In October, 1888.
1620. You have been good enough to furnish the Board with a statement of the number of members you had in 1890, in 1891, and the present total enrolment; and you have also mentioned the number of members of your society who have received sick pay on account of leading in 1890, 1891, and 1892, and the number of days that each of those members was laid off from that cause. Can you tell us, in relation to that, how many of your members are engaged in or about the mines? I have no means of telling that, because a man may join the society and put his occupation down as a miner, and may not work in the mines after that another week.
1621. Some of the other secretaries have furnished us with a statement showing the number of their members who were miners. Does what you have said just now apply to all such records—that a man may enrol as a miner and may soon after cease to be a miner? I should take it to be so; and also those who register themselves as following other trades may possibly become miners afterwards.
1622. How long have you been a resident of Broken Hill? A little over four years.
1623. Is it your opinion that lead causes a serious amount of illness—that is, serious in point of the numbers attacked—among the persons engaged at the mines? I should judge that lead causes more sickness in the district than any other single disease.
1624. But whether it causes a larger proportion of miners to be ill than a corresponding number of the general population you have no means of judging? No; but there is just one thing I may say. Our report, which we send in from the books, does not necessarily show the full extent of lead-poisoning amongst our members, because there are so many members who get leaded and do not declare on the funds, and therefore we have no official information on that head.
1625. Still, we take it that a man who begins to suffer from lead-poisoning will not suffer very long without having to lay off—is that not so? Well, yes, I suppose that would be the case.

[The witness withdrew.]

Mr.

Mr. W. Curgenven called and examined :—

Mr. W. Curgenven. 1 July, 1892.

1626. *Chairman.*] What is your occupation? I am a miner.
1627. Have you worked in mines containing lead anywhere else than on this field? No; I have only worked here.
1628. Where did you begin to work here? At the big mine—the Proprietary.
1629. When was that? At the first starting of the mine—about seven years ago. I was working in the shaft.
1630. How long have you lived in the neighbourhood? During the seven years. I only went down when I was laid up with my hand.
1631. How long did you continue to work in the big mine before your first spell? About two years.
1632. What class of ore were you getting? I was on the lead, working down to the 216 level, and from there upwards.
1633. In which shaft was that? McCulloch's, principally.
1634. Did you work there for two years without getting leaded? Well, I felt it coming on; but they shifted us from one place to another. At the end of the two years, Mr. Wilson came there, and he started contracts, and the men then had to stay in the lead face. There were six of us in the lead face, and only one escaped—in fact, I believe he was bad, although he said he was not.
1635. The six were on the same contract? Yes.
1636. Are you of opinion, if the original system of changing had been continued, that you would not then have suffered? Yes; at least I think if the system of changing had gone on, we should not have been so bad. But as I have said there was no changing on this contract work at the time.
1637. Up to the time you began to take contracts, was there not any changing to and from the lead stopes? No; there was no shifting.
1638. But you mentioned shifting just now? Well, I was in Jamieson's, and had a contract there; and I was in McCulloch's, and had a contract there. That is what I called shifting; but after I got leaded, we shifted about—a fortnight in the lead, and a fortnight in the ironstone.
1639. During that two years, was all the work done by contract? No.
1640. Were you doing the work by contract all the time? No; we were doing day work sometimes.
1641. We will pass over these two years. Tell me how long you stayed away, when you laid off from the effects of lead? The first time I was away four weeks.
1642. Then did you go back to work? Yes; I worked three or four shifts, and then had to go home again. I was home eight or ten weeks, and never did anything. I was very bad.
1643. What sort of attack had you—was it colic? I had pains across the chest, pains in the bowels, and weakness in the legs.
1644. Were your arms not affected at that time? No; not at that time.
1645. You had no fits? No.
1646. Well, after this last spell of a few weeks, did you go back to work again? No; I left then, and went to work at the outside mines. The doctor said it would not do to work at the lead again, that if I did, I should be as bad as ever in a few days.
1647. Is there no lead in the outside mines? No.
1648. Then did you come in again? Yes; and I worked in the British.
1649. In what year was that? A little over two years ago.
1650. That was in 1889 or 1890? Yes.
1651. And how long did you work there? About seven or eight, or nine months.
1652. Was there any system of shifting you from one working place to another in that mine? No; there was not much difference there.
1653. At the end of the nine months did you get leaded again? Yes; I had to go away from there again. In fact, I was leaded twice there.
1654. Did you experience the same symptoms on the second occasion? Yes; it used to take me in the chest, and the pains would go right through me. I was completely bound up for a fortnight.
1655. Well, did you go back again after that attack? Yes; I stopped a few weeks; then I found it was coming on me again, and went home. I remained home for some time; then I went to the Junction, and that is where I finished.
1656. Did you get more lead then? I do not think it was lead altogether. I think it was the gas there mostly. You can see by my hands what the lead has done for me. [*The witness showed that he was suffering from paralysis of the extensor muscles.*] It is about twelve months ago since I first began to feel it in my hands like this, and for the last nine months my hands were bent so that I could not get a cup of tea to my mouth.
1657. Your statement amounts to this: that you became leaded towards the end of the first two years you have spoken of? Yes. I may say that there was no air going through the mine when I first worked there.
1658. It was ill-ventilated at that time? Yes.
1659. Then you had three or four attacks subsequently to that each time on going back to work, but it was not until the last attack that you got wrist-drop? Yes.
1660. Is the condition of the mine now much better than when you first went to work there? Yes; there is very much more air there now.
1661. Do you know whether any one mine is considered more dangerous or better than others to work in? Of course; there is a great deal of difference between some of the mines. There is Block 14, for instance, though I never worked there, or Block 11.
1662. At present do you mean to say that Block 14 and Block 11 are better than the other mines? Well, I cannot really say anything about them personally. I know what Block 10 and the Junction are. The lead is very damp in those mines.
1663. *Mr. Hamlet.*] Did you experience any headaches when you were working at the mine underground? Yes; when we have been firing the lithofracteur.
1664. Did you suffer from thirst much? Yes; you require to drink a good deal of water or tea while at work there.
1665. About how much do you carry down with you? About a quart.
1666. Do you find that enough, as a rule? Sometimes it was, and sometimes not.

Mr. W. Curgenven. 1 July, 1892.

1667. When you were at work on the lead had they any means of damping the stopes or sprinkling the face with water? No; they had nothing of the kind at all.
1668. And your opinion is, the air was very bad there? In places it was. Some places were worse than others; but, taking it altogether, the Junction is not very bad. Of course, when we fired a shot there would be a great smell arising from the gas, and the candle would die away for a time.
1669. In your experience as a miner have you ever found, on striking your pick into the face, any outrush of foul gas? I have found a little of that in the Junction at places, and I have seen it in the Big mine near Block 10.
1670. Had it any effect on the candles? Just for a little while, especially if the candles were down low.
1671. You would notice your candle go dim if you held it (say) 8 inches from the floor? I have noticed it go dim many times, but have never noticed whether it was at the bottom or not.
1672. In consequence of your hands being in the state you have shown us, are you unable to work? I cannot do heavy work; I cannot lift my arm up high enough to do that class of work; I cannot get a good grip of anything, but I daresay I could do light jobs.
1673. Do you think you will ever be able to wield a pick again? I do not think I shall be able to work in the face again, because the strength has all gone out of my upper arm.
1674. *Mr. Sleath.*] You say you were working contract when you got leaded first? Yes.
1675. Then do you think that by working contract men are more liable to get leaded than when they are working for a wage? Of course he is; because when a man is working on contract he is all the time pegging away at the face.
1676. Have you seen water-pipes carried through the Proprietary Mine? No.
1677. Did you ever see the stopes or any part of the mine sprinkled with water;—that is, in the Proprietary? Not in the Proprietary.
1678. Have you seen it done in any of the mines? Yes; I have seen it in the British.
1679. You have not seen it in any other? No; in the British they used to water it about once a week.
1680. Do you think, as a practical miner, that sprinkling the stopes and drives would tend to prevent lead-poisoning? It would keep the dust down, certainly; but I would not advise that it should be put near the timber.
1681. Why not? Because it causes a foul smell to come out from the timber.
1682. You think the water does that? Yes. I have noticed it myself, when I was working there, when the water was put on to it the effect was enough to knock you backwards.
1683. Did you ever see a changing-house in the Proprietary? No.
1684. At the British? None at all.
1685. Was there a changing-house at the Junction? No; if they changed at all it would be in a little bit of a shed round by the shaft.
1686. Did you ever see provision made for the men to wash on the surface of the mine? No.
1687. Do you think it would be beneficial if hot baths were provided, so that the men could have a wash on leaving their work? I should think so.
1688. Do you think the men would make use of it? Yes; I think they would if proper provision were made for them to change.
1689. Do you take precautions as to cleanliness;—are you careful to wash yourself, for instance? My word I am. My wife has washed my back many a time when I have gone home pretty well black.
1690. Have you ever known any one other than miners to suffer from what is called lead-poisoning? No; I never did.
1691. Have you ever applied for any lighter kind of work at the place where you had been engaged since you have been able to get about? Yes; I went up to Mr. Howell, and he told me that he had too many men suffering from the same complaint.
1692. Do you mean to state that he said he had too many men suffering from lead-poisoning? Yes; I do not mean to say that he referred to the condition of my hands altogether, but suffering in different ways from the lead.
1693. Anyhow, you did not get employment? No; not from him.
1694. How long have you been out of work now? I have worked only seven days during the last nine months
1695. What doctor attended you? Dr. Groves.
1696. *Chairman.*] You said that you began work here about seven years ago, more or less? Yes.
1697. You worked in the Proprietary Mine first, and you worked there two years? Yes.
1698. Have you worked there since? I worked there once since then.
1699. In what year, do you think? I can hardly say; I know I was away, and after coming back worked two or three months when I felt the effects of lead return and went away again.
1700. Was it two or three years ago? About that, I should say.
1701. Was it before you went to the Junction? Oh, yes; a long time before I went to the Junction.
1702. When you said there was no sprinkling done at the Proprietary, you meant, I suppose, at the date you worked there? Yes.
1703. You do not say there is no sprinkling there now? Oh, no.
1704. And what is the latest date you speak of with regard to the changing-rooms;—you said there were no changing-rooms at any of the mines to your knowledge; to what date were you referring when you said that? From the time I went there up to the time I left. I cannot say whether there is any changing-room in the big mine now, but I know there is not in the Junction.

[The witness withdrew.]

Mr. Matthew Ormsley called and examined:—

Mr. M. Ormsley. 1 July, 1892.

1705. *Chairman.*] What is your occupation? I am a miner.
1706. How long have you been working on this field? I have been working four and a-half years on the Proprietary.
1707. Were you working there all the time? Yes, all the time.
1708. In what parts of the mine have you been working in mostly? In the stopes.

1709.

1709. But in which part, particularly? Well, we have been used to change this last three years now, turn about each fortnight, between Jamieson's and McCulloch's—the lead end; only the second time we shifted we might be detained a month in the lead-end.
1710. Does that system of shifting hold good throughout the whole mine, or was it for the benefit of the men working in McCulloch's? I suppose it is for the benefit of the men working in the lead; but they never get more than a fortnight's work at Jamieson's end.
1711. That practice, you say, has lasted for three years? Yes.
1712. Have you ever been leaded? Yes, three or four different times.
1713. Tell us of the different times;—in the first place you went to work in the mine about four-and a-half years ago—that would be in 1888? Yes.
1714. How long did you work before you were laid up the first time? The first time I felt the effects was after I had worked eighteen months at the mine.
1715. And during those eighteen months had you been working in the lead stopes all the time? No. I was working partly in Jamieson's, and partly in McCulloch's—that is, the lead end.
1716. But not always a fortnight in each place? No; we were more often six weeks in the lead end. But within the last three years this arrangement came to pass—to shift the men every fortnight or so.
1717. How long were you laid up the first time? About six weeks.
1718. Do you think the attack was long in coming on? Yes; I think I worked on after I got a touch of it, and never took any notice of it.
1719. What were your symptoms? The first time I got it right across the bowels, with great pain, and my loins were also affected. I had to undergo an operation to give me ease.
1720. You had colic and constipation? Yes.
1721. Did your legs give way? Yes; I had it in my feet very bad, and my legs are swollen now from the effects of it.
1722. Did you go back to work again? Yes.
1723. And in the lead-stopes? Yes, in the stopes.
1724. How long did you work then before you fell ill again? It might have been eight or nine months afterwards when I felt the effects a second time; but I generally took stuff to check it.
1725. What stuff? All kinds of stuff to check the pain, and also opening medicine. I was subject to giddiness.
1726. However, you got it a second time, and had to lay up, and then you went back again, I suppose? Yes.
1727. Still in the lead-stopes? Yes; there and in Jamieson's.
1728. How long did you stay at work before you became ill again? Well, I worked there for some time. But I am off now through the lead; I got affected again in the head.
1729. You kept on suffering and going to work again, and you are now off because you have become affected again? Yes.
1730. And does it chiefly attack you in the head, now? Yes, but I am getting better.
1731. What doctor has been attending you? I have been attending myself. If it had not been cold weather I should have blistered my temples, but I find I am getting better again. It is still in my system, I think, because my legs are all swollen. I may say that I had a fall from the cage, of about 15 feet, a few months ago, and that, perhaps, may have affected me.
1732. How old are you? I am fifty-five.
1733. Have you been attended by a doctor for lead-poisoning? Yes, I have been.
1734. Who generally attended you? Dr. Bartley for one, and I have also been attended in Adelaide.
1735. Is it, in your opinion, a very common thing for men who get leaded here to go to their homes at a distance to get well? Yes; a great many do go—for a change as well. I think some men are more liable to get leaded than others, having weaker constitutions.
1736. You know that yourself? Oh, yes.
1737. Do you think there are some people who, on account of constitutional weakness, ought never to work in lead? If they could get anything else to do it would be better, but I did not adopt that advice myself, being so used to one mine. I never worked in any others on the Barrier.
1738. Do they not take you on? No.
1739. Do they not give you any reason? No; they give me no reason. I got a chill when I was last taken ill, and started to vomit, and could not keep my head up.
1740. Have you seen many men affected by the lead in your mine? Yes; I have known men who have been carried away to their graves through it.
1741. Can you say if any class of men are more particularly subject to lead poisoning than others? I think the young men are more subject to it than elderly men.
1742. Are there many teetotallers in the mines? Yes.
1743. Do you think they get leaded as well as others? Yes.
1744. It makes no difference? No.
1745. Have you noticed any improvement in any of the mines of late—any particular precaution taken by the mine managers against leading? The only thing I know is that there is better air in the mines now than there used to be formerly. Although sometimes when the mine is given a spell, such as a shift off, you will find very faint smells coming from the ground.
1746. How is that? It comes from the ground, I fancy.
1747. *Mr. Hamlet.*] Can you tell us now what you and other men used to do to relieve yourselves when you wanted a motion of the bowels—how far did you go off from where you were working? There is a certain place left in the mine—left for the purpose.
1748. Do the men usually make use of it? Yes. Sometimes there is a slight smell there. I think they ought to have carbolic acid or lime to destroy it.
1749. There is a bad smell there sometimes from that cause apart from the lead? Yes.
1750. What do you do with regard to washing. I suppose you know that a man who washes carefully after he leaves the mine every day is not so likely to get leaded? I do not know. I generally wash myself all over when I come out of the mine—that is, my body and face and hands.
1751. When you were at work in the mine you got very hot, I suppose—sweated a good deal? Yes; and of course when you are breaking the lead ore it all comes down on your arms.

Mr. M. Ormsley. 1 July, 1892.

1752. How were you dressed at your work—had you more than trousers and shirt on? Trousers and flannel.
1753. And another shirt beyond that? No.
1753½. Just the trousers and flannel? Yes.
1754. And you found it hot then? Yes; in places.
1755. And I suppose you sometimes wiped your face with your hands? Yes; and you naturally run out occasionally to get a little fresh air, and then it dries on you.
1756. Do you take your food down below with you? Yes.
1757. Where do you keep it? In the coat pocket.
1758. And then you hang up your coat in the mine? Yes.
1759. And then when crib-time arrives can you wash your hands? No; we cannot do that very well.
1760. What do you do? We wipe our hands as well as we can. We generally have a little place some distance back where we keep our crib.
1761. Did you ever suffer from headache when you were working in the stopes? Yes; very often.
1762. I suppose you always wore a beard and moustache? Yes; I think it is best.
1763. Do you know any miners who shave at all? Yes.
1764. Shave the upper lip? Yes.
1765. And do you think men who shave are more likely to get leaded? I do not know; but I have heard a good many complain who had the moustache off. They used to get on to me about taking it off; but I thought it was a preventive, to some extent.
1766. *Mr. Sleath.*] You have been employed all the time at the Proprietary Mine? Yes.
1767. Was there much dust there? Oh, yes; very often a tremendous lot of dust. Sometimes you could not see your hand before you.
1768. Did they use any water? Not at that time.
1769. Did you ever see water used in the Proprietary for sprinkling? No.
1770. Never once? Not to my knowledge.
1771. How long is it since you worked there last? It is going on for six weeks now.
1772. Then, up to six weeks ago, you never saw any water used in the Proprietary? No.
1773. Do you think it would be beneficial to use water for sprinkling purposes? Certainly.
1774. Independent of laying the lead dust, would it make the ventilation better? Yes; I think it would.
1775. What sort of changing-house have they got on the Proprietary Mine? The changing-house is very good, I think; but it is only for the use of the shaft-men who work in wet places.
1776. You never used the changing-room? No.
1777. Did you ever know any man who worked in the stopes to use it? No.
1778. Is it generally understood that they can use it? I think it is understood they can.
1779. Did you ever have a copy of the mining regulations presented to you? No.
1780. Did you ever see them posted at the shafts, or anywhere about the mine? I did not take notice.
1781. But you are certain you never got a copy? I am certain I never got a copy.
1782. Have you seen any number of the men who have been working with you (your mates) suffering from the effects of lead poisoning? Yes; several.
1783. Do you know if any men who have been working in the lead stopes here for any considerable length of time without suffering from lead poisoning? I have heard from one or two, or perhaps three, that they have never had a touch of it; but where there is one like that there are fifty the other way.
1784. Speaking generally, which mine bears the worst reputation for lead poisoning, or is there one that bears a worse name than the others in that respect? I think the worst mines on the Hill are Block 14 and the Proprietary.
1785. So far as you know, those are the two worst mines for lead? Those are the only two that I know of. I have heard a little talk about the British.
1786. When a man is laid off from leading, is it a customary thing, in such cases, to allow him to return to his work again when he recovers? I believe it is customary.
1787. Is it customary to find lighter employment for them? I have known a few to get on the surface for a while.
1788. But they have refused to give you employment this time? Yes.
1789. On the previous occasion when you suffered from lead poisoning, did you get your place back again when you returned? Yes.
1790. Then, this was the first time they refused you? Yes.
1791. Did they tell you directly the reason? No.
1792. They simply refused you? Yes. I went to Mr. Uren, and he told me to appeal to the bosses I was working under, and, accordingly, I went to the head man at M'Culloch's, when I left off. I found I did not get any satisfaction, however, and I then went to Mr. Howell, the manager. He told me that he had nothing to do with the under-ground work whatever, and that I should apply to Mr. Uren; but I did not go to Mr. Uren again.
1793. Do you think if hot baths were provided on the surface alongside the changing-room that that would be a beneficial measure? Yes, it would be a great thing for the men.
1794. Do you think the men would take advantage of it? I do.
1795. Would you do it personally? I would do it for my own sake, certainly.
1796. *Chairman.*] It has been suggested to us that even if warm baths and a suitable room for changing were provided that the men, when they come up from below, are in such a hurry to get home that they probably would not care to stop an extra quarter of an hour to wash;—what do you think of that suggestion? Well, I do not know. Every one would not be of that opinion. I believe that any of the men who had some distance to go would be glad to make use of it. Those who lived handy to the mine might not think it worth while to wash until they got home. But I am sure a good hot bath would do them all a lot of good. I know I generally use it myself when I get home from the mine.
1797. But is it not the case that comparatively few men have the means of bathing themselves at home, or in the bad times hitherto, have had no water? Yes; very often in the way we were situated there would not be a great deal of water at home for washing purposes.

[The witness withdrew.]

MONDAY,

MONDAY, 4 *JULY*, 1892.

Present:—

DR. ASHBURTON THOMPSON (CHAIRMAN).

WM. M. HAMLET, Esq. | R. SLEATH, Esq.

J. HOWELL, Esq.

Mr. Jas. Hebbard called and examined:—

Mr. J. Hebbard. 4 July, 1892.

1798. What office do you hold, Mr. Hebbard? I am the Government Inspector of Mines.
1799. Under what Act are you appointed? The Mining Act of 1874.
1800. Do the general rules, which form a schedule to the regulations for the regulation of mines, other than coal and shale mines, made under section 64 of the Mining Act of 1874, apply to these mines on the Barrier? Yes.
1801. Are your duties defined in the regulations just referred to. Yes. (*Copy of the Regulations handed in*).
1802. How often do you inspect the mines—do you go round regularly, or only when you are asked to do so? My duty is to occupy my time by inspecting the mines of this district.
1803. Is it a particular instruction to you under the general rules to see that there is adequate ventilation in the workings? Yes, as a general rule.
1804. Will you kindly tell us how you proceed to ascertain whether the ventilation is adequate or not? A certain test is the possibility of a candle burning in the place where the men are working, and the action of the atmosphere on the candle, as well as the feeling of coolness or otherwise, which may be in the mine.
1805. Under the fifteenth rule, is it ordered that there shall be accommodation near the principal entrance of the mine for enabling the employees to conveniently change and dry their clothes? Yes.
1806. Is such accommodation invariably provided on the mines? In several of the mines there is accommodation provided, but in no instance that I know of is there sufficient accommodation of the kind to allow of all the men employed at the mine changing and drying their dresses.
1807. The rule says "change and dry," is their any provision at any of the mines for drying the clothes? There is the top of the boilers.
1808. But this accommodation is ordered to be separate from the engine-room or boiler-house, is it not? Only for changing, I think—that is the way we generally read the rule, at any rate.
1809. But rule 15 says definitely that the changing and drying-room shall be near the principal entrance to the mine, and not the engine-house or boiler-house; so that the rule is plainly framed to prevent any boiler or engine-house being used for the purpose? Yes; the rule definitely states that; but I know in my experience as a mine manager, that the drying of dresses has always been allowed on the boiler top.
1810. You are now speaking as from your former experience as a manager? Yes.
1811. And you point out that the rule has usually been contravened; but as a mining inspector——? I wish to speak as a mining inspector, sir.
1812. I think you should do so—yes? I only want to make that part of it clear.
1813. You know that where men working in the mines get their clothes wet they ought to have a chance of drying them; why is it not provided, according to regulation. But I will ask you another question:—Men working in lead mines ought to have the amplest opportunity of washing, and of changing their clothes; but in winter, at all events, when they come from below into a cold atmosphere, I should say they would be very little likely to use an unwarmed changing room, and perhaps would be wise in not using it, but in going straight to their homes. Do you agree with that upon the whole? I do.
1814. In general, you agree that they should have every inducement and opportunity of changing? Yes.
1815. Then if rule 15 were observed, and they had a changing house and a place in which they could dry their clothes, as provided by that rule, it would be a warm room, and not a draughty place such as we see it to be, is not that so? That is so, certainly.
1816. Do you then think it would be desirable, in connection with the working of lead ores, that the changing rooms should be something more than the mere sheds that we see them to be? Yes.
1817. Do you know of any other reason why the men do not resort to these changing rooms than that they are devoid of necessary accommodation and warmth? No; I do not; unless it is—but perhaps I should not be right in saying anything in that regard. I would only remark that, as a miner, I always changed my clothes.
1818. I suppose you think there is a proportion of the miners who would not take the trouble to change their clothes, or wash themselves, whatever you might do for them? Yes; the great majority of them.
1819. Still, it is much more likely that they would wash and change if they had a suitable place to do it in—a warm place? Yes; and proper facilities.
1820. And in connection with the getting of lead ore you think it desirable that everything should be done to encourage habits of cleanliness? Undoubtedly.
1821. Personal cleanliness is regarded as one of the best means of preventing lead poisoning, is it not? Yes; I think so.
1822. Does not rule 22 of the Mining Regulations provide that a copy of the rules shall be posted in some conspicuous position on the mines, and also that a copy of the rules shall be supplied to each of the men employed on the mine? Yes.
1823. Do you think those rules are observed—that is, the last one? Well, that is not stated in my copy of the rules. This is supplied by the Department:—[*Copy of the Regulations issued from the Department of Mines, put in by the witness, from which, as he points out, the last sentence of Rule 22, is omitted.*] I certainly thought that was in it myself until I looked through this copy. Of course, it is in the original Regulations.
1824. *Chairman.*] Is that provision of any practical use, that a copy of the Rules shall be given to every person employed upon the mine? I cannot say. They have ample opportunities of seeing them on the mine. That part of the clause is carried out I know, because it is part of my duty to see that they are posted up on the mines.
1825. Whereabouts are they posted on the British, for instance? At the entrance to the main shaft.
1826. Are they posted at every mine? Yes.

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1827. At the same time, the intention of Rule 22, appears to be to make them well known to every individual; and, as in point of fact, no mine has yet provided proper facilities for changing clothes, perhaps if the men were made thoroughly aware of it, they might, by this time, have got that accommodation? Yes, that might be so.
1828. Have you managed any lead-yielding mines? Yes, I was managing the Junction Mine in this locality up to August, 1888.
1829. What kind of ore were you getting at that time? Principally carbonate of lead.
1830. Were there any cases of leading among the employees? Yes, there were cases.
1831. Can you give the Board any information as to the way in which leading comes about—anything connected with the arrangements of the mine, or the personal habits of the men; or things that induce leading? I cannot speak conclusively on that point; but I have a theory.
1832. You have thought about the matter, and formed a theory. We should like to hear it? I think one great cause of leading among the men is a want of personal cleanliness, and the neglect to change their clothes immediately after finishing their work.
1833. Anything else? Yes; there is the constant stirring of the dust in the mines, causing the men to breathe it in that way. There are also the gases arising from the ground itself, as the mine is opened up.
1834. Well, what do you think should be done by way of a remedy—suppose you take the dust and the gases first? The constant damping of the stopes would, in my opinion, be one great remedy.
1835. Is that done in all the mines? There are several mines in which it is pretty well carried out.
1836. Can you name them? Notably in the British, and the lead stopes of the Proprietary Mine. I cannot speak definitely to having noticed it in the other mines.
1837. Do the other mines make any provision at all for sprinkling? I cannot say. I have not noticed that.
1838. In the case of the British and the Proprietary Mines, are you of opinion that sprinkling is regularly carried out in the lead stopes? Yes.
1839. You know that it is so from your personal inspection of those mines? Yes; I have seen it. Perhaps I should qualify that a little, because I cannot actually say now from memory whether I have actually seen the water carried to the stopes or not. But I have seen it in the levels, and places of main traffic.
1840. That is, you have seen the pipes carried through to contain water? I have seen sprinkling actually going on as well.
1841. Do you mean that the main passages are sprinkled as well as the working places and floors? Yes.
1842. Do you mean that the main drive is sprinkled regularly? Yes, the main drive.
1843. You are speaking of the Proprietary? I am speaking of the British more particularly; but the Proprietary can be included.
1844. The main drive very often goes through country, does it not? No; as a rule the main drives are in the lead, and the dust is very likely to be beaten up and disturbed and carried through the air passages.
1845. Well, sprinkling is one thing;—I suppose the floors ought to be kept swept reasonably clean? No; I believe that is rather harmful than productive of good.
1846. Then, what would you do with the accumulations on the floors? I would let it lie undisturbed as much as possible, so as to avoid affecting the men in the working places.
1847. But does it not fall through the cracks from floor to floor, and does it not get shaken up every time a shot is fired, and so forth? Yes. But it is not possible to sweep the place so clean that there will be no dust there. In my opinion, you can sweep as often as you like, and there will still be dust. That is why, I think, it would not be productive of much good, especially as by disturbing the dust, you must cause a certain amount of it to circulate through the air-passages.
1848. Would sprinkling assist the ventilation? I think not.
1849. Not by cooling the air in hot places;—several witnesses have suggested that it would assist the ventilation? I think it would produce a dampness in the air, and that certainly would not be beneficial.
1850. Do you mean the evil produced by dampness would outweigh the good produced by laying the dust? No; I mean on the cooling of the atmosphere.
1851. Then, as to the ventilation of dead ends and tops, and the upper part of the stopes, and so forth? Connection is formed with the upper level by winzes, and so on to the surface; and in some cases the ventilation is carried by means of pipes through which the air is forced by fans.
1852. To which mine are you referring now? I was referring to the British and Proprietary. I do not know whether I can speak definitely as to the artificial ventilation in the other mines.
1853. What else can be done besides sprinkling, and the observance of cleanliness on the part of the men, by way of diminishing lead-poisoning? I am inclined to think that the practice of eating their food with dirty hands may be part of the evil. There is no provision for washing the hands, although they may wash their mouths out with the tea they carry with them. I think, also, that the use of the pipe may do something towards leading them, as they commonly rub their tobacco in their hands.
1854. Some of these are personal matters which the men must look after themselves; but there are several things which the proprietors can do to assist the men, as it appears to me, thus: the proprietors can at all events make such provisions nowhere—as we have seen down below—for the men to wash their hands underground before taking their food during crib-time;—do you agree with me so far? I think so.
1855. Such provision is not made anywhere now, is it? No.
1856. As to the use of tobacco, and eating with dirty hands, &c., these are personal matters which the men must undertake for themselves along with some others;—but would you express an opinion as to whether the men are generally aware that such precautions as you mention are necessary, that is, are they aware of what they may do for themselves? I do not know whether it is so at present, but at one time I know there were instructions issued by the company as to the measures to be adopted against lead poisoning. That was during my time as shift-foreman, under the Proprietary Company.
1857. How long ago was that? It would be over six years ago now.
1858. That was at the very beginning of the work, or very nearly the beginning? Yes. I was employed by the Proprietary Company between 1885 and 1886.
1859–60. Then what was your experience; did the men attend to these regulations in any degree? They did not. I may give you the chief points of these instructions, perhaps. 1861.

1861. If you can remember them? Yes. The principal one was the observance of absolute personal cleanliness; the use of as great a quantity of fruity food as the stomach would take, and to use dilute sulphuric acid, which was provided for the men if they wished to use it. There were at the time these instructions were issued baths provided on the site now occupied by the north smelters, but which, so far as I can remember, nobody used. Those were about the chief instructions.
1862. Then from your account it would appear that at first considerably more was done for the men than is done now? In that respect, at any rate.
1863. How long have you held your present post? Since the 16th December of last year.
1864. Do you see much of the men? Yes; I mingle with them constantly.
1865. Do you think the amount of lead poisoning that actually occurs is important—in the course of a year, for instance, do you suppose that an appreciable proportion of labour is lost on that account? Yes.
1866. Which mine is the worst as regards leading, do you think? I do not think a comparison could be instituted between any of them as regards the lead stopes; because some places are entirely free from lead, such as in Block 10, for instance; in the Central also, it is a very small item; and the same may be said of portions of the Proprietary Mine.
1867. You have not noticed whether any one mine has furnished a larger number of cases of leading than other mines? No.
1868. You have not the means of noticing, in fact? No; and chiefly for this reason: Say I visited one particular mine once a fortnight, I would only see one set of men out of the three engaged there, and there are so many that I do not become personally acquainted with them.
1869. *Mr. Hamlet.*] Do you know, from your own experience, whether these regulations that you produce here to-day, are observed on the part of the mine proprietors? Yes; except in the one particular matter we have already referred to under clause 15.
1870. Is there a similar tendency among the men to observe these regulations? Yes; so far as I have seen.
1871. Have you observed whether they take much notice of the regulations? I never saw a man reading them; but from what I hear in my talks with the men, I find they know the regulations as well as I do. A great many of them do at any rate; they get to know them somehow.
1872. How often do you visit the mines? My duty is to employ my time constantly in visiting the mines. If you wish it, I will give an idea from my diary of how my visits do occur.
1873. If you please, just give us a month, by way of example? I will take the month of June. The first entry is *re* accidents, and so on. That is how I was employed on that date. Then 2nd June, Central mine; 3rd June, Jamieson's section; 4th June, boiler inspections; 7th June, Jamieson's portion of the Proprietary; 8th June, McCulloch's portion; 9th June, M'Gregor's; 10th June, Junction North and South, and North Broken Hill Mines; 11th June, the British; and so on throughout the month.
1874. I think that will do. Now, with regard to ventilation, what is the principle adopted in those mines? Just the natural draught.
1875. And that, I think you said, is sometimes assisted by artificial means? Yes.
1876. Have you any means of ascertaining how the ventilation is going—at what speed? No.
1877. You never use an air-meter? No.
1878. And what would be your method of finding out whether the air was very bad? My personal experience, and seeing its effect on the candle, I suppose. It would be an extra bad case, of course, if the candle were much affected. Roughly speaking, the rule is that where a candle will burn, a man can live, but I never allow it to go that far.
1879. Do you ever try to ascertain the temperature of the mines? No.
1880. Is there much difference, or variation, between summer and winter? Yes; the mines are cooler as a rule in the winter; and there is a good deal of heat in the summer. It is caused by the absorption of the heat by the timber.
1881. What is the size of the drives or main passages underground, as a rule? Generally 7 feet by 5 feet.
1882. That is 5 feet wide and 7 feet high? Yes; the main levels.
1883. What would be the size of what they call a set? An ordinary set is 6 feet by 5 feet.
1884. That is 6 feet high? Yes; that is a top set.
1885. Have you, in your experience as a mine inspector, ever heard of men going to sleep in the mines? No; not in my experience as a mine inspector. I can only say that I have heard it as a common remark.
1886. You have never, in your experience, found men asleep in the mine? No.
1887. If the remark that they do so is correct, where do you think they sleep in the mine? In the face, I should say.
1888. Or on the timber? Yes.
1889. From your experience of this class of mining, do you think that sleeping in a dusty atmosphere would tend to produce lead-poisoning? Yes; I think so.
1890. With regard to the instructions once issued to the miners and the provisions made for them against leading, you mentioned dilute sulphuric acid. Was that provided by the mine proprietors? Yes.
1891. And did the men use it? At first they did; but they afterwards left it off. There was not very much demand for it.
1892. Can you describe those baths which you say were provided; what were they like? Well, I have only a very rough recollection of what they were like. I know they were attached to the smelters somewhere, and were ranged in a shed.
1893. Were there arrangements for a man to take off his clothes decently and have a bath? Yes; so far as I recollect there were small compartments with a hip bath in each.
1894. How many compartments were there? Twenty or thirty, I should say. The mine was only in a small way of working then. There were only two 30-ton furnaces going at that time.
1895. Do you remember if the men made free use of the baths? I do not remember that they were made use of at all; I never made use of them myself.
1896. Was warm water provided? Yes; so far as I remember the water was laid on from the boilers. I am only speaking from memory, of course; it is a long while ago.
1897. *Chairman.*] Those instructions which were issued to the men, and which were not regarded by them at the time, were issued, perhaps, before the men had become alive to the danger they were running?

Oh,

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Oh, no; cases of lead poisoning had occurred; that, indeed, being the reason why the instructions were issued.

1898. In what capacity were you employed by the Proprietary Company? As foreman.

1899. You say you never used those baths yourself; probably you had bathing accommodation at home? Yes; my practice was to strip off and have a sponge bath—water being scarce—and change my clothes entirely.

1900. Were you ever leaded? No; I was never leaded.

1901. How long have you worked continuously in a place where you had the opportunity of becoming leaded? I suppose I was in the Proprietary fifteen or sixteen months.

1902. But were you working in the lead? I was never actually working in the lead.

1903. What I was coming to was this: You happened to have the means of keeping yourself clean in your own house, which very many of the miners had not, and have not now; is that not so? Scarcely. I was living exactly the same as they were then—everybody lived in tents at that time.

1904. Well, will you express an opinion upon this point. Do you think that whether the employees take advantage of the means provided for them to preserve their health or not, that the proprietors would do well to furnish those means? Yes.

1905. Can you make any general suggestion to help the Board in conducting this inquiry? I do not know that I can add anything to what I have said. I think sufficient accommodation should be provided and that it should be made compulsory on the miners to change their dress.

1906. Do you think that is a rule you could enforce? I think so. It has almost become a law in Victoria. That is where I first learnt the habit of changing the clothes.

1907. Has it actually become the law in any part of Victoria? Yes; in Bendigo—at least almost the law—it is the law of the district, at any rate.

1908. Do you mean to say it is the custom? Well, it is slightly more than a mere custom in the general sense, because the companies will not allow any man to work in the mines who will not change his clothes.

1909. It is a rule made and enforced by the employers? Yes; by the whole of the employers in the district.

1910. That is the associated employers? Yes.

1911. What is the object of the regulation in relation to mines other than lead mines? Well, I believe the primary object of it was to prevent the men stealing gold. But it has had a good effect upon the men.

1912. Upon their general health, do you mean? Yes; it must do; because most of the miners get their clothes very damp.

1913. Is there any opposition to it on the part of the men, as a whole? No. It is regarded as a very good thing.

1914. Then you think a scheme might be devised by which every man going below in these mines on the Barrier should, first of all, change his clothes? Yes.

1915. Then, on coming up again, he would put off his working clothes, and resume his ordinary dress? Yes.

1916. And he should take a bath where such is provided? Yes.

1917. Is there anything else you think might be done, or anything you would like to suggest? The only thing I can say is that I believe a list of instructions, similar to those that were sent round here at one time, prepared by some medical authority, would be advisable.

1918. Yet, when such instructions were sent round, the men did not attend to them, as you say? Well, probably there are not many of the men here now who were working on the mines in those days, and, perhaps, they might take more notice of the rules now. I think changing of importance; but there are differences of opinion. For instance, I have two brothers in the mines here as miners. I was speaking to one of them the other day, and he said he preferred to go home, and change at home, and he had been brought up to change his clothes in the mine as well as I had; and he did not avail himself of the accommodation when it was offered.

1919. Notwithstanding what your brother said, you would still have it made compulsory to change? Yes. I am only giving you his opinion. It is my opinion that such a provision would be beneficial.

[The witness withdrew.]

Mr. Thomas Whysall, called, and examined:—

Mr. T. Whysall. July, 1892.

1920. *Chairman.*] You hold the office of Telegraph Master at Broken Hill, Mr. Whysall? Yes.

1921. You keep a record of the wind and weather? Yes.

1922. Do you hand in a statement which gives particulars as to the rainfall and prevailing winds for the two years from July, 1890, to 1892? Yes.

1923. And the only statement with regard to the winds is that southerly winds prevail? Yes; it is southerly nine months in the year. [*Record handed in. See Appendix* .]

[The witness withdrew.]

TUESDAY, 4 JULY, 1892.

Present:—

DR. ASHBURTON THOMPSON (CHAIRMAN).

WM. M. HAMLET, ESQ. | R. SLEATH, ESQ.

J. HOWELL, ESQ.

Dr. J. F. Bartley, called and examined:—

Dr. J. F. Bartley. 4 July, 1892.

1924. *Chairman.*] What are your qualifications, Dr. Bartley?

1925. Are you registered by the Medical Board of New South Wales? Yes.

1926. How long have you lived in Broken Hill? Two years and seven months.

1927. During that time have you been resident medical officer at the hospital? Yes; for all that time.

1928-9. Will you tell me your average daily number of in-patients at the hospital? For the last year it was forty-two; this year it has been fifty-five.

1930. Have you an out-patients' department? We have no organised out-patients' department. I have treated some cases occasionally, when they have come to the hospital and have not been able to obtain relief elsewhere; but we are not supposed to treat out-patients.
1931. You attend out-patients in cases of necessity if they present themselves? Yes.
1932. You have treated in the hospital a good many cases of lead-poisoning? Yes.
1933. Can you tell me the number of cases you have met with during each year of your residence at the hospital? During the year 1890 there were ninety-eight cases; during 1891 there were 123; and during the first six months of this year seventy-three cases. I may remark, with regard to these numbers, that not all the patients who presented themselves while I was connected with the institution could be taken in, as the hospital was greatly overcrowded, and provision could only be made for the more serious cases of illness; cases of the milder forms of lead poisoning had to be refused. And again, though we have no organised system of out-door relief, I treated a number of cases of lead-poisoning as out-door patients. Those are not included in the numbers I have given you. During the two and a half years I was connected with the institution the numbers so treated would be, say, about forty.
1934. Do you mean forty cases per annum? No; forty cases of lead poisoning altogether.
1935. In those forty cases were the patients sufficiently ill to be admitted if there had been room for them in the hospital? No; what I wish you to understand is, that I treated those cases because I thought they could be well enough treated outside, the institution being full, or fairly full; but a large number presented themselves when the place was overcrowded that I did not treat at all; and those I do not include in the forty I have spoken of as having been treated as out-patients.
1936. Have you formed any opinion as to whether many leaded persons go away from Broken Hill for treatment? Oh, yes; a number of them go away.
1937. Where do they go to? To Adelaide, or other parts of South Australia, I believe. I think the reason they go away is that they know they will have to stop work for a certain time, and many of them have homes or friends in South Australia, so they go for a change of air very likely.
1938. Have you observed whether some of the mines furnish more cases of lead poisoning than others? Yes. I have no figures to guide me, but I can speak definitely, I think, from memory.
1939. Can you mention them in their order, so far as you have formed an opinion? I should say they are Block 14, the British, and part of the Proprietary.
1940. And from the Central, Block 10, and the South, you did not get many cases? Not many.
1941. Have you observed that some kinds of work, either above or below ground, furnish more cases of leading than other branches? In the statistics I furnish I have divided the cases according to their occupations.
1942. From which we shall be able to draw our own conclusions? Yes.
1943. Have you noticed in the course of your practice that some people are more susceptible than others if exposed to lead: that they are more likely to get poisoned? Do you refer that question as to one attack predisposing to another, or that persons of a certain temperament are more likely to take it than others?
1944. The latter? I cannot say that I have noticed that.
1945. Very well, then we can go on with the cases. I understand that you distinguish three, or even four classes of symptoms caused by leading? I divide the cases treated into four classes, namely, lead colic, lead dementia, lead paralysis, encephalopathy.
1946. In encephalopathy, do you include epilepsy and coma together? Yes; that is, they very often occur together, or in the same patient, first coma, and then epilepsy. For the information of the non-professional members of the Board I have prepared a definition of the various classes. Colic being the most common form in which the poisonous action of lead exhibits itself amongst those working in lead, the attack entailing a good deal of suffering on the persons afflicted, and varying under treatment in duration from a few days to a fortnight, during which time work must be entirely stopped. But in some cases the miner loses more time even than a fortnight, as the attack leaves the patient so weak that it may be a month before work is resumed. Dementia, being the chronic form of brain disease, is slow in inset, and usually more permanent in its results, paralysis being loss of muscular power. Encephalopathy being a more acute form of brain disease, is sudden in onset, and more dangerous as to its immediate results, shorter in duration, and in it I have classed all cases of brain disturbance, acute in form. That includes coma and epilepsy.
1947. Do you regard plumbism as essentially affecting the nervous system? I can certainly say that I do.
1948. What is the relationship of these four classes to each other. Do repeated attacks of colic lead to paralysis, and then to epilepsy or coma, or are the four forms in your opinion merely indications of determination of the poison to different parts of the nervous system? Rather the latter, I should say. Certainly you do see cases of encephalopathy, or cases of paralysis, or dementia, occur after repeated attacks of colic; at the same time it does not necessarily follow that colic will precede any one of the three classes. And again, I have seen the worst cases of encephalopathy occur in persons who never had an attack of lead colic.
1949. I will ask you just there have you had any females among your lead patients? No.
1950. Then will you mention these different forms of the disease in the order of frequency with which you see them? They will be readily seen by my figures.
1951. Your experience being limited to your hospital practice? Yes.
1952. Then have you any reason to think that your hospital practice is generally representative of the practice of others, excepting, of course, that you get a larger number of serious cases? Yes; generally, I should think; colic, being as I have said, the more common form.
1953. All I ask you now is whether the outside general practitioner would, in your opinion, probably agree with your classification? Yes.
1954. Colic is the most common? Yes.
1955. And paralysis, perhaps, next? Encephalopathy I rank next. Perhaps you will allow me to explain here, as I make encephalopathy next in frequency and before paralysis, that all cases of encephalopathy are brought to the hospital because they exhibit such serious symptoms at the mine. All cases of paralysis do not come to the hospital. Possibly, only a small proportion of such cases reach the hospital. They may be first treated by a medical practitioner in town, and perhaps never require hospital treatment.
1956. Will you kindly describe a case of encephalopathy—the man is brought to the hospital in a state of coma? Yes. The history you usually get is that the man has been working in the mine, or has just

come

Dr. J. F. Bartley. 4 July, 1892.

come up the shaft, when he has been stricken suddenly; has fallen down, in most cases without previous warning. He will remain in a state of coma for twenty-four hours, perhaps, more or less, and then take the epileptic form of convulsions, generally passing on to the maniacal condition, with delusions. Then, in most cases they recover. Out of thirty-five cases of encephalopathy I have seen in the hospital, there have been only two deaths, although most of the cases seemed to be exceedingly serious during their course.

1957. Do you mean to say a novice in that class of case would generally expect death? Yes, decidedly.

1958. Then as to the remainder of the course of those who do die, do they remain comatose all the time, or do they become delerious? They exhibit coma and epilepsy usually. Of course, I am speaking now from my observation of the two cases I have mentioned.

1959. They exhibit coma and then epilepsy? Yes, and the fits become frequent, and death supervenes.

1960. In those cases did you usually meet with the blue line? Do you mean in the cases of encephalopathy?

1961. Yes? Well, usually; but not necessarily so.

1962. Now, suppose you get a case which you describe as of encephalopathy, in which the patient does not exhibit any blue line on the gums, how do you recognise it as being due to lead and not to some other cause; in short, what do you especially rely upon in your diagnosis? In the first place there is no history of accident, and it occurs in persons not likely to be apoplectic, and excluding accident and apoplexy, the cases present symptoms not met with in any place where there is no lead-poisoning.

1963. That is, the symptoms are not met with in any other disease, or where there is no lead poisoning? Exactly.

1964. You have had opportunity of watching the ultimate effects of lead-poisoning, such as affections of the circulatory system of the kidneys? Yes.

1965. Have you observed retinitis among your patients? I have not examined for it.

1966. You do expect affections of the eye in your patients? No.

1967. Have any of the encephalopathic cases ended in insanity to your knowledge? Yes; they have recovered from the acute symptoms, and have remained demented.

1968. Shall we find those cases mentioned in your notes? No. The dementia cases you will find here have not been the result of encephalopathy; they have been rather a chronic form of brain disease.

1969. Not associated with lead work? Not associated with any acute attack during any period of their lives, but incidentally connected with the occupation of lead-mining.

1970. You think them due to chronic poisoning? Yes.

1971. Do you recognise any personal conditions as predisposing to lead-poisoning? No; I cannot say I do.

1972. Is anæmia a constant sign of lead? Yes; a fairly constant sign, or perhaps I should say a fairly constant accompaniment.

1973. You have not made any systematic examination of the blood to ascertain that? No.

1974. I suppose you admit to the hospital a great many residents who are not connected with lead-work in any way? Yes.

1975. Have you ever met with cases of leading among that class of patients? Yes; but of the cases of lead-poisoning seen by me, they were all of persons actually exposed to lead by working in or about the mines, except four, and the cause of lead-poisoning in those cases could be distinctly traced to circumstances independent of the presence of lead mines in the town, such circumstances being present in other cities, and recognised there as causing lead-poisoning.

1976. Can you name occupations followed by the persons you refer to? Yes; one was a painter, one a plumber, one a labourer, working at a beer factory with lead pipes, and one a cook, who was fond of an early glass of beer in the morning, which he drew from the lead pipes in the hotel where he was engaged.

1977. Among the general population, do you ever meet with cases of indisposition which you cannot satisfactorily account for, and which may possibly be due to a slight degree of leading? Yes.

1978. I presume they do not present any definite symptoms? Not of lead-poisoning; rather of *malaise* and languor.

1979. Are they anæmic? For the most part, yes.

1980. Do they show any blue-line? I have seen a slight blue-line in several cases, in which there was no other symptom of lead-poisoning present.

1981. But that, I understand, is common enough among miners and smelters;—you will find them very often have the blue-line and at the same time no symptoms of lead-poisoning? Yes.

1982. But what is the value of the blue-line as a diagnostic; if, for instance, you meet with an anæmic person showing the blue-line, is that sufficient to establish the diagnosis of leading or not? It would be sufficient to establish that lead has been imbibed into the system; but whether lead is the cause of illness at the time is another question. In such a case probably it would.

1983. These people you mentioned just now were members of the general population not known to be connected with the mines? Yes; but I take it that my evidence on that point would not be of much practical value, because that class of persons do not come before me professionally in the hospital, as they are not ill enough to be admitted. They are cases I see in a casual sort of way, and not in large numbers.

1984. Do you treat children to any extent? Not to any large extent.

1985. Can you speak of the ultimate effect of lead upon man from your own observation? Yes; the ultimate effect frequently is to make a man quite incapable of pursuing his occupation as a miner in lead mines, and perhaps to make him incapable of employment at all for a very long time. In such cases we generally advise them to leave Broken Hill; and, so far as I am personally concerned, I have not been able to find out how they have got on elsewhere.

1986. Have you met with gout among your lead patients? No; I have not among the lead patients. In fact, I may state that gout does not seem to be a common complaint in the town—so far as my experience goes, that is.

1987. Now, as to prophylaxes;—what do you think the workers can do for themselves to guard against the effects of leading? That opens up the question as to how the lead is received into the system. I may state my opinion upon that is, that carbonate of lead is the usual form of ore which causes lead poisoning. I think the carbonate ore taken into the lungs or into the stomach, will be absorbed, and cause lead-poisoning.

1988. And as to the skin? As to the skin, I cannot speak authoritatively, but I do not think it is usually taken into the system through the skin.

1989.

1989. However, where the skin and lungs and stomach are all exposed it is, of course, very difficult to say which is the chief channel? Yes; but seeing that the carbonate ore dust can get into the lungs very easily—for it is a dry ore, and makes a good deal of dust—we know that men working on a dry face must take in a great deal of it through the lungs. Regarding the matter from a prophylactic point of view, we should turn our attention, in the first place, to lessening the quantity—if it cannot be done away with altogether—of the lead ore taken in by the lungs, and the same holds good as to the stomach—we should do the utmost to stop the ingress of the ore into the stomach.
1990. Have you considered practically in what way these ends could be attained? No; I have not sufficient knowledge of the manner of working the mines.
1990½. Do you know anything of the use of a purge periodically—say, once in ten days or a fortnight—is that done, and is it, in your opinion, a useful practice? I do not know of it having been done.
1991. *Mr. Hamlet.*] I had intended to ask something regarding the prevalence of gout, but you say there is none, or very little. It has been stated that swelling of the calves of the legs and pains in the muscles were caused by carbonic acid gas—do you agree with that, or do you think it is more probably caused by lead? I think it is more probably caused by lead, the swelling of the legs, accompanied by anæmia.
1992. Have you ever heard of it as the result of carbonic acid? No.
1993. Has it come to your knowledge that lead-poisoning has caused loss of sexual appetite and impotence? No.
1994. And functional derangements of the kidneys—are they frequently met with? Yes; very frequently.
1995. With special reference to cases of lead-poisoning, I mean? I understood you to ask if derangement of the kidneys was frequently met with in Broken Hill.
1996. I am asking the question with special reference to those who are exposed to the effects of lead? Well, yes; I would still say it is met with very frequently.
1997. Then, with regard to the channel by which lead is introduced into the system, do you not think it possible for the lead to be absorbed through the pores of the skin? Well, I do not know that it is impossible, but I have not got sufficient knowledge of the subject to give a decided answer. It could easily be tested by making an ointment of carbonate of lead, and rubbing it into the skin, to see if the symptoms would be exhibited. In the case of a man perspiring freely it might be taken in through the pores. Drugs can be introduced through the skin, and therefore, I suppose, there is no reason why carbonate of lead could not be introduced into the system in that way also.
1998-9. Do you not also think the skin is affected, since authorities say that anæsthesia is sometimes observed in such cases? Well, I can hardly go by what other authorities say on the subject of lead-poisoning. I must rather be guided by such symptoms as I have seen myself, and I have not seen that in my experience.
2000. Has anything ever been done, after a *post mortem*, for instance, in a lead case, to ascertain the extent of the poison taken into the system, or what is a poisonous dose? No. I know nothing on the subject, except, I may remark, that some persons seem unusually susceptible to lead-poisoning, and others, again, appear to be better able to withstand it. I have known miners here to be working three and four years in the lead without exhibiting any form of lead-poisoning whatever; and, again, I have known lead-poisoning to occur in an individual who has worked no longer than a fortnight underground in the lead.
2001. The prevailing ore on the Barrier is carbonate of lead ore, which is almost identical with white lead, and cases of lead-poisoning are of frequent occurrence in white lead works? Yes.
2002. Then you would infer from that that the lead ore would be easily taken into the lungs and stomach, because carbonate of lead is so easily soluble—is that so? Yes.
2003. Do you think the precautionary measures to be taken against lead-poisoning are well known amongst the miners here? Well, as a rule, I do not think they take any precautionary measures at all.
2004. When they are told of the necessary precautionary measures, do you think there is any disposition to carry them out? Well, I am afraid they are not generally told. But then I do not know what precautions you could advise, against the entrance of the lead into the lungs, for instance, with any chance of them being carried out. You might tell them to wear a respirator for example, but a man would not work incommoded by a respirator. They might certainly carry out the rules of personal cleanliness, and washing their hands before eating.
2005. With regard to the use of a respirator, you think it would be impossible for a man to wear one while at work? No, I did not say that. It would be decidedly possible, I think. But as to whether a man would wear one is another question. I do not think it probable that miners, as a rule, would take kindly to wearing a respirator while at work.
2006. But you know, as a matter of fact, I suppose, that in some of the industries in England respirators are used? Yes; I know they are used by the operatives in certain factories; but the dangers of those occupations are much more universally acknowledged, and the evil consequences of not wearing respirators would more surely follow.
2007. *Chairman.*] Does your experience here vary from the accounts given in the various text-books and the like in any important respect? Yes; in a most important respect, it varies from one authority. Dr. Oliver last year lectured on this very subject; and he said that miners working underground never got leaded—that it was not the miners working in the raw material, but the workers amongst the manufactured material, or in the manufactories, that got lead-poisoned; that miners did not get leaded, although it had been found in the smelters. Well, I have seen cases of leading among the smelters here, but as the figures, which I will give you, will show, they do not suffer to anything like the extent that the miners underground suffer from lead-poisoning; that is, of course, within my experience.
2008. You are aware that Dr. Arlidge, another physician, who gave a course of lectures under similar circumstances, but who no doubt spoke from experience, gained in a different place, and a different country, from that which furnished Dr. Oliver's experience, recognised lead-poisoning less among smelters and others than among miners? I have not read the lectures you refer to.
2009. Would you be inclined to say, therefore, that that is a point which depends upon local conditions usually? It depends upon the class of ore in which they are working, I take it.
2010. Is there any other point on which your experience here varies from the teachings of authorities on the subject elsewhere? Yes; in the case of the ordinary lead-colic. Here we find very little; indeed an infinitesimal

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infinitesimal amount of wrist-drop amongst those cases, whereas in the ordinary lead-colic occurring in the plumber or the painter, or the white-lead manufacturer, we find that wrist-drop is a fairly constant symptom.

2011. In fact, teachers almost always refer to wrist-drop as a leading symptom, and almost a diagnostic sign of lead-poisoning, do they not? Yes, very often.

2012. But wrist-drop here you say is of rare occurrence? Very rare indeed. Except in cases of general lead paralyses, when the wrist-drop seems to be the chief paralysis, or when the paralyses of the extensor muscles of the forearm seem to be more decided than others.

2013. Do you mean to say that when paralysis does occur it takes the form of wrist-drop, but that very often it does not occur at all? What I rather mean to say is this, that when you get paralysis from lead poisoning here a great number of muscles are affected; but especially the extensors of the forearm.

2014. But still you say muscular paralyses are uncommon? Yes; certainly uncommon.

2015. Can you express an opinion as to the importance of the fumes issuing from the stacks here, to the general inhabitants of the town? Not from the result of experience of cases seen. But it is a well-known fact in the district that dogs and cats, and cows and horses are affected when living within a radius of a mile from the mines; and I think it is granted that a large amount of lead escapes with the fumes from the smelters, and falls over the town, and on the roofs of the houses, so that the inhabitants run the risk of taking it into their system by drinking water, or of inhaling it while it is in suspension in the passage down. Nevertheless, as I have said, I have had no cases in my experience here that I could definitely state to be cases of lead poisoning, other than those of men working in or about the mines, and the four outside cases, which were also due to definite causes, as I have already explained.

2016. Then your statement amounts rather to this: that lead-poisoning from the fumes does occur among cattle and the smaller animals, and ought therefore to occur among the people of the town; but, as a matter of fact, you have had no evidence that it does occur among the people? Not lead poisoning. But I am of opinion that there is a certain amount of languor, or *malaise*, caused among the general population by it, without definitely assuming any of the forms of lead poisoning.

2017. Children are susceptible to lead poisoning, are they not? Yes, usually.

2018. Are the children of Broken Hill, as a rule, very rosy, and strong, and fat? As I have said already, my experience of the children is limited.

2019. I mean from general observation, such as I am able to make in going about the streets? Well' no; they do not present a robust appearance as a rule, I think.

2020. I have gone through the Death Register for 1889, 1890, and 1891, and I find in each of the three years certain cases of lead poisoning. I find also some cases in which the entry in the register is not quite clear. For instance in May of 1890, you certified that a man named Henry Lobb, a miner, died of epilepsy of eight weeks' duration—do you remember anything about that case? Yes; I remember the case very well: the man had a previous history of epilepsy. I do not know why I put down the "eight weeks' duration"; but he had a previous history of epilepsy I think.

2021. You remember that it was not a case of lead epilepsy? Yes. I remember the case distinctly.

2022. And lead had nothing to do with it? No.

2023. Then in July the record of your certificate in the case of Wm. Hunt, a carpenter, aged 40, as it appears in the register, is merely "death from poisoning." Can you explain that? I do not think that was given by me. There was a coroner's inquest on that case. That was strychnia poisoning, I think, and should have been a coroner's case.

2024. There is no record in the register of an inquest having been held. Then, in February, 1891, you certified the death of James Frederick Roberts, an ore-dresser, 17 years of age, as being due to "meningitis—duration, fifteen days"? I do not remember that case at all just now.

2025. Can you look it up? Yes.

2026. In May, 1891, you certified that James Magor, a miner, aged 41, had died of meningitis after an illness of seventeen days; do you remember that case? Yes. So far as I remember now I had no reason to suspect that the cause of meningitis was lead poisoning; if I had I should have then put it down.

2027. Then, in September there was a third case entered thus:—"James B. Bruce, carpenter, age 39, died of meningitis, after twenty-one days' illness," do you recollect that? Yes; that was after influenza.

2028. Do you think that in your certificate you probably put down influenza as the first cause? I think so. The influenza I did not see. He went through his attack of influenza, and developed meningitis in the place where he was living. He came to me with meningitis. I do not know why I did not put influenza in the certificate. As you suggest, probably I did. But I remember the case distinctly. It was after influenza.

2029. As to Major's case, you have not as clear a recollection? No; I do not remember what was the cause of meningitis in that case, but I feel sure that if I had had reason to suspect that lead was the cause, or I was satisfied in my mind that lead was the cause, I would have put it down.

2030. Then, in October, you certified that Adam M'Arthur, age 43, died of anæmia; duration of illness three months; and influenza, duration five days. Do you remember whether the anæmia was lead anæmia or not? No. I remember the case now; it was malaria, as far as I can recollect.

2031. Was he a man who came down from the northern territory? Yes.

2032. Then, lastly, do you think, it would be a good thing, in view of what you said just now, if a short fly-leaf of instructions were published and disseminated among the miners, informing them what they could do to protect themselves against leading? Yes; if your Board will be able to suggest certain precautions which are at once easy of adoption, and are likely to be adopted by the men, it will be a very good thing, I think.

2033. Do you hand in a statement for the years 1890, 1891, and 1892, which shows the number of cases of lead poisoning treated in the Hospital, the distribution of those cases, according to class of cases, and mentioning the occupations of the patients? Yes.

[The witness withdrew.]

Dr. T. R. Belgrave called and examined :—

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2034. *Chairman.*] What are your qualifications, Dr. Belgrave? Doctor of medicine of the University of Edinburgh, member of the College of Surgeons, and Licentiate of the Apothecaries' Society.
2035. You are registered by the Medical Board of New South Wales? Yes.
2036. How long have you practised in Broken Hill? I am now in my fourth year of residence here, I think.
2037. Do you hold any special appointment? No; I cannot say I do. But there is a Medical Fund here, which is the chief medical institution. I founded it. But I am just a member co-ordinately with any other member of the profession who may come here, and likes to join it. It is a commercial undertaking on the part of the medical profession resident on the Barrier.
2038. You attend a proportion of the persons employed about the mines, I suppose? I do.
2039. And also a proportion of the townspeople who are not connected with the mines? Yes.
2040. Can you give us any idea as to how many of the people employed about the mines would apply to you if they were sick? About 400 I should say, at the present time.
2041. Is that an average number? Yes.
2042. Then can you tell us how many cases of lead poisoning you meet with in the course of the year? I cannot say the precise number. But they are very numerous, and the numbers vary; sometimes there is quite a rush of them, and it has appeared to me that this rush of cases has been traceable in some degree to states of the weather. When the weather has been as it is now, that is damp, there have not been many cases; when, on the contrary, it has been dry and dusty, there have been many.
2043. We have been told that animals suffer more in the hot weather—has temperature any influence in your opinion? Yes. I think so, too. I have seen more animals lying about dead, presumably from drinking water contaminated by lead, in the summer, than I have during the winter.
2044. Does that apply to men also? I think it does.
2045. Do you think the proportion of cases of leading to the number of workers on the field is decreasing or increasing? I cannot give an answer that would be satisfactory to my mind in that detail.
2046. You did not mention the number of cases which you estimate you treat in the course of a year? Several hundred, I am quite sure.
2047. Do you think you treat 300 cases? Oh, yes; I am quite sure of that number.
2048. Then will you extend that statement to this: that three-quarters of all the persons employed about the mines as miners or surface hands, become leaded? As to all the principal mines, such as the British, Block 14, and the Proprietary, I would say yes; but not as to the others.
2049. That, I suppose, is because they contain very little lead? Yes; the others contain little lead, comparatively.
2050. Is there anything to choose between the three mines you have mentioned, as regards danger to the men, in the direction of lead poisoning—are they all equally dangerous? Well, I think Block 14 is the worst, the British next, and the Proprietary next.
2051. Do you think the better reputation of the Proprietary is because the management make a practice of periodically shifting the men from the lead faces to other kinds of ore? Yes; I think that arrangement has worked very beneficially indeed.
2052. And it may be that the uniform character of the ore in Block 14, and the British, prevents them carrying out a similar arrangement? I do not know that; I think very likely they have more surface work in the Proprietary Mine. But I think it would be impossible to find more than 1 or 2 per cent. of all the persons working in the three mines I have mentioned who have escaped leading, and possibly, not a solitary one.
2053. Your view then, on that point is, that a man employed at any of these three mines in the lead faces, is sure to get leaded sooner or later? Yes. There may be an idiosyncrasy which prevents the ordinary manifestation at the junction of the gums and the teeth, but even then they will suffer from colic and paralyses, and from the other conditions.
2054. The blue line is not universally present, even when the teeth are there? No.
2055. Do the tradesmen about the mines furnish cases of leading? Yes; such as mechanics; and the rule as to the weather applies very much to this question, I think; thus, when it is very dusty the surface men suffer more than usual, and more than the underground men, I think.
2056. Only a small number of young people are now employed as ore-pickers, I understand? I believe so. Certainly, there are not nearly so many employed now as there were when I first came here, and very properly so too.
2057. I think you have already said that you have noticed some people are much more susceptible to lead than others? Yes, I have.
2058. Now, will you tell us something about the symptoms of lead poisoning—I understand that you distinguish three or four classes of symptoms caused by lead, namely, colic, motor paralysis, epilepsy, and coma; is that the proper classification, in your opinion? No. I think it is not sufficient. In addition to these there is a kind of paralysis of the sensory system. The sensory nervous system is affected.
2059. And that class of cases you think distinct from the others? Yes; and my conclusion is that the sensory nervous system is more frequently affected than the motor here.
2060. You find motor paralysis decidedly uncommon? Certainly. I have only met with one or two cases during the time I have been here.
2061. And sensory paralyses, are they common? I think it is nearly universal. It shows itself in this way: the subjects are exceedingly dull in the use of their fingers and hands, and the same observation would apply to their minds. They are dull of apprehension. If they go to work with their fingers, in sewing, or in tying a knot, for instance, you can see how awkward they are. And in addition to that they suffer from amaurosis, that is to say the retina is affected.
2062. By way of diminished perception? Yes.
2063. Do you think these sensory symptoms are liable to be overlooked except by careful observers? Yes, I do.
2064. Are you of opinion that lead poisoning is essentially a disease of the nervous system? Chiefly, I should think, that is the case; though it affects the muscles very much. I should say it is not from the local deposition of lead in the muscular structure, but in the nervous structure.
2065. Then what do you think is the relationship of these four or five classes to each other;—do repeated

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attacks of colic lead to paralysis, and then to epilepsy or coma; or are they independent of each other? It is quite the contrary, I think. In proportion to the severity of the colic, the treatment becomes more effective. The patients suffer so much that they implore the medical man for assistance, and they have to clear out the *prima via*, and by that means remove the large quantity of lead that may have accumulated in the intestinal canal. But in those cases where the sensory system becomes affected, and where, too, the mind becomes dull, the accumulation appears to me to be much slower than in colic; and patients neglect treatment sometimes until complete recovery is scarcely to be expected.

2066. Then is it the case that the encephalopathic class of cases do occur quite suddenly, and without prodromal symptoms? Yes.

2067. Then how do you establish the diagnosis in those cases, without any forewarning, or any blue line, for instance? In the cases I have had the blue line has been present. Those were the cases of two children who had been ore-pickers, and whom I attended. In both cases they were comatose when I reached the house. One died within a few minutes after my arrival, and seeing that the patient was dead, and the parents went in to perform their last duties, I did not further disturb them, but left the house.

2068. Can you tell me the names of the patient you are now referring to? No; but it is procurable.

2069. Are you referring to the case of Joseph Bennetta, 1889? No; but he was my patient.

2070. Are you referring to Henry Christopher? Yes; I think that was the name. With regard to Bennetta, I may say that he was on the sick list one or two years before the fatal attack. They were living upon the mine, you may say, and were somewhat dirty people. They took none of the precautionary measures that had been suggested to them.

2071. Do you observe that drinking predisposes to leading? It does morally; not physically.

2072. How do you mean? I mean to say that they become so careless and uncleanly in consequence of their drinking habits, that they do little towards preventing the absorption of the poison into their systems. But I do not think that the drinking of any particular kind of liquor contributes by itself to lead poisoning.

2073. Have you had opportunities of watching the ultimate or later effects of lead poisoning, such as disease of the kidneys? No, I have not; I have wished to do so.

2074. Such effects you think must occur? Yes; they must occur in some portion of the renal structure.

2075. Is albuminuria common among the leaded people? No.

2076. Are they usually anæmic? Yes; worse than that; they are very sallow and unhealthy looking, and very dull in intellect; and so slow in their movements that it is quite surprising to me that some accidents, in the street for instance, have not occurred. Speaking of children, I have known babies affected in Argent-street—that is between Argent-street and Crystal-lane, but nearer Argent-street than the lane. A person named Ford, a water and wood carter, has a child about 2 years of age, which had a definite attack of lead poisoning; and the entire family while they resided there were exceedingly unwell; but since they removed to a distance of about 2 miles from here, they have recovered their health. The baby had convulsions.

2077. Did the baby recover? Yes.

2078. I was on the point of beginning to ask you about such cases. Can you tell us of any other case of lead poisoning among the general population? Yes; there was one woman in Crystal-street, whose name I forget, and whose husband is one of the shift bosses of Block 14, whom I attended several times for severe lead colic.

2079. At what distance from the middle of the ridge do you think she lives? About half a mile.

2080. Ford, I understand, had nothing at all to do with the mines? Nothing whatever.

2081. Well, are there any other cases? No. I have frequently been applied to by persons who thought they were leaded, but who were not.

2082. Do you find any cases of indisposition among persons not connected with the mines, but living rather near them, which you cannot account for? Oh, yes; that is a very common experience; indeed, I may say it is general. Those persons who are unable to take a change suffer very severely, and I think that is the cause of so many deaths during the summer. Those persons who can take a change for three or four weeks before the summer sets in pull through better.

2083. Have you found any particular line of treatment so usually beneficial to those persons who are suffering from indefinite symptoms that you can use the result of it as an aid to diagnosis? Yes.

2084. Now, as to the causes of death, I have consulted the records and I find, in 1891, there were ninety-two deaths of persons under 1 year of age ascribed to disorders of the digestive system, and thirty-three of those deaths were ascribed to wasting diseases; that is, to such causes as marasmus, consumption of the bowels, malnutrition, and indigestion. Are you of opinion that lead poisoning aids at all in bringing about these deaths from wasting diseases? I think not. I think they can be accounted for in other ways. I mean the disposition of the diseases and their developments, indeed.

2085. Do you refer to tuberculosis? Yes; and tabes—the gradual decay of young children.

2086. Then what happens—to what do you ascribe that gradual decay? I think such cases are not so prevalent now as they were. But, during the first year or two I was here I noticed that they occurred in the poorest families, of those least protected from the inclemency of the weather and having little food.

2087. You ascribed them to the general hardships of life on this field during the earlier period? Yes.

2088. I find also that there were fifty-nine deaths ascribed to such causes as diarrhœa, dysentery, gastritis, enteritis, intestinal catarrh, and the like—are you of opinion that improper feeding is the cause of that class of deaths? Yes; I am quite sure of it.

2089. Do you think general insanitary conditions have anything to do with them? Yes; I think so.

2090. But at all events lead has probably nothing at all to do with them? No.

2091. Then, in the same year, twenty-five deaths were ascribed to premature birth, defective development, and malformation; and, of course, in our system of registration, that applies solely to live-born children, do you consider that premature birth—whether live or still—is commoner among this population than among others of which you have had experience? I think it was greater at first—that is, during the earlier years of the field—and I do not think it was attributable to lead.

2092. Is abortion more common here than elsewhere? Not now, I think. It was, during the earlier years of the field. When it occurs now it is generally in the case of new-comers.

2093. Are derangement of the menstrual function more common? I think they are very much more common. The women sustain great trials on new mining-fields.

2094. Do you ascribe it to general hardship? Yes.

2095. And among the males, is impotence at all common? I think so.
2096. Do you think that is a result of lead poisoning? I should say it is very probable.
2097. Can you say anything as to the absence of small birds here, and the leading of stall-fed animals? Yes; during the first year I was here, I found a very large number of dead cows, horses, cats, dogs, and rabbits, lying within a few miles of the town, and generally not far from water.
2098. Can birds be kept in cages here? There is some difficulty with them from what I hear. I have been unlucky with my own birds.
2099. You live about a mile from the centre of the ridge? Yes, about that distance.
2100. I have been informed by more than one apparently credible person, that you do not have fleas here—does that accord with your experience? That is very true, there are no fleas here.
2101. And bugs? I have never seen one.
2102. You corroborate what they have told me? Yes.
2103. Are you of opinion that the fumes from the smoke-stacks, which do pass over, and often beat down on the houses, are without recognisable or appreciable effect upon the inhabitants? I think between Blend-street and the mines they have an appreciable effect.
2104. And the deaths of animals you are inclined to ascribe rather to the drinking of mineralised water than to the licking up of oxide or sulphide of lead from the ground? Yes.
2105. You have mentioned one or two cases of lead poisoning among the inhabitants, one of them a woman. Do you think she may have been a susceptible person, and taken it from her husband's clothes? I think not, because he was a superior boss, and was cleanly about his person.
2106. But she would have to do the washing? Yes.
2107. Are you of opinion that lead poisoning here is practically confined to the workers in lead? Yes.
2108. That is, with the exception of cases due to causes which exist in every town, such as house-painting, and so forth? Yes; I believe we have had a few of such cases—I have not had one of them.
2109. Now, will you give us your opinion on the subject of prophylaxes; there are personal measures, of course; and measures that could only be taken by the proprietors? The personal measures are habits of cleanliness, and refraining from rubbing up their tobacco in their hands, while they are dirty from their work. The text-books tell us that 4 grains of lead are sufficient to produce autopsic symptoms, and 4 grains of lead might easily be removed from the hands by rubbing the tobacco in that way after leaving work. Then, again, I frequently meet with men returning from the mines in the same clothes that they have worked in, which, I think, should not be. They should have conveniences at the mines for changing their clothes, and also for washing before they leave the mines; at least they should be able to wash their hands.
2110. It is desirable, especially in a place like this, where water is scarce, that they should have the means of washing the whole body? Yes; they should have baths. In the medical treatment of such cases I have found great benefit from warm bathing.
2111. I presume you agree that the proprietors ought to make such provision, whether the men take advantage of it or not? Yes; certainly.
2112. We have been told that in all probability no important proportion of the men would use it? I think the probability is that every one of them would avail themselves of it, and would be only too thankful, because the conveniences for washing without being seen by other members of the household, or people outside, do not exist in one out of ten of the cottages on the field; the result is that you will find the men pretty clean down to their waist, while the rest of the body is covered with grime.
2113. You have noticed that? Yes. The majority of the yards are not enclosed, and there is no quiet corner where the men can wash unobserved. As a matter of fact, they rather like washing in the open, but there is no corner, as a rule, where they could do so unobserved.
2114. Then you think if a reasonably suitable bath-room were established on each mine, with hot water in the winter, with towels and soap, and the necessary appliances, that probably they would be used by the majority of the men? Yes.
2115. We have been told that at Bendigo, Victoria, it is customary to provide clothes for the men, and make the men change, the object there being to prevent the stealing of gold; but since it is practicable there, apparently, it might be made a matter of regulation, or even a matter of law here;—if that were enforced, would it be a useful measure in your opinion? Yes; very much so.
2116. Then your view of the seriousness of lead poisoning here is such that you think some such regulation might well be enforced by law? Certainly, I think so.
2117. Do you think so, in view of its immediate consequences, and the amount of labour which is lost through leading throughout the year? Yes.
2118. You also think it of importance, I suppose, in view of the ultimate constitutional effects upon the men? I do. There is another important thing, I think, which I mentioned to the late Minister for Mines, Mr. Sydney Smith, who agreed with me, and that is the way in which the town sections here are subdivided. Allotments of land in the centre of the town, being not more than the third or fourth of an acre, are permitted to be cut up indefinitely, so that we have houses with frontages of 10 feet or 12 feet; and I have noticed that severe lead poisoning cases occur in the worst and most confined dwellings, where there are the least conveniences for cleanliness, for breathing freely, and for living decently. I am of opinion that no allotment should be subdivided without the assent of the Minister, or the Department of Mines.
2119. I entirely agree with your views on that point, Dr. Belgrave, and in other places, for other reasons, attention has often been drawn to it; but as yet no regulating powers exist? No; but I believe if an effort were made that a measure of the kind would be carried. I have myself written about it, and spoken to many political gentlemen, and they all agree. Mr. Smith was very strong upon the point. I brought it before him and Sir Henry Parkes when they visited Broken Hill. The frequency of cases of disease in the places I have mentioned has been very marked indeed.
2120. In short, in attempting to prevent disease, one cannot isolate one cause of death from other concurrent causes? No.
2121. And as you point out, lead poisoning, as it is, is aggravated by general insanitary conditions of other kinds? It is.
2122. *Mr. Hamlet.*] What means actually exist, or if they do not exist, could be adopted in the mines to reduce the liability to lead poisoning? In the dusty mines it is necessary to keep down the dust as much

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much as possible, of course. There is an ore here called lead ore,—I think the experts call it "dry ore." It is very dusty, and like quicksand, and is blown about by draughts, and so forth. I had under my care the underground manager of the British Mine once. He was exceedingly ill, and I thought he would die. His illness was due to lead. An accumulation had taken place in the liver. He had bleeding, and lost a bucketful of blood. I was astounded that he survived. He recovered, and in the course of a year or two afterwards he had another attack, and recovered from that. With the view of completely regaining his strength he went away to Victoria, but in about six months, though he had been away from the lead all the time, he had another attack, and died from it. After the first attack he adopted the system of sprinkling in that part of the mine where this ore is that I have spoken of. The result was that for some time I had very few cases from that mine, and at the time I speak of I had nearly all the cases that occurred. However, he became careless, like the rest of the men, and as I have told you, he was again attacked. He said he would resume the sprinkling, but I doubt if it was resumed.

2123–4. Is there a tendency in the miners to ignore these precautions? Yes. I think stringent regulations should be framed and enforced by fines.

2125. You have told us that you think the habits and conditions of the miners are favourable to lead-poisoning; and you think it desirable that precautionary measures should be adopted? I do, certainly.

2126. Do you think the country sustains any abiding loss through the permanent effects of lead-poisoning? I do, yes; in this way: I think the children of persons who have been frequently leaded are not so robust as those of persons who have not been leaded.

2127. Have you noticed any peculiar liability on the part of people of any particular nationality, race, or temperament, to leading? Yes; I have noticed that fair people are more liable to lead-poisoning than dark people. With regard to race, I think all are equally liable; that is to say, I have not been able to determine whether there is a greater or less tendency in the Germans, Italians, and Indians. If there is any difference I think the Germans suffer least. It may be owing to their superior cleanliness and orderly habits.

2128. Do you observe that they are cleaner than the others? Yes.

2129. What part of Germany do they come from? I have not ascertained; but I think from Westphalia. That is the dark men; and the fair men come from the north—from Pomerania and those parts. We do not get the best specimens of the nation here.

2130. My question referred simply to their personal habits, of cleanliness? Yes. I think they are cleaner—that is for the most part—than our people. They are so well trained too. Their wives are so well trained; they can sew, and do so many things that we cannot do.

2131. What ultimately becomes of the most severe cases of lead-poisoning? They leave the Hill.

2132. Do many persons go away for treatment? I think not. The majority receive their treatment here; but occasionally by the advice of their medical men they may go away for a change, as that is sometimes found to be the only way to bring about a permanent cure. And strange to say, the lead remains in their systems a year or two afterwards, even when they have left the Hill.

2133. In what part of the town particularly would you expect to find people suffering from lead poisoning? In Crystal-street chiefly.

2134. *Chairman.*] Why? Because it is a low street, and is nearest the mines, and it is not formed and clean. Curiously enough, the street belongs partly to the Government, and the Local Corporation have no control over it. It is a source of danger to the town.

2135. Do you mean us to infer, then, that general insanitary conditions stand in almost direct relation to susceptibility to lead? Yes.

2136. You do not mean to say that in Crystal-street there is any considerable accumulation of lead or flue-dust? Yes; I think so. The fumes from the smelters reach the people there pretty suddenly, because the wind blows mostly towards the west, and the people in Crystal-street catch it first.

2137. Notwithstanding that the top of the stacks is, perhaps, 250 feet high? Yes; notwithstanding that.

2138. And the distance between the stacks and the street about 500 yards? Yes. I have frequently noticed the smoke from the stacks fall down towards Crystal-street and Argent-street.

2139. *Mr. Hamlet.*] Do you think it possible for a man who has once recognised lead fumes, to be able to detect them by the smell after a lapse of years? Yes; I think so. For I have noticed a relationship between the density of the smoke and the smell of it myself. It is very pungent sometimes.

2140. Of the persons whom you have had under treatment for lead-poisoning, how many have died of the disease? Two children and one man, Mr. John Gregg, a miner, age 50, he died of extreme debility through chronic lead-poisoning.

2141. Did you ever meet with cases of lead-poisoning before you commenced practicing in Broken Hill? Yes, frequently; among plumbers and gasfitters.

2142. Do you consider the majority of the cases you meet with here are of a severe type? No; I think not—not nearly so severe as those I have met with elsewhere, among plumbers and gasfitters.

2143. In your opinion, does the temperate use of beer, wine, or spirits, conduce to lead poisoning? No; I think not. I do not think it exerts any influence one way or the other.

2144. Have you any suggestion to make to the Board which might tend to reduce these dangers to a minimum? Well, I think suitable dressing-rooms should be provided at every lead mine.

2145. Do you think special legislation is required to cope with the dangers of lead poisoning? Yes; I think special legislation is required; but inasmuch as the measures of prevention would necessarily change in the course of the development of scientific knowledge of the subject, I think there should not be any hard-and-fast rule, but that the Minister of the Department for the time being should have the power to fix the rules.

2146. If miners are not particular in their habits the risk of lead poisoning is necessarily increased? Yes. For instance, I think the habit of using uncut tobacco, and rubbing it in their hands after they have cut it, is a fruitful source of lead poisoning here, also there is the impossibility of the men being able to get a good wash all over, in a great many instances, without being seen by their mates, or even when at their own homes, by the people about the house.

2147. What, in your opinion, is the minimum age at which young people should be permitted to work about the mines? Eighteen years, I should say.

2148. Do you think the social arrangements, or the the want of such in Broken Hill, in any degree contribute

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contribute to the induction or persistence of the disease? Yes; particularly, I think, the habit of subdividing the land with the view to gain, and entirely irrespective of the sanitary interests of the people, conduces very largely to the absence of cleanliness here, as I have mentioned already.

2149. *Chairman.*] There is only one other question I should like to ask you, and it is whether your experience of lead poisoning here corroborates the statements usually met with in the text books on the subject; or rather, I should ask does it perhaps differ from those statements in any important respect? Well, I read, not very long ago, a paper which I think had been written in London by a gentleman who assumed authority from his connection with some lead works, and I remember that I disagreed with many points that he mentioned.

2150. You cannot mention any particular point? No; nor can I remember his name, but I know it occurred to me at the time that the medical men at Broken Hill could have given him some important information on the matter, and that he was radically wrong on one or two points.

2151. As to the children of Broken Hill, and speaking quite generally, would you say they are robust, and fat, and strong, as a rule, as children should be? Well, I think those that survive are particularly robust, but a large proportion succumb.

2152. You are aware that the infantile death rate is large? Yes.

2153. Do you attribute that to the lead? Well, I think the influence of the lead on the parents has conduced to the fewness of the children.

2154. Do you meet with gout up here? We do.

2155. But rarely? Yes.

2156. And it is not prevalent among the leaded men? I have not noticed that. It is not common. I have only met with one case of gout here, and he was a beer drinker.

[The witness withdrew.]

Dr. W. Blaxland called and examined:—

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2157. *Chairman.*] What are your qualifications, Dr. Blaxland? Licentiate of the Royal College of Physicans, London; Fellow of the Royal College of Surgeons, England.

2158. Are you registered under the Medical Board of New South Wales? I am.

2159. How long have you been practising in this town? About three years.

2160. Do you hold any special appointment? Only as surgeon to several lodges.

2161. Do you attend a proportion of the persons engaged about the mines? Yes.

2162. And a proportion of the persons who are not in any way connected with the mines? Yes.

2163. Can you tell us how many miners and surface hands would apply to you, with a view to comparing with such number the number of cases of leading you meet with? I am afraid I cannot.

2164. Can you give us an idea of the number of cases of leading you do meet with in the course of the year? I should think an average of two or three a week.

2165. Does that apply to the three or four years you have been here? Yes.

2166. I suppose the yearly number increases with the number of hands employed—do you know anything on that point? No. But of course we may naturally conclude that it would be so.

2167. Can you form any opinion as to whether the proportionate number is increasing? So far as my experience goes, the cases are not as frequent as they used to be.

2168. Do you think many leaded men go away for treatment? I think they do.

2169. Do you think a considerable proportion go away for treatment? No: a small proportion I shoud say. Many of them, after recovering from an acute attack, go away for a change. That I do not consider going for treatment. Then some men have told me that they have been leaded, as they call it, and have gone away to Adelaide immediately.

2170. Do you think the seasons influence the prevalence of leading, and if so in which season do you think it is most prevalent? I think cases of leading are more frequent in the hot weather.

2171. Have you noticed whether some mines furnish more cases than others? Yes; because some mines have a greater proportion of lead than others. Such mines as Block 14 and the British, and Proprietary, for instance.

2172. You do get some from the Central and Block 10? Yes, occasionally.

2173. But much more rarely? Yes. I may remark that a number of cases have come under my observation, of men who had not for some time previously been working in lead, but I should think—if you will allow me to give my opinion—that the system had become impregnated with the poison, and, as in other diseases, when the system became lowered the poison made itself felt. One man I remember particularly. He assured me he had not been working in lead for six months, but he was apparently suffering from lead colic, and he got well very rapidly under proper treatment.

2174. Did you ascertain as far as you could that he was not suffering from any of the common causes of leading—which are common to every population I mean? No. As far as I could make out he had the poison in his system, and his system becoming lowered it made itself manifest.

2175. Are such cases common? No; but I have noticed several.

2176. Do the tradesmen employed about the mines furnish cases of leading? Yes.

2177. But less often than the miners or smelters, I suppose? Certainly. For instance, I have had cases of carpenters employed round the smelters.

2178. Then as to fitters, engine-drivers, and mechanics? No; I do not remember any cases among that class.

2179. In the case of the carpenters, you think it depended upon the place in which they worked? Yes. For instance, knocking down old timbers where the smoke would be playing on them, and that sort of thing.

2180. Are there many young children employed in ore-picking and similar occupations? Not many now, I think. We had cases of leading among ore-pickers some time ago.

2181. Are some people more susceptible to lead poison than others? Yes.

2182. And for them there is nothing for it but to stay away from their occupation, that is to say, in lead? Yes.

2183. Their disposition to become leaded is constitutional, and cannot be removed? No.

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2184. Do you know of any person who has been employed a long time in the mines and has escaped? I know such a case of escape from the acute symptoms; but, though he never had lead colic, the lead had got into his system, and he had the blue-line, and lost weight very much, and became very bad. I recommended him to leave for six months, at any rate, and I have not seen him for six months. I think he left the district.
2185. Is it your belief that every man who works in lead is sure to get leaded sooner or later if he stays at it long enough? That is my belief.
2186. He is certain to suffer? Yes, in time. Whether from the lead only, or whether from that combined with other poisons that are probably in the mine, I will not say; but they get into this state of ill-health, lose their appetite, become pale, and lose flesh.
2187. I should have asked you, if, in speaking of other causes of poisoning, you meant mineral poison—arsenic, for instance? There are some cases which rather puzzle one sometimes; but I have never had a case of acute arsenical poisoning.
2188. You do meet with anomalous cases? Yes; cases suggestive of metallic poison of some kind, exhibiting tremor and nervous debility.
2189. I believe three, or even four classes of symptoms caused by lead are distinguished, namely, colic, motor paralysis, epilepsy, and coma;—are you of opinion that cases of plumbism may be conveniently divided into these classes? Well, I should rather combine the epilepsy and coma. Very often the patient has a distinct fit of epileptic form, and then becomes comatose.
2190. Then we have been told that besides motor there is also sensory paralysis? Yes. I regard that as a preliminary to actual paralysis, and always advise those exhibiting the symptons to go away from the place.
2191. What connection or relationship is there between the three classes you do admit. Do repeated attacks of colic lead to motor paralysis, and then after a time paralysis to epilepsy and coma; or are the different forms in your opinion merely indications of determination of the poison to different parts of the nervous system? I do not connect them. I have always had an idea that the lead attacks what is probably the weaker part of the system.
2192. And do you look upon lead poisoning as being essentially an affection of the nervous system? Yes.
2193. Can you tell which of the symptoms is the commonest? Colic is the commonest. Paralysis is comparatively rare, and so are fits of epileptic form.
2194. You say you meet with two or three cases of leading in the course of a week, probably—that would be, say 150 a year. Can you give an estimate of the way in which these cases would be distributed amongst the three classes. What proportion would be of colic for instance? They are nearly all of colic. I suppose 90 out of the 100 would be of colic, of various degrees of severity. Sometimes a man is writhing with pain on the floor; at other times there is merely loss of appetite, and a feeling of general indisposition, from which, of course, they rapidly recover. Some of them, of course, come for treatment at once; others, again, wait until they cannot do a hand's turn, and then they are really bad.
2195. Then, how would the remaining ten cases out of the 100 be divided between paralysis and encephalopathy? I should thing they would be about equal.
2196. What do you look upon as the prodromal symptoms of lead poisoning? Loss of appetite, I should say, is one of the first symptoms. They complain that they have no appetite, but force themselves to eat, as they have work to do. That is what I hear in many cases. In such cases, if a man continues in that course he will be attacked with pain; and then he may take a dose of salts, perhaps, which will give temporary relief. But the constipation continues, and he is attacked with vomiting; and then he will come for treatment.
2197. Are you aware whether at any stage the evacuations are blackened? I cannot say from personal observation. But I often inquire, and they generally say it is very black, and think it is the lead-dust.
2198. Do you think it is? No.
2199. What do you think it is? Well, I have always had an idea of the sulphate of lead being formed in the bowels. Of course any fœcal matter being contained any length of time in the bowels becomes more or less dark.
2200. Do you sometimes get cases of coma or epilepsy in which all prodromal symptoms are absent? Yes.
2201. Including the blue-line? Yes.
2202. What is the value of the blue-line as a diagnostic in the case of people who have their teeth? I do not consider it of great value.
2203. Has it not a positive value—if you found it in a patient, for instance, would you suspect lead to be the cause of his illness? If I found it in a man who came to me suffering from any complaint whatever, I should add something to his medicine to eliminate lead. But further than that I do not consider it of any practical value.
2204. Do you include anæmia in the prodromal symptoms we are talking about? I should say only so among the men working underground, and in many cases they are pale looking; but beyond that I do not think I should include it; that is, one hardly investigates for anæmia as a disease here.
2205. Now as to the later effects of lead poisoning, there is an important question, not merely as to how many persons are laid by, and how many days of labour are lost, but also as to the ultimate constitutional effects. Men come here and get leaded; you recommend them to go away, and they do so. Now, do they recover, do you think, or are their constitutions permanently damaged—that, perhaps, could scarcely be a matter of experience with you? Hardly as yet. Men go away, and perhaps, never come back; and if they do return I may not see them again.
2206. It is, however, a generally accepted opinion that lead poisoning does lead to permanent alterations? I think it is. I have always considered that it has a damaging effect upon the constitution.
2207. By way of predisposing the patient to diseases of the kidneys, or the circulatory of system? Yes. It has been noted before, I think, and I have noticed here, also, that there is a distinct connection between gout, rheumatism, and lead.
2208. Do you meet with gout here? Yes.
2209. Do you meet with it often? No.
2210. You meet with it especially among lead workers? I have only seen two or three cases of it here. In one of those cases the man was working in lead, and I told him he must keep away from it.
2211. That refers to gout, but do you say rheumatism too? Well, among other things, the way in which lead affects the system is, that they get pains in the joints of the knees, and weakness. Sometimes when

I have been a little doubtful in a case, I have asked the patient if he felt pains in the knees, and he has answered "Yes, and as I am going up to the mine sometimes my knees give way." I have always thought there was a connection between that and rheumatism.

2212. It has been suggested to the Board that the symptoms you have described are in reality due, not to lead poisoning, but to carbonic acid poisoning. Do you know anything about that? No.

2213. Those persons who are leaded in a moderate degree, are they dull or slow in their manner at all? I have not noticed that particularly. When they get colic badly they take little or no food. Their stomach rejects it.

2214. You are sure there is no prevalent dullness of intellect among persons slightly affected by lead? I have never noticed it.

2215. As to the general population, have you met with any cases of plumbism among persons not in any way connected with mines? None that I have recognised as such.

2216. Do you meet with doubtful cases in which you may suspect lead to be a factor? I did meet with one case that I thought might possibly be due to that. But while I had been seeking for the cause of trouble, the patient had been seeking for other advice, and as soon as I came to that conclusion I lost sight of her.

2217. You have seen only one such case? Only one of the kind in which I thought lead might possibly be a factor.

2218. Do the people in general show signs of anæmia? No.

2219. Are the children here as a rule rosy and strong, active, and healthy? I think so.

2220. Then, touching the causes of death, in 1891 there were 188 deaths of children under one year of age; thirty-three of these were ascribed to wasting diseases, such as marasmus, tabes, mesenterica, or consumption of the bowels, malnutrition, and indigestion. Are you of opinion that lead has anything to do with that class of cases? No.

2221. Are you of opinion that tuberculosis is answerable for a considerable portion of them? No; not in my experience.

2222. Are you of opinion that improper food is a great cause of death among children of tender years? Yes; my experience leads me to that conclusion. As you know, some children appear to be born with just sufficient energy or vitality to last them till teething time; and beyond that they cannot stand anything. A number of deaths are due to teething and improper feeding.

2223. You are quite clear that lead has nothing to do with it? That is my opinion.

2224. Then fifty-nine deaths of persons under one year of age, were ascribed to such cases as diarrhœa, dysentry, gastritis, enteritis, intestinal catarrh, and the like. Are you of opinion that improper feeding is a cause of that class of deaths? Yes, a very important cause. Dysenteric diarrhœa naturally plays an important part in that class of deaths.

2225. Is dysentery frequently met with? It is rather common among children. Not true dysentery, but inflammatory diarrhœa.

2226. Partly contributed to by the necessarily hard conditions of life here, and partly due to improper feeding, but not contributed to by lead poisoning in any degree? Not that I know of. It has occurred to me occasionally that the systems of the parents, or that of the father at least, might have been debilitated from that cause.

2227. As to diarrhœa and dysentery, I presume you would recognise the general insanitary conditions of life as being contributory, or a concurrent cause of such diseases? To a certain extent I do. But I do not think the sanitary conditions here are so very bad. Sometimes the water we have to drink here is not very good.

2228. Then, in the same year twenty-five deaths were ascribed to premature birth, defective development, and malformation; and under our system of registration that number includes only such children as were born alive, and none of the still-born. Do you consider that the number of such cases, whether still-born or alive, is greater here than in other communities of which you have had experience? Well, this is the only population I have had experience of in private practice, therefore, I cannot say.

2229. Is abortion very common here? Yes.

2230. Are derangements of the menstrual function common among both the married and unmarried here? Yes.

2231. Do you hear impotency complained of amongst the males? No.

2232. Have you seen any reason to ascribe abortions, premature births, derangements of the menstrual function, and so forth, to minor degrees of leading? No; I have seen no reason to conclude that.

2233. Then, in short, are you of opinion that the fumes from the smoke-stacks which do pass over the town and often beat down on the houses, are practically without ill-effects upon the inhabitants? I think so far they have not shown any bad effects upon the systems of the inhabitants.

2234. You think that lead poisoning among the men is confined to persons who work amongst the lead practically? Yes.

2235. Now, as to animals, I believe they do die here. Can you tell us anything as to the cause of death among the animals here? One of the symptoms frequently exhibited in cats and dogs here is an epileptiform seizure in which many of them die.

2236. Cats and dogs are liable to fits are they not? Yes. But here they are remarkably liable to fits.

2237. Have you made any post-mortem examination in such cases? No.

2238. We have been told that fleas are absent here? There are remarkably few, certainly; but they are not absent altogether.

2239. They are unmistakably few? Yes.

2240. Have you seen bugs here? I have seen an occasional one; but they also are rare.

2241. Like other physicians, I suppose you have had opportunities of making acquaintance with the homes of the poor, in other parts of the world? Yes; in the east end of London for instance.

2242. Do the small birds die here? If not in captivity they do. If they are allowed to hop about on the ground they get ill and die. I do not remember any in cages.

2243. Do you keep fowls? Yes: and I have lost some of my fowls.

2244. They run about? Yes; about the yard.

2245. And your yard is not made up of refuse from the mines, as in the case of some people's premises? No.

2246. Do you think your fowls die on account of what they pick up from the ground? I really do not know. I have one now which has paralysis of the extensors of the legs.

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2247. Will you hand that hen over to Mr. Hamlet for analysis? Yes.
2248. As to prophylaxes, there are two kinds of precautions that may be observed—one that the workers can take for themselves, and the other that the proprietors alone could enable them to take;—have you anything to suggest in that connection? I have thought if the men could wear some form of respirator it would be a good thing; but I am informed that the men could not breathe through it satisfactorily.
2249. But supposing a miner did wear a respirator, do you think he would be entirely protected thereby? No; but he would be protected in a great measure. I may say, also, that the men would do well to wash their hands before eating, or cutting up their tobacco, which they rub fine in their hands before putting into the pipe.
2250. Have you considered at all what direction legislation might fairly take in regard to providing for increased protection for the men? No, I have not.
2251. Have you any knowledge of the use of milk as a prophylactic? I have no direct knowledge. I always recommend them to drink it.
2252. May I ask on what ground? Merely that I saw it stated sometime ago that in some place where the people were working in lead they drank enormous quantities of milk, and that cases of lead-poisoning there were very rare.
2253. Among the people whom you have recommended to take milk here, do you know of any who have taken it regularly? No. The fact is, that the milk is so scarce here very often that they tell me they cannot get enough to drink in the ordinary way.
2254. Are you of opinion that personal cleanliness—I do not mean merely washing the hands or mouth, but general cleanliness and attention to the skin—is of special importance in this class of work? I have no ground for believing that the lead is absorbed through the skin. I have always had the idea that it is taken in chiefly through the lungs; but I have no evidence to bring forward on the subject.
2255. At all events, I suppose you think that the workmen should have their time clear in which to eat their crib—that is, they should not be compelled to leave their food every now and then to take a hand at their work? No, certainly not.
2256. That arrangement being incompatible with clean hands during crib-time? Quite so.
2257. *Mr. Hamlet.*] With regard to the ingestion of lead into the stomach, we know, for a fact, that men are subject to that on being in the atmosphere of lead-dust. May it not also be taken in through the skin, do you think? That is what I do not know, as I have already said. I suppose it might be taken in by the skin in certain forms. For instance, finely-powdered carbonate of lead might be rubbed in through the skin.
2258. Especially when a man is perspiring, and the perspiration being of an acid character? Yes; but the current there is outward rather than inward. I have always thought that perspiration tended to clear the skin.
2259. At present we have no positive knowledge on that point? No; I have none.
2260. Lead is an accumulative poison, is it not? Yes.
2261. Consequently, it might be a very short time during which a poisonous dose of lead might be taken into the system? Yes.
2262. Especially seeing the poisonous dose is from 4 to 9 grains of compound of lead? Yes; that might be taken in very rapidly; but some systems might not suffer from the same dose as others.
2263. With regard to precautionary measures, do you consider that the compulsory changing of clothes would be an advantage? I should think it would. For instance, after a man has done his work, if he could throw off all his working-clothes, and put on others, especially after a good wash, he would be in a decidedly better position than the man who had not done so—that is, provided we are right in concluding that lead may be absorbed through the skin, which is possible.
2264. Do you think that the companies might be reasonably asked to provide baths for the use of their men? Yes.
2265. And you think that would be especially reasonable, seeing that the opportunities which the men have of getting a bath here are rare? Yes—that is, they used to be rare, but now I suppose we are going to have plenty of water.
2266. Speaking generally, what are the conditions of life in Broken Hill of the ordinary miner? Well, he gets plenty to eat and drink, but is rather short of water for domestic purposes, including washing and bathing, and his house in many cases is too little ventilated in the summer-time—too hot, and in nearly all cases too small for himself and his family.
2267. As a rule, when a miner goes home from his work, has he an opportunity of washing himself all over thoroughly—would he have a place, for instance, out of view of the rest of his family? No, not to strip. They strip to the waist, and wash at their back door, generally.
2268. Have you noticed, as a fact, whether they are clean from the waist upwards? Yes; fairly clean, so far as a casual glance goes. I have driven by and seen them performing their ablutions at the back door. I have seen men from the mine with their skin black and grimy from the dust.
2269. *Chairman.*] A statement has been made to the Board that owing to the want of decent accommodation for washing the men do wash from their waist upwards, but are found to be from the waist downwards dirty? I understand.
2270. *Mr. Hamlet.*] Is that your experience? No; but in any case I think you can hardly blame them altogether. For instance, a woman has come to me concerning something the matter with her foot or leg, perhaps, and appearing ashamed of the condition of her feet, has assured me that she washed them before starting, and got them dirty on the ground coming from her home. We have a great deal of dust here sometimes, and suddenly rising up under one's clothes will dirty the legs very much.
2271. So that, under all the circumstances, if baths were provided on the mines it would be a good thing, you think? Yes; I think it would be a very good thing, indeed.
2272. And a reasonable thing for the mining companies to provide? I think it would be a fair thing; but, of course, it is a large question.
2273. *Chairman.*] Have you certified any deaths as being directly due to lead-poisoning? Yes; one occurred recently which I believe was due to lead-poisoning, and I certified it as such.
2274. During the last three years have you given any other certificates to that effect? No.
2275. Has your practice here led you to differ from the statements regarding lead-poisoning usually met with in the text-books, and so forth? No; it agrees with them very fairly.
2276. Is there any other point that you can bring under the notice of the Board, or any suggestion you can make that might assist them in this inquiry? No, I think not.

[The witness withdrew.]

WEDNESDAY,

WEDNESDAY, 6 JULY, 1892.

Present:—

DR. ASHBURTON THOMPSON (CHAIRMAN).

W. M. HAMLET, Esq.

Dr. H. J. Groves called and examined :—

Dr. H. J. Groves. 6 July, 1892.

2277. *Chairman.*] What are your qualifications, Dr. Groves? I am a Member of the Royal College of Surgeons, Licentiate of Royal College of Physicians, and Licentiate of the Apothecaries' Society.
2278. You are registered by the Medical Board of New South Wales? Yes.
2279. How long have you been practising here? Six years.
2280. You do attend a proportion of the persons engaged about the mines? Yes; I was the second doctor on this field.
2281. Have you any idea how many miners and surface hands would apply to you, if they were sick—that is, in view of making a comparison between that number and the number of cases you meet with during the course of the year? I can get you that information.
2282. Can you give me an idea of the number of cases you meet with in the course of the year? Well, you may put it down at 150. I think that would be a fair average; but there are a number of mild cases which would not be included in that average.
2283. Do you think that the proportion of cases of that kind, to the number of men employed, is increasing or decreasing? It is decreasing; that I am positive of.
2284. Why is it decreasing, can you tell us that? Well, it has decreased since the mines have been better ventilated.
2285. Do you think many persons go away for treatment? Yes; many of them, after the first effects of the lead, go away for a holiday, perhaps for months.
2286. Do you think the seasons have any influence—do you meet with more cases in the summer than you do in the winter? I do not think so. But I have heard patients say when they are getting better that if they go out in the cold the pains come back again.
2287. Do you notice that some people are more susceptible to leading than others? I have noticed it in one way—for instance, I believe the unmarried men who "batch" are liable to get leaded quicker than married men.
2288. To what do you trace that? It is, I think, largely a matter of cleanliness. Married men have their rooms and meals prepared for them; they have time to get a wash and change, and their circumstances are generally more favourable. The unmarried men are not usually so cleanly in their ways. They have to cook their own food as soon as they get home.
2289. Are the men who live in boarding-houses better off, do you think? Yes; better off than those that batch.
2290. Do you think every man who works among lead is sure to get leaded sooner or later—is it merely a matter of time? Yes; it practically comes to that, whatever care he may take. I have known a man to work five years without being leaded. The man I have in my mind now, when I saw him, had been working for five years in lead, and he was then complaining of the first symptoms, and I sent him out to the White Lead, where there is no lead. He was a married man, and his house was very cleanly kept.
2291. How many classes of cases do you recognise as being due to lead poisoning;—do you recognise one as being characterised by colic, for instance? Yes; acute cases are characterised by colic, and very rare cases of chronic poisoning are characterised by paralysis. Then there are other cases where the men will come for a dose of medicine, and after getting a good clearing out will go to work again.
2292. Then, is there not a class of epileptic patients? Yes; that comes rather under the class of chronic cases.
2293. How many deaths due to lead have you noticed in your own practice? Very few. I can only recollect two.
2294. You have had none during the last three years—that is, during 1889, 1890, 1891;—you have not recorded any? Well, I suppose I have not. I was just thinking of the cases of some children on the other side of the Hill some three years ago. The whole family were lead poisoned, I have no doubt. They were under the smelters of the Big mine.
2295. Was the father employed about the mine? Yes; he was an engine-driver. I should say he was not leaded. The majority of the family showed the blue line, but did not complain of lead poisoning. Two of the children died of convulsions.
2296. How do you suppose the lead reached them? I take it, directly from the smoke. Possibly it was from drinking water contaminated by the fumes.
2297. Are cases of colic the commonest cases? Yes.
2298. Are paralyses more or less common than epileptic and encephalopathic cases? I have seen very few cases of paralyses—only two or three; two of them in one family, by the way.
2299. Do you consider that the absence of the blue line weighs strongly against a diagnosis of lead poisoning? Yes.
2300. You are not of opinion that the blue line is often absent from persons who are suffering from lead poison, and who have their teeth? No; I have never seen a case in which I could say the person was leaded in which there was not the blue line. It might occur, perhaps, in the first place that no lead line would be apparent. I remember I had two cases when I first came here, and I was then new to lead poisoning. These men had been put to clean out the flue leading up to the stone stack at Block 14, which was since pulled down. They only worked there four hours, and both suffered severely from colic. I do not think in those cases I saw any lead-line, so far as my memory serves me.
2301. And they had not been exposed to lead except for the four hours you mention? No.
2302. Do you find people who are leaded dull in intellect or slow of movement? No; not in the early stages.
2303. I do not refer to those who are so affected as to be epileptic? So far as my observation has gone, I do not think it makes any difference in the mental condition.
2304. Have you noticed any effect upon the kidneys? Yes; I believe it is so in cases where they have been leaded several times. In one case I found albumina in the urine of a patient who died from what appeared to be lead anæmia.

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2305. You do not commonly meet with albuminuria? Not commonly.
2306. Have you any reason to think that the kidneys are commonly affected in persons who have suffered from lead poisoning several times? Yes; I have reason to think so. I believe myself that such would be the effect from what I have seen. But it would require a longer experience than I have had here to speak with certainty.
2307. You are of opinion that people suffer constitutional damage of which the effects are not developed until after many more years than you have practised here? Yes.
2308. Do you meet with gout here? Very slightly. I have not seen enough gout here to associate it with lead in any way.
2309. Have you seen six cases altogether since you have been practising here? No; not true gout.
2310. With regard to rheumatism, do you think that is an accompaniment of lead poisoning? Yes.
2311. And anæmia? That is a constant sign.
2312. Have you met with cases of plumbism among the general population—that is, in persons not connected with the mines in any way? Yes; there was the case of an employee of the South Australian Brewery Company two summers ago. He drank a great deal of water from the roof, and got it in that way. The place is under the stack in Crystal-street.
2313. Was he the only man who suffered in that way? The only one I can call to mind at that time.
2314. If he suffered from drinking water contaminated by lead dust, would you not expect other persons in other parts of the town to suffer in the same way? Yes; and they probably have done, but they have not come under my observation.
2315. Do you meet with many cases of indisposition among the general population that you cannot satisfactorily account for? No.
2316. Are you of opinion that the fumes from the smoke-stacks, which pass over and often beat down upon the houses, have a recognizable effect upon the general population? No.
2317. The people in general do not show signs of anæmia;—are the children healthy, rosy, and strong-looking? The children living near the mines suffer, I believe, but not the adult population.
2318. Will you tell us what you call near the mine? I mean the houses right under the mine—on the side of the hill, and as far as Crystal-street, I should say. The cases of children I have seen were much nearer, right under the smelters, in fact.
2319. Speaking generally, you would say a distance of about 400 yards, I suppose? Yes; or closer, some of them. At that distance, notwithstanding the height of the stacks, you see the smoke beating down on the houses in some states of the weather, but I do not think the general population in other parts of the town suffer so much from lead poisoning.
2320. You say, "not so much"—do you think they suffer at all? No; I do not think they do suffer from lead poisoning.
2321. I find in the Register for 1891, a number of deaths of children ascribed to wasting diseases; do you think that lead has had anything to do with bringing about those deaths? From my experience, I should say that many of the cases were caused by improper feeding and gross ignorance.
2322. Do you think that tuberculosis is here a common cause of death by wasting diseases? Yes; but as I have said, the deaths are largely due to gross negligence and ignorance that seem almost incredible.
2323. Then there were fifty-nine deaths of children under one year, ascribed to intestinal diseases, such as diarrhœa, dysentery, gastritis, enteritis, and so on; and these you would probably ascribe to a similar cause? Yes; mostly, of course, in the summer months.
2324. Do you think that the same ignorance and neglect is a concurrent cause with general insanitary conditions? Yes.
2325. You do not expect to get specific diseases like summer diarrhœa and dysentery, merely from bad feeding. The records for 1891 show that ninety-two deaths of persons under one year of age were ascribed to distempers of the digestive system. Of these, thirty-three were ascribed to wasting diseases, that is, to such causes as marasmus, tabes, mesenterica, consumption of the bowels, malnutrition, and indigestion. Then besides these, in the same year, there were also fifty-nine deaths of children under one year, ascribed to diarrhœa, dysentery, gastritis, enteritis, and intestinal catarrh; and the question is whether you are of opinion that improper feeding is the chief cause of those classes of deaths? I do think so, coupled with insanitary conditions, and the intense heat of the small iron houses, and the bad water. Up to the present time, these people have been in the habit of drinking the surface water collected round the place.
2326. They have drunk the surface water of the area round about, which, in part, becomes putrid before they take it? Yes.
2327. Then, as regards these ninety-two deaths, you would say that lead has nothing to do with them practically? No; not with the great majority.
2328. None of the still-births are recorded at all? No.
2329. Do you think premature birth, whether live or still, is more common among this population than among others? Difficult labours are more common here.
2330. But premature birth, malformation, defective vitality, and that sort of thing? I would not give a definite opinion upon that question.
2331. Do you think the proportion of such cases is much greater in this population than in others? Not particularly, I should say.
2332. Are derangements of the menstrual function at all common here? Not more than in other parts of Australia, so far as I have seen.
2333. Among males, is impotence a common complaint? No; I have not heard of it.
2334. Now, as to animals, which are said to die here of lead poisoning;—do you know if the cause of death has actually been established? No; but everyone has a strong feeling that it is so. It occurs principally in young animals. I have lost pups. The bowels become paralysed.
2335. And birds in cages? No. I have birds now—English birds—which I have had since I came here, and I have only lost one, a thrush, which was killed. We lost one bird the other day, I should say; but that, I think, was from old age. They are healthy enough now.
2336. But animals and birds which take their food on the ground are in great danger? Yes.
2337. We have also been told that if you bring a dog here after it has reached the age of twelve months, it may survive, whilst the pups born here all die? Yes; very likely. I think it depends upon the distance they are from the mines.

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2338. Can you give us an idea of the limit of distance in that connection? Well, I have lost pups at my house, as I have said, and it is between half a mile and three-quarters to the west.
2339. Do you agree that there are scarcely any bugs or fleas here? There are not many bugs, I believe; but there are plenty of fleas.
2340. I think four witnesses have stated that fleas are very scarce here? There are plenty of fleas.
2341. Do you have to use fleapowder to your dogs, for instance? No.
2342. Or you birds? No.
2343. Then, finally, you say the lead poisoning you meet with here, for all practical purposes, is confined to persons working in or about the mines? Yes; or those who live close by, as in the case of the children I have mentioned.
2344. You do not think it reaches persons not connected with the mines, but who live close to them? Yes; in the case of children, certainly.
2345. And by close you mean how far off? Close up, or near to them.
2346. Crystal-street, for instance? No; not Crystal-street. As I have said, I have only known one case there.
2347. Then, if people live 400 yards or 500 yards from any stack, they are safe, in your opinion? Yes; so far as my experience goes.
2348. Will you tell us what you consider the most important steps towards the prevention of lead poisoning? Personal cleanliness, I think, is the most important thing, and if the miners were provided with the means of changing their clothes on starting and leaving their work, and some provision were made to ensure their taking advantage of it; that, I think, would go a long way towards checking the evil.
2349. There are some things which the men can do for themselves, and others that the proprietors only could do for them? Yes.
2350. Then there is another thing; if a man has been leaded several times, and he is a good worker, should that be taken into consideration to the extent of giving him some other kind of work which would enable him to recover? Yes; but many men are unable to get work out of the lead, and go back again and again.
2351. But we have been told by more than one manager that they do systematically shift the men;—at all events, as far as they can? They shift the men from one end of the workings to the other; but there is such a thing as surface work, where the men are away from the lead altogether, and, on the production of a medical certificate by the men who are so suffering, they might be kept away from the lead altogether.
2352. You think the system of changing the men might be carried out more thoroughly? I think attention might be drawn to it.
2353. It has been suggested that if suitable changing-rooms were provided, few of the men would use them? It is quite likely.
2354. Nevertheless, you think they ought to be provided? Certainly; and I think the men should be compelled to change, by a rule making systematic neglect to do so a reason for discharging them. A man who is suffering from lead poisoning cannot do a fair amount of work.
2355. Your inference is that it would pay the companies, looking at it merely as a matter of money? Yes. I do not think they would lose by it. What they would lose in one way they would gain in another.
2356. *Mr. Hamlet.*] What, in your estimation, is the distance from the mines to Crystal-street—about a quarter of a mile? Yes.
2357. Have you, during your practice here, found many cases of lead poisoning in Crystal street? No; only one. In fact, almost all the cases I have seen have been those of men who have been leaded on the mines.
2358. From your knowledge, can you say whether the children here drink all kinds of water? They drink any water they can get. A great deal of illness among children, and a number of deaths, arise from carelessness in that respect.
2359. They drink any water they can get? Yes.
2360. Do you know, in your experience of the working people here, of any family who keep a filter? I cannot call one to mind. Some of them do, I believe.
2361. We may take it that some do? Yes.
2362. Have you had opportunities of knowing how long a man here will or may go without washing his body entirely? I cannot say that exactly. Of course, I know that some of them are not so careful as they should be about washing.
2363. You have sometimes had opportunities of seeing the bodies of these men from the loins upwards; do you find many dirty men among them? I should say about the same as you would find among the ordinary class of labouring men anywhere. Some are dirty, of course, but I think the greater number are fairly clean. The point I take is that they are not careful enough about washing when they come from the mine, especially, as I have said, in the case of the young men who "batch."
2364. Do you think there are instances of men who never completely wash their bodies? Well, I cannot say I have ever met with a case of that sort. I cannot recall one to my mind.

[The witness withdrew.]

Dr. C. Govett called and examined:—

Dr. C. Govett. 6 July, 1892.

2365. *Chairman.*] What are your qualifications? M.R.C.S., England.
2366. You are registered by the Medical Board of New South Wales? Yes.
2367. Do you hold any special appointment? I am the local medical referee for the A.M.P. Society.
2368. Have you any private practice? No; I am not practicing privately.
2369. Do you know anything in general about the subject of lead poisoning here? What I know is simply from those who have come before me for examination. I have had a few of such cases in that way.
2370. Do you load candidates for life assurance here? Yes, certainly, among the miners.
2371. How much do you load them? Five years.
2372. Is that loading imposed in every case in which a man says that he is a miner? Yes, when their occupation brings them in contact with lead ores. I am very particular to ascertain whether they are in actual contact with the ores. For instance, I had a man yesterday who told me he was what they call a timber

Dr. C. Govett. 6 July, 1892.

timber-man—a man employed in the mine putting up timbers; and I asked him: "Have you anything to do with the ores?" "No, sir," he said, "I have nothing to do with the ores; I simply put up the timbers." In such a case I make a note of the statement made to me, and perhaps make further inquiry. I have had to reject one or two of them that have come before me in that way.

2373. Do you load smelters—the men on the tapping-floor—as distinguished from those who work on the feeding-floor? I am not prepared to say that—that is, whether they should be included in the category of miners, the men who handle the ores.

2374. My question is, whether you load smelters—the men who tap the furnace on the bottom floor? Yes, I think so. I would load anyone having to handle the ores in any way whatever.

2375. Of the proponents that come before you in the course of the year, what proportion do you find to be suffering from the effects of lead, at the time of examination? I have only seen two, and I have been here for eight months. I imagine they take care to be in good health, as a rule, before they present themselves.

2376. Does your experience enable you to mention any points that might be of service to the Board in this inquiry? I cannot speak from actual experience; as I have told you, I do not practise here. From what I have noticed of the people here, I should say that a great many of those I have met betray more or less signs of lead saturation.

2377. Do you distinguish in any way between the townspeople, in general, and those employed in or about the mines? Yes, I think so; I think the lead is more or less apparent among the latter class particularly.

2378. Do you think you observe the lead line among the townspeople—those not connected with the mines—to any extent? I should be disposed to think not.

2379. What is your opinion of the aspect of the children here? Generally, I think fairly healthy.

2380. People do not often die directly from lead poisoning? Not to my knowledge.

2381. On what principle does your Society load applicants for life insurance who are workers in lead—is it in view of damage to the constitution which may be caused through working in the lead? I think so.

2382. In view of the permanent damage which may have occurred, rather than in view of acute poisoning? Yes; although there have been very bad cases here, I am told.

[The witness withdrew.]

THURSDAY, 7 JULY, 1892.

Present:—

DR. ASHBURTON THOMPSON (CHAIRMAN).

W. M. HAMLET, Esq.

Dr. J. T. Harvey called and examined:—

Dr. J. T. Harvey. 7 July, 1892.

2383. *Chairman.*] What are your qualifications? M.B., C.M., Edinburgh; M.R.C.S., England; and M.B., Melbourne.

2384. Are you registered by the Medical Board of New South Wales? Yes.

2385. Do you hold any special appointment here? No.

2386. How long have you lived here? Five months.

2387. You attend a proportion of the people engaged about the mines, as well as the general townspeople, of course? Yes.

2388. How many cases of lead-poisoning have you met with during the time you have been here? About twenty, I should say.

2389. Have you any idea of the proportion that number bears to the total number of persons engaged about the mines who would apply to you if they were sick;—by the way, are you a member of the Medical Fund? No.

2390. Then you have no notion of the number of persons who might apply to you if they were sick? No.

2391. You say you have met with twenty cases of leading during five months;—can you tell us how they fell under the different classes of lead-poisoning? There was one case of acute encephalopathy, one case of eclampsia, one of wrist-drop, and the remainder were chiefly lead colic—that is, there were a few cases in which digestive trouble formed the cause of complaint; but the bulk of them were colic. In fact, unless the men get a pain they will not send for a medical man. As a rule it is the colic that makes them call the doctor in.

2392. Then you do recognise a minor degree of lead-poisoning which is not betrayed by any definite symptoms? Yes—that is to say, cases indicated by disorders of the digestion, and constipation.

2393. Then are you of opinion that probably some of those cases of encephalopathy which appear to be sudden, and therefore apparently acute, are really cases of chronic lead-poisoning in which there have been no symptoms but indigestion and constipation? Yes. I should look upon that as being so. I look upon the conditions as not being understood by the men; they do not refer these effects, or brain affections to lead-poisoning at all, that is, unless they get symptoms they themselves understand, such as colic.

2394. Have you formed any opinion as to the value of the lead-line as a diagnostic? I look upon it as valueless by itself, because it may be seen on the gums of persons other than those who are suffering from lead-poisoning.

2395. But you find it very little among the townspeople, I suppose? I have seen it on the gums of the townspeople. I do not look upon it as necessarily an indication of the existence of lead in the system.

2396. You have reason to believe that it may be merely a local manifestation—a deposit of lead on the outside of the gums? It may be. I do not know why there should be a blue mark there because, as I have said, it is met with in persons who present none of the usual symptoms of lead-poisoning.

2397. And do you meet with it frequently among the townspeople? Yes. I make a point of examining the gums, and I find it fairly constant; but I cannot say the percentage.

2398. When you see a townsman with the blue line, do you prescribe the usual remedies for leading? Not necessarily; he might be suffering from a disease totally distinct from lead-poisoning.

2399. Would you disregard it? Yes; I would not base my estimate of the case on the existence of the blue line alone.
2400. Have you seen it in children? Yes.
2401. Suppose in the case of a sick miner the blue line were absent, should you consider that against a diagnosis of lead-poisoning? It is against a diagnosis of lead-poisoning to that extent; but when other symptoms are present you may accept the blue line as an indication.
2402. Then what you say is this: That the blue line confirms the diagnosis of lead-poisoning where other symptoms point to it; but if the blue line is absent you do not therefore disregard the diagnosis, which the other symptoms seem to warrant? Yes; that is precisely my view.
2403. Is anæmia common among the townspeople not connected with the mines? I do not think so—not especially common.
2404. What is your opinion of the children here—are they as sharp, quick, and healthy-looking as the children living in other places? I fancy there is a form of anæmia among them; but I believe they are as sharp and active as the children in other places. You do not meet with the rosy children here that you see in an agricultural population.
2405. Are the children, in your experience, liable to suffer minor degrees of indisposition which may be attributed to lead? No; I cannot reasonably say I have ever diagnosed a certain case of lead-poisoning in any of the children here.
2406. Then you do not mean us to infer that the anæmia you speak of as being among them is due to lead? No.
2407. Have you noticed whether the majority of your twenty leaded patients came from a particular mine or not? They mostly came from Block 14.
2408. Do you know how many? I should say the half of them came from Block 14. I have no particular statistics.
2409. And the other half were distributed? Yes.
2410. Have you noticed what particular place or occupation about the mines the twenty men followed? They were mostly smelters and underground men. The underground men, I think, suffer more than the smelters.
2411. What about the ore-wheelers? I have not met any of that class professionally.
2412. Do you find derangements of the menstrual function more common here than you have found them elsewhere in the course of your practice? No; I do not think so.
2413. Have you any reason to think that abortion is especially common? Not in my experience; but I should say that my experience of midwifery here has been rather limited. It is mostly done by the midwives, I think.
2414. Nearly all of the questions I have asked you have had reference to the importance of the fumes that issue from the smoke-stacks to the general population here, and in conclusion on that point I infer that you would say they are of no consequence to the general population? So far as the diagnosis of lead-poisoning goes, I should say not.
2415. Will you explain what you have in your mind besides that? Well, I have not successfully diagnosed a case of lead-poisoning among the general public; but I do not wish you to infer that I think the fumes are innocuous.
2416. What I want to know is whether you do meet with cases of illness among the townspeople in which, though you cannot diagnose lead poisoning, you suspect that lead poisoning plays a part? Yes; I believe it does play a part in certain indefinite forms of illness. But there is difficulty in establishing proof of it, of course.
2417. That is what I want to get at; and the point of what you say is, that you suspect it? Yes.
2418. Have you noticed whether that suspicion arises in the case of persons living in particular neighbourhoods within a certain distance of the mines? No. I do not think it is localised to any particular spot. It seems general.
2419. But I suppose you never had a case of that description come to you from Stephens' Creek, or even Round Hill, did you? No. Of course my remarks refer to the immediate neighbourhood of the town, within a radius of 2 or 3 miles.
2420. Have you turned your attention to the question of prophylaxes? Yes; I have thought about it. In the first place, as regards constipation that should be attended to. Any man suffering from constipation should be treated for it at once, and then he should be put to a class of work at which he would not be liable to absorb lead. Then the men might use respirators. Sprinklers have been used in the mines, I understand, but I think they should be more extensively used. The men should also bathe regularly, and change their clothes. That is a necessity, not only to keep the lead out of the system, but to keep the men clean. At the top of the furnace there should be trap-doors and shoots—long shoots for the charges, so that the men could then work at a distance from the fumes. I have heard that the ventilation of the shed over the feed-floor is not always what it should be. Of course there is always a certain amount of difficulty with the men themselves, as they do not usually realise the gravity of their complaint until they are obliged to call in somebody.
2421. Notwithstanding that they subscribe regularly to a sick-fund, and have to pay, whether they get attendance or not? Yes.
2422. Is that partially due to ignorance—do you think, that they do not know what is the matter with them? They try to put off calling in the doctor as long as possible, I fancy. It is a general prejudice, particularly marked among these men.
2423. Can you think of anything else;—do you think it would be useful to circulate among the men a fly-leaf of hints as to what they might do to protect themselves? Yes, probably it would.
2424. It would be a judicious thing, at all events? Yes.
2425. You think baths should be provided for the men by the mine-owners? Yes.
2426. And they should be capable of being warmed? In winter, yes.
2427. And you have told us, I think, that you approve of the periodical purge that has been recommended? Not necessarily a periodical purge, but the men who are becoming liable to constipation should be treated for it promptly, before it advances any further. There is another thing. The men who work in that dust get their clothes saturated with the dust, and then go into the town without changing; and a number of them, I am sure, do not change their shirts for a long period, and they are really undergoing a form of in-unction of lead all the time.

Dr. J. T. Harvey. 7 July, 1892.

2428. You think, then, the absorption of lead may take place through the skin? Yes.
2429. Do you know anything of the use of milk as a prophylactic? No.
2430. *Mr. Hamlet.*] Have you ever been on the feed-floor of a furnace? Yes, I have been up there.
2431. Have you noticed cases of defective ventilation there? Yes. It is not so much defective ventilation of the building itself, as that there is no suction at the top of the furnace in order to draw off the fumes from the men before they come to the edge.
2432. Have you often observed that? Yes. As a rule, the man who is wheeling the charges gets the fumes all over his face and body the moment he comes up to the mouth of the furnace.
2433. But do you not know, as a matter of fact, that there is a powerful draught in the throat of the furnace—a draught downwards, to carry away the fumes? Yes. But any of these men who feed the furnaces will tell you that the fumes come up round them as they are tipping the charges down.
2434. *Chairman.*] Has that been represented to you as an habitual occurrence? Well, no. I have gathered the idea chiefly in conversation with the men. It is not an occurrence that I have actually seen frequently myself. It has been mentioned to me by the men.
2435. As an habitual occurrence, or as an exceptional thing? It has been mentioned to me as happening.
2436. *Mr. Hamlet.*] Do you think men on the floor of the furnace—that is, the tapping-floor, are more subject to fumes than those on the feed-floor? I do not know exactly. I am not sure; but as cases of leading occur there the presumption is that they are subject to them at all events.
2437. It has come out in evidence that the men are accustomed to eat their food in the mine, in the stopes? Yes; at crib time, as they call it.
2438. What do you think could be done to avoid their inhaling the dust and getting leaded through eating their crib in that way? They should wash their hands, in summer especially. In dry workings they should have the ore sprinkled with water, and of course the ventilation should be sustained. The habit of rubbing tobacco in the hands is also a very dangerous practice for men so engaged. They rub the tobacco, and then put it in their pipes, and I dare say the heat of the lighted tobacco causes the lead to vapourise and go down their throat. It might also be absorbed through the hands.
2439. With regard to the Public Schools, have you met with any cases among the pupils that you could attribute to lead poisoning, either directly or indirectly? No. I have not met with a case that I could ascribe to lead poisoning among any of the children.

[The witness withdrew.]

Mr. Daniel Parr called and examined:—

Mr. D. Parr. 7 July, 1892.

2440. You are a veterinary surgeon, Mr. Parr? Yes.
2441. What are your qualifications? I am a registered veterinary surgeon of Victoria, and I am a member of the Veterinary Medical Association of Australasia.
2442. How long have you practised here? About two and a half years.
2443. Are you of opinion that animals of all kinds suffer from lead poisoning here? I am certain of it.
2444. How have you established the diagnosis in any case? Well, the cases that I see on the hill are different from any cases that I have seen in any other part of the Colony. They develop peculiar traces of disease.
2445. How long have you practised as a veterinary surgeon? Since 1879.
2446. And where have you been practising? In different parts of Victoria and New South Wales.
2447. Are you aware of any case in which a chemical analysis has resulted in the finding of lead in a dead animal? Yes.
2448. Will you tell us of such a case? Yes. I had the stomach of one of my own patients analysed, and it contained lead, arsenic, and copper.
2449. What animal was that? It was a pig.
2450. Who made the analysis? Mr. Arthur Smith, an analytical chemist, of Broken Hill.
2451. What is the distance from the hill up to which cases of poisoning are observed, taking the Proprietary Mine as the central point of the line? Most of the cases I have seen have been in the immediate vicinity of the mines.
2452. Do you mean between Crystal-street and the Hill? Yes. More horses die between Crystal-street and the Hill than anywhere. I have had more cases in cattle on the opposite side of the Hill, between that and Aldridge's farm, about due east from here.
2453. And on Mr. Aldridge's farm? No; between the two. Cases occur up to a distance of two miles away or more. I think the greatest distance at which I had a case was 3 miles away, or say between the dairy and the Hill 2½ miles.
2454. That would be the farthest in that direction? Yes.
2455. And in other directions? I should say 2½ miles all round.
2456. You do not think the points of the compass have much to do with it? I think not. I have had them all round, but more particularly in the rear of Block 14 Mine and the Junction—that would be about south-east.
2457. Who keeps animals there now? The horses are kept by the carters; the dairy cattle were originally close to the town.
2458. They are nearly all removed now? Yes.
2459. All moved outside in consequence of their suffering from illness? Yes. I advised the people to do so.
2460. Are the symptoms the same in horses and cows? No. I have made a few notes here which I will quote from, with your permission. I find the symptoms run through about three different stages.
2461. You are now speaking from your own observation? Yes. With regard to the symptoms in horses, I will describe the different stages, as follows—(1.) Loss of appetite, staring coat, cold legs and ears, tucked up appearance of barrel, pulse slightly above normal, about 46; temperature taken per rectum, about 101½ or 102; head depressed. In no case have I noticed colic at this stage. In a few days large quantities of grey or crystal coloured matter discharges from the nostrils and saliva from the mouth, and they champ their jaws every few minutes. (2) Coming to the second stage, the breathing now becomes very laboured, and so difficult that the animal appears in danger of suffocation. The stench from the breath

breath at this stage may be smelt at a distance of a few yards. The animal trembles violently and perspires freely; becomes very restless, and is constantly lying down and rising up again, as if suffering from inflammation of the bowels, suffering the most agonising pain; temperature, 103 or 104; pulse very small and quick. (3) In the third stage the breathing becomes more irregular, and is performed with greater difficulty. The urine is ejected in very small quantities every few minutes. The animal is constantly walking round and round, until it loses control over its movements, staggers, and dies convulsed. They are generally quite dead in three or four minutes after they stagger and fall. The temperature during this stage is from 104 to 106½; I have registered 107 in one instance with Arnold & Sons' clinical thermometer. The flanks have a peculiar lifting motion, characteristic of this disorder. I have a note here on this class of cases, as follows:—"Cannot reduce temperature; exhibits in many cases tuberculosis in kidneys and lungs; bladder highly inflamed; kidney pale, and spleen rather large; liver pale."

2462. The symptoms you have been describing occur in horses, is that so? Yes. I may say before starting to speak of the cattle, that the disease runs through them very quickly, or else they recover quickly; either it terminates with a fatal issue or the beast starts to mend. In the case of the horses the disease will lie dormant for a time, but I have never seen an instance of that in cattle. The symptoms in cattle may be described as follows:—First stage: a beast that has been well suddenly loses its appetite, ceases to chew its cud, and stands apart from the herd. It becomes very restless, has a very anxious expression, a staring eye, and a pupil dilated, and foams at the mouth, the pulse is slightly above normal—about 65; internal temperature, taken from rectum, about 102½ to 103; respirations, about 25 per minute, or about 10 above normal; the external temperature of body is variable; the legs are generally cold; ears and forehead temperature above normal. I have often observed the muscles of the body spasmodically contracting and twitching, especially those of the shoulders and face. The animal will also run round or forward, dashing its head right and left, as if labouring under an attack of inflammation of the brain. I may say I have never seen these symptoms in horses at all. If a person who had not been accustomed to observing these symptoms were to examine a horse under the circumstances he would be almost sure to conclude that the horse was suffering from typhoid fever.

2463. You think horses do suffer from typhoid? We know they do. I have treated horses successfully for typhoid. Professor Kendall, in Melbourne, has had a good many cases. In the second stage of the disease, as observed in cattle, in a few hours fever sets in, and the internal temperature rises to 104 or 105 Fahr.; pulse about 80. The heart beats are very distinct, and may be felt by placing the back of the hand slightly in rear of the animal's elbow on the near or off side; there is also grinding of the teeth, and champing of jaws, and generally at this stage there is a flow of saliva from the mouth. Colic is often present. In the third stage the eyes are motionless; convulsions occur, during which the animal utters low groans, and dies. In some instances the breathing becomes very laboured, and the animal dies gasping for breath: in others the animal lies down, closes its eyes, and dies in a state of coma. The temperature in these cases falls very fast, and the pulse becomes very small, until it is lost. In conclusion on this branch of the subject I have some notes here which may be of use to you. During the past two years I have seen a large number of these cases; about 25 per cent. of them die. I have had about twenty cows and bullocks die during that time. It is questionable whether the animals that live are worth the trouble, and expense of treatment. They are generally ill four or five weeks, and have to be well nursed—very often gruel-fed during that time. They invariably go dry, and are therefore useless as milkers for at least nine or twelve months after suffering from an attack. I have known cows worth £6 or £7 cost over that amount to cure. Having no green forage is a great drawback in treating these cases.

2464. Have you had reason to think that the milk, which does not cease to flow altogether, I believe, is altered dangerously? According to the best authorities milk taken from cows which are suffering from plumbism is highly injurious. Anything that diminishes the secretion of the milk is injurious, and makes it less wholesome.

2465. Can you furnish us also with some notes as to the post-mortem appearances? Yes, I have opened them for examination, and can get you some particulars.

2466. Perhaps you can give them now? The horses generally die of gangrene of the lungs. I may state that in the horses the stomach and alimentary canal are very seldom inflamed in the least—are generally very pale. In the cows I find it seems to cause paralysis or nerve depression, and it also seems to cause inflammation of the whole of the alimentary canal, and the stomach. I have seen congested spots from the size of a pin's head to the size of half a split pea.

2467. To what do you trace this lead poisoning, in the case of horses, for instance? I attribute a great deal of it to feeding the horses in the open air, where the lead-dust can fall into the animal's food.

2468. Do you refer to the fumes emitted by the smoke stacks? I am not in a position to express a decided opinion on that. Probably the smelters have a good deal to do with it; but I think, probably, there is more dust thrown into the food—that is, the dust that comes from the hill. The winds here are very strong sometimes, and a considerable amount of stuff containing poisonous matter is blown from the hill. Then again, I know two or three instances of horses dying through feeding in the immediate vicinity of the British Mine, that is before the smelters were erected, and drinking at the Junction dam. I cannot say whether they took in the poison in solution from the Junction dam, or from the herbage growing near the mine. But oxide of lead is but slightly soluble in water, and I am of opinion that the streams running from the mines carry a good deal of lead and other poisonous substances as a vehicle, that is, the water acts as a vehicle, and carries it down. With regard to the fumes, my opinion is that if the lead from the fumes which fall over the town is soluable in water, and the fumes contain the poisonous property attributed to them, very few people would be able to live here.

2469. As a matter of fact, have you ever known of a case of lead-poisoning in a man here unconnected with work among lead? No; I have not known of any.

2470. Do you think, so far as you have been able to observe, that the fumes which issue from the smoke stacks are not of consequence to the health of the animals here? I think they are; but that they are not soluble in water.

2471. You have said that you never heard of a case of lead-poisoning except in persons working in lead or lead ore? Yes.

2472. The fumes from the stacks do contain lead, and they do beat down upon the houses, and therefore if the townspeople are not poisoned the fumes do not do them any harm? I would not say that. What I wish you to understand is this: that I do not think the fumes falling into the water do the people any harm. I am not talking about inhaling the fumes.

Mr. D. Parr. 7 July, 1892.

2473. Very well; then I will ask you again. Do you think that the fumes interfere with the health of the people who are entirely unconnected with the mines? I am of opinion that they do.
2474. On what sort of evidence—what leads you to think so? I understand from some of the chemists in town that there is arsenic in the fumes, and I think the inhaling of arsenic in any shape or form must be injurious.
2475. Still, you do not hear, in the case of any of your neighbours falling ill, that the doctors say they are ill of lead-poisoning? I do not place myself in a position to hear that.
2476. Do you mean that if the air were impregnated with oxide of lead and arsenious acid, it is most likely the people would suffer from it? Yes; certainly.
2477. Besides those you have mentioned, other animals die, do they not, from lead—dogs and cats? I have had two or three cases of dogs, but no cats at all.
2478. Still you know that cases do occur? I know that a lot of them die, and that the deaths are attributed to metallic poisoning. I may say that there are very few valuable dogs here worth treating.
2479. We have been told that it is of no use to try to rear pups on the Hill, but if they are brought here after they have reached the age of twelve months or thereabouts, there is a chance of rearing them—is that correct, in your opinion? It may be correct in some instances; but I have seen full-grown dogs brought here and die just as quickly as dogs that have been born in the district.
2480. I understood you to say that in several cases cows had been removed from the town on your advice. Are there any remaining within a distance which you consider dangerous? Yes; some of them are allowed to feed at the back of the hill here.
2481. *Mr. Hamlet.*] In the case of the *post mortem* examination of animals you have referred to, was the quantity of lead found in the stomach estimated? No.
2482. Would you get lead quicker in the urine than anywhere? Yes.
2483. Have you any cattle or horses under your care now suffering from leading? I have two horses.
2484. Are they going to die, do you think? I cannot say. I thought one was going to die the day before yesterday, but he seems to be getting better now.* The horse belongs to Mr. Lane, of Block 14.
2485. I think you said there were more deaths of animals from lead-poisoning in Crystal-street than any other street in the town? Yes.
2486. Is there any street corresponding in position to Crystal-street on the other side of the Hill? No.
2487. Are there any other streets on this side in which animals are kept, which do afford you an opportunity of comparing the effect of the lead upon animals? Yes; there are other streets where animals are kept.
2488. And in Crystal-street the proportion of deaths is much greater? Yes; much greater. My opinion is that the cows wander away and get poisoned on the rubbish heap.
2489. You refer to the Municipal garbage tip, which, I believe, is 4 or 5 miles from the Town hill? Yes; about 3 or 4 miles.
2490. Which is too far away for the fumes to poison the cattle? I would not say it is too far. But I have never had cases of lead poisoning that far out.
2491. No cases except near the tip? No.
2492. And you are of opinion that the milch cows ought to be kept away from garbage heaps? Yes; certainly.
2493. How is it they are not kept away from them here;—can no means be devised for keeping them off? Not without fencing the rubbish heaps in. The dairymen here save very little by allowing their cattle to roam at large; in fact they lose by it, because the cattle pick up all sorts of injurious things. I may say, when I first came up here, or about six months afterwards, I was not quite satisfied that these cattle were dying from lead poisoning; so I bought a horse—I gave £2 10 for it, and turned it out between the Junction Mine and the British, and allowed it to find its own food and water. It lived three weeks after that, and died of plumbism. It developed all the symptoms I had previously seen.
2494. Do you happen to know the distance between the Slag Dump and Crystal-street? I do not think it is more than 800 yards.

[The witness withdrew.]

FRIDAY, 8 *JULY*, 1892.

Present:—

DR. ASHBURTON THOMPSON (CHAIRMAN).

WM. M. HAMLET, ESQ.

Mr. A. N. Barnett, called, and examined:—

Mr. A. N. Barnett. 8 July, 1892.

2495. *Chairman.*] What office do you hold, Mr Barnett? I am Warden of the Broken Hill and Silverton district, divisions of the Albert Mining District.
2496. How long have you held that appointment? Since 1889.
2497. Briefly, what are your duties? They consist chiefly of hearing disputes in the Warden's Court at the different mining centres. Broken Hill, Silverton, and Purnamoota, visiting the various mines throughout the district, in regard to their compliance with the labour conditions, and dealing with the question of leases, &c.
2498. You are not officially brought in contact with the miners? Not generally with those in the large mines. I come in personal contact more with the prospecting class.
2499. Then, am I right in supposing that you know nothing of the subject of lead poisoning among the men? Yes. I have no personal knowledge of the matter whatever.
2500. And also with regard to those provisions which are necessary in the mine to preserve health in general, you have nothing whatever to do with that? Nothing whatever.
2501. I see that on the 30th September, 1890, you reported that you had made inquiry to discover instances in which children were being employed in ore-sorting on the Barrier? Yes.
2502. Did you report that it was possible in some cases, that youths of, or about 14 years of age were so employed, but that you were satisfied that the employment of younger children in that capacity was not a general practice, and that you were not aware of any such instances at that date? Yes; that must be the tenor of my report.

2503.

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* NOTE (*on revision*):—This horse recovered.

Mr. A. N. Barnett. 8 July, 1892

2503. Have children under 14 years of age ever been employed in sorting, so far as you know? No; not to my knowledge.
2504. Then did you, at a later date—that is, towards the end of 1891—make some general inquiry into the prevalence of lead poisoning? Yes.
2505. And you concluded that during the last five years there had been considerably more than 1,000 cases of lead-poisoning in the Barrier District? Yes.
2506. May I ask how you arrived at that? The information I supplied in that report was obtained by conference with the mine managers, miners, and medical men. Of my own knowledge, I knew nothing; but from the information I was able to obtain, and more especially that derived from the medical men, I came to the conclusion that it would be quite impossible to give an exact estimate of the number of cases of lead poisoning that had occurred during five years, which I took then to be the life of this place. However, taking all the reports of the medical men together, I felt that I was quite safe in saying that there had been considerably more than a thousand cases known of during the preceding five years. I may state that the accounts of the medical men varied as to the numbers, and as to whether the evil was increasing or decreasing, but from a synopsis of the whole of the communications made to me, I thought I should be on the safe side in stating that number.
2507. You mentioned 1,000 as being a safe number, without wishing to imply that there might not have been more? Yes; I thought that sufficient to answer the question.
2508. Then you also concluded, I think, that the fatal cases where lead poisoning, perhaps, had been the cause of death had been extremely rare? Yes; I had no doubt of that.
2509. And, thirdly, you thought the evil was chiefly confined to the three principal mines here? Yes.
2510. You think that the contradictory evidence you have just referred to arose from a really different experience of the medical men? Yes. The discrepancy was confined to the number of cases, and as to whether they were on the increase or the decrease, but I found no difficulty in arriving at the conclusion that there were but three mines on the line where lead poisoning was considered as an evil. I refer more particularly to the Proprietary, Block 14, and the British.
2511. And then, lastly, you concluded that owing to the adoption of the most approved methods of ventilation, and also water-sprinkling, the evil was probably on the decrease—that was your opinion from what you had heard? Yes; from what I was informed.
2512. Can you furnish the Board with any information likely to be of service to them in this inquiry? No; I cannot say I can do that. I may state that, not being even a resident of the town, I am not able to speak of it from a resident's point of view. I live in Silverton.
2513. I think we have been told of one lead mine outside Broken Hill—I mean Umberumburka? Well, I made inquiries particularly of the manager there, and also of the men who had been working there, and they assured me that there were no cases of lead poisoning there.
2514 From what you learned on the occasion in question, do you think it would be necessary for the Board to concern itself with that mine? I think it would be quite unnecessary, not only because I think the evil does not exist there, but as a matter of fact the mine has ceased to work, and there is very little probability of its working again, except, perhaps, on tribute.
2515. Is there any other considerable lead-bearing mine outside Broken Hill? Not of any extent.
2516. In any case, such recommendations as the Board may find it expedient to make with regard to the Broken Hill mines will of course apply to any other mines of the same character that may now or subsequently be worked? Yes.
2517. *Mr. Hamlet.*] Have you ever heard of any case of lead poisoning at Silverton? No; I cannot say that I have heard of any actual case of lead poisoning. I have heard of men who have voluntarily left the Big mine here to work on smaller ones in Silverton, in order to get rid of lead poisoning; but I know of no instance in which the malady has been contracted in or near Silverton.
2518. Do you know if it has been the practice of some men to buy allotments of land in Broken Hill, and divide them up into smaller allotments of say only 10 feet frontage? No; I have known cases where the ordinary mining allotment of ¼ acre has been divided into three, but that would not be of such a small frontage as 10 feet.
2519. You have never heard of such a case? I cannot say I have. I would not speak specifically on the subject; so many cases come before me. But I do not know of any so small as that.
2520. Can you suggest anything under the existing law to prevent the cutting up of allotments into small areas? Do you mean under the Mining Act itself?
2521. Yes? No; I know of nothing to prevent a man doing that if he gets a title to his land; he can then do as he pleases with it. It is necessary that he should hold a business license, and reside upon it himself in order to keep alive his title under the Mining Act. But he might have half a dozen people living with him at the same time without vitiating his title in any way.
2522. Can you tell us anything with regard to the number of boarders taken in some of the common lodging-houses of Broken Hill? I am afraid I cannot give you any information on that point.

[The witness withdrew.]

Mr. J. Melville called and examined:—

Mr. J. T. Melville. 8 July, 1892.

2523. *Chairman.*] Are you a veterinary surgeon? I have not passed through any college, but I have been practising fourteen years, and have had three years' experience on the Barrier, during which I have devoted the greater portion of my time to lead poisoning cases; but, before I go any further, I would like to say that I am not in favour of giving evidence which would assist outsiders to give a diagnosis of the disease.
2524. What the Board wishes to hear from you, if you will be good enough to tell them, is whether animals of all sorts, or what sort, do die of lead poisoning here, and how far away from the Hill you have observed them dying from that cause? I can simply state that cows, horses, poultry, dogs, and cats all suffer from lead poisoning. It is common among poultry, cats, and dogs, and this I attribute to them drinking the water where the men wash after coming from the mines. I have been very successful in treatment of dogs and horses. In horses I have generally remarked inflammatory symptoms of the trachea and bronchi tubes, and inflammatory patches on the lungs, rather lighter in colour than ordinary inflammation, and I have also found traces of lead in the liver and the spleen.
2525. Have you found traces of lead anywhere else? I have not tried for it anywhere else. The intestines are generally inflamed.

Mr. J. T. Melville. 8 July, 1892.

2526. Taking the Proprietary Mine as the central point of the Hill, can you say at what distance animals appear to be safe from lead poisoning? From the cases I have had, I should say about 2 miles. I find none outside of that suffering from symptoms of lead poisoning, excepting in the case of horses engaged in carting water about the town. Poultry I have found suffering from lead-poisoning within 2 miles of the line, but not outside of that.
2527. Do you agree with what we have been told, that pups brought up here and kept within the dangerous limit are almost certain to die, but that if dogs are allowed to attain the age of twelve months before being brought here they may live within the dangerous limit without being affected? That is not correct. I have had old dogs brought to me that have been badly leaded, coming from within half-a-mile of the Hill.
2528. Cows suffer also, do they not? Yes; but I was about to say, further, of horses that plenty of them suffer from paralysis of the respiratory apparatus. This I attribute to the effect of salts of lead on the system, varied by cold changes. I have also seen many cases of paralysis of the optic nerve, but have never arrived at any conclusion as to whether that was the result of lead; but it is prevalent on the Barrier more than anywhere else, I fancy; and that alone, I think, is sufficient to prove that it is the effect of lead in the fumes from the smoke-stacks.
2529. *Mr. Hamlet.*] You have spoken of the spleen in horses; have you ever found traces of lead in it? Yes.
2530. Will you tell us how you found that? By means of the blow-pipe and the microscope.
2531. What quantity of the spleen did you take? Only a small piece—a chip.
2532. A chip of the spleen? Yes? The lead seems to be distributed; it does not collect together.
2533. And how did you ascertain the presence of lead in these chips? I subjected it to the blow-pipe on a piece of carbon, and used carbonate of soda as a flux; and what appeared under the microscope was a bright globule of lead.
2534. So that, according to your account, the spleen would contain a large quantity of lead? Yes. That is in the case where an animal dies of lead poisoning.
2535. Would you be surprised to learn that in the analysis of the spleen of human beings only very minute traces of lead are found, as a rule? What I saw was invisible to the naked eye.
2536. Well, the spleen must have contained an enormous quantity of lead to give you globules of lead under the blow-pipe? ——
2537. *Chairman.*] Are you of opinion it does contain a large quantity of lead? I think the spleen has an affinity for lead; but a certain amount of the lead which is taken into the stomach becomes soluble, by the agency of acid secretion before it enters the system.
2538. *Mr. Hamlet.*] In the course of the next month or so, if you get such a spleen as you have described, will you be good enough to take the trouble to send a small portion to the Government Analyst in Sydney? Certainly.
2539. Have you ever examined the liver? Not under the blow-pipe, although I have seen a bluish colour in the liver.
2540. Do not you see that colour sometimes in ordinary *post-mortem* cases? Not the same. The horses show the same blue line that is present on the gums of a man who is leaded, and that is a sure guide to making a diagnosis of lead poisoning. I see, according to a Royal Commission appointed in England some time ago, that the blue line is caused by the salts of lead mixing with the tartar of the teeth.
2541. *Chairman.*] What is the title of the Royal Commission you refer to? It was a Commission appointed to inquire into the effects of lead poisoning somewhere in Wales. I can give you the title to-morrow.
2542. Have you got the report? Yes.
2543. *Mr. Hamlet.*] You have noticed cases of lead poisoning in animals within 2 miles of the town? Yes.
2544. Have you ever seen a case 6 miles from the mines? No.
2545. So you think a horse sent to grass in a paddock 6 miles distant would not be affected? I think not.
2546. It would be quite a safe limit, you think? Yes; I think if a horse were kept 2 miles away continually he might be safe. In the cases I mention, the horses got lead into their systems whilst working in the town.
2547. Did you ever see a horse die of lead poisoning? Yes. A horse dying from lead poisoning has a discharge from the nostrils of a grayish matter, and the membrane is very much inflamed.
2548. Does the horse fall down suddenly, or does he become paralysed in the legs? Very often the horse shows paralysis of the extremities, sometimes behind, and sometimes before. They seem to die in great pain.
2549. *Chairman.*] The cows suffer also, do they not? Yes; I have not had many cases of cows. I have had a few. Their great trouble is constipation, and they seem excited, like an animal intoxicated; probably caused by renal trouble, or something of that kind.
2550. Do you meet with pleuro among the cows here? I have heard of a few cases, and have seen one; but of course we have an Inspector of Stock here, and directly a case is known the cow is condemned.
2551. Which one do you refer to? About two years ago was the last case I saw.
2552. You have heard of none since then? Yes; I did hear of one case, about 4 miles on the other side of the White Lead, a few months ago. They told me they were going to shoot the animal that day.
2553. Was it a milch cow? No; it was a dry cow left by a travelling mob, I think. There was a report here some time ago about pleuro, but I contradicted it. Dr. Groves and myself made a post-mortem of the animal, two inspectors being present also at the time.
2554. At all events, there was no suspicion of lead poisoning there? No.

[The witness withdrew.]

Dr. F. C. Evill called and examined:—

Dr. F. C. Evill. 8 July, 1892.

2555. *Chairman.*] What are your qualifications? Member of the Royal College of Surgeons, and Licentiate of the College of Physicians.
2556. You are registered by the Medical Board of New South Wales? Yes.
2557. Do you hold any special appointment here? I am one of the honorary physicians to the hospital. That is the only official position I hold.
2558. Do you attend a proportion of the persons engaged about the mines? Yes.
2559. And a proportion of the townspeople as well, of course? Yes.
2560. You have no idea, probably, how many persons engaged about the mines would apply to you if they were ill;—do they belong to clubs? Yes; a great number of them; and they also belong to the Medical Fund, a great many of them. I am on the staff of that Fund, and a certain number on the list would apply to me.

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2561. How many on your list are actually engaged about the mines? Those actually on my list I should say, number between 300 and 400 altogether, including the clubs, of those actually engaged in the mines.
2562. Can you tell us how many cases of lead poisoning you have met with in the course of a year? In my general practice, since January, I find by my books I have had thirty-eight cases of lead poisoning out of 900 cases altogether.
2563. What we wish to get at is, in the first place, the proportion of leading there is among the persons who are exposed to lead, such as miners, and so forth. You are not able, more than anyone else, to form an estimate, are you? I estimate that 4 per cent. of my general practice are lead cases, and of course there would be a much larger percentage of those actually engaged about the mines.
2564. How long have you practised here? Just one year.
2565. Do you think many of the miners go away for treatment when they get leaded? A small percentage, I should say. They first come under the observation of medical men in the town.
2566. Have the seasons any influence, in your opinion, on the prevalence of leading? I think it is very likely. The worst cases of lead poisoning that have come under my observation have been in the winter. The only fatal cases I have seen were in last winter.
2567. The proportion of fatal cases is very small, is it not? Yes; very small indeed.
2568. It has been said that leading both among men and among animals is more common in the hot weather;—have you seen anything to lead you to endorse that statement? Among the animals I should think it might be, on account of their drinking more in the hot weather. That is the cause of leading in animals. But it is not so among the men, I think.
2569. Do you observe that some mines furnish more cases of leading than others? The mines which furnish the greatest number of cases are those in which there is the largest proportion of carbonate ore.
2570. Which are the mines that furnish the larger number of cases, in your opinion? There is a great deal of leading in Block 14.
2571. Does that furnish most cases? Proportionately, more than any other block, I think. I have not actually gone into the statistics.
2572. Have you observed that some kinds of work, whether above or below ground, furnish more cases than other branches? Certainly; I think the underground work—stoping—is more dangerous. There is much more leading among that class than among the smelters.
2573. That is, having regard to the vastly larger number of men employed underground than at the smelters? Yes; even then, I think, it is more prevalent among the underground workers.
2574. More prevalent proportionately? Yes; the numbers coming for treatment for lead poisoning from the smelters are comparatively few.
2575. Do the tradesmen furnish cases—such as carpenters, engine-drivers, mechanics, and so forth? Yes, occasionally; but rarely. Of course, among the plumbers, it is commoner.
2576. Are you now speaking of the townsmen? No; I am speaking of the plumbers employed at the mines.
2577. Have you noticed whether some people are especially susceptible to lead poisoning? Yes; it depends a great deal upon their habits of life.
2578. You do not think it is a constitutional peculiarity so much as a matter of habit? No; I think it depends rather upon their habits to a great extent.
2579. Have you met with any cases at all in your general practice in persons not connected with the mines in any way? Yes.
2580. Can you tell us how many? Very few. I dare say not more than three or four altogether.
2581. Do you trace those cases to some of the causes which are common to every large town? No.
2582. To what cause do you attribute them? I attribute them to the fumes amongst those living or working close to the mines.
2583. But as to those not connected with or working in the mines? Those whom I have in mind now were not connected with the mines; they were tradesmen in Argent-street.
2584. Were they men, women, or children? Children are affected.
2585. You know that as a matter of practical experience? Yes. They may not be exactly leaded, but their health is certainly affected by the fumes.
2586. In what way is their health altered? In the direction of general debility. There may be no actual illness discovered, but all the functions of life appear to be a little below par.
2587. Do you now speak of children of all ages? Well, children up to 10 years of age, I should say.
2588. I think you did not tell us whether the cases of actual leading you referred to were in men, women, or children? In men.
2589. What business did these men follow? One, I remember, was a draper's assistant, and another was connected with an hotel as barman; but now I remember that I have seen one case which could be traced to the occupation directly. It was that of a man who had been connected with an ærated-water factory, where there would be a good deal of lead piping about. I think the leading in that case might have been directly connected with the man's work.
2590. You have now mentioned two;—were there any others? The first barman was another case.
2591. Were there two barmen? Yes; the man who had been working in the factory I have referred to was a barman.
2592. There were two barmen and one draper's assistant;—in the case of one barman you attributed the leading to the usual cause among barmen; in the other you could not trace it to the usual cause? No.
2593. And in the case of the draper there was no suspicion of any of the usual causes? No.
2594. Do the people here in general show signs of anæmia? Well, yes, they do, decidedly; especially those living down in the town, near the mines.
2595. You are quite clear about the distinction between the condition of the people who live in Argent and Crystal Streets and those who live at a greater distance? Yes; there is a decided difference between the people living out of the town and those living in the town. The further away from the fumes, the more healthy the climate is; there is no doubt about that.
2596. A good many deaths here of children under one year are ascribed to marasmus, consumption of the bowels, malnutrition, and indigestion—wasting diseases, in short;—do you think that lead has anything to do with them? I think a small proportion of them may be due to lead; but certainly the climate has a great deal to do with those cases in the summer. It is a very unhealthy place for children in the summer, owing to the want of water, and the smells, and generally insanitary conditions of the houses, which are much too small.
2597. Do you mean that it is a naturally unhealthy locality, or that it is an unhealthy town? Well, it is insanitary to a great extent, certainly. The locality I consider decidedly unhealthy.

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2598. In 1891 there were fifty-nine deaths of persons under one year ascribed to diarrhœa, dysentery, gastritis, intestinal catarrh, and such causes;—would you ascribe any considerable proportion of them to lead, or would you trace them rather to the general insanitary conditions? I should attribute the majority of them to the general insanitary conditions and the intense heat in the summer.
2599. Upon the whole, speaking generally, would you say that lead had anything to do with them? No. It might have had something to do with a small proportion of them, but certainly not the majority.
2600. Then there seems to be a considerable number of cases of premature birth, malformation, and so on. Among persons under one year a good many deaths are ascribed to these cases. Do you think lead has anything to do with such cases? In this way, perhaps, that they were the children of unhealthy parents.
2601. That is the point of view I am asking you to take? Certainly from that point of view. Lead poisoning among the fathers would be a considerable factor.
2602. Is that your opinion merely, or do you make that statement as the result of observation? It is merely an expression of opinion.
2603. As a general rule, do you find menstrual irregularities more common here than elsewhere? I am hardly in a position to answer that.
2604. Or abortion? I hardly think so; but I have not had much experience in that direction elsewhere.
2605. They are not strikingly numerous, you think? No; I should say not.
2606. Have you had complaints of impotency from patients? Yes, but not particularly among the miners.
2607. Were they traceable to usual causes? Yes; the cases I had to do with.
2608. You do not think lead had anything to do with them? No; certainly not the majority.
2609. Speaking generally, are you of opinion that the fumes that issue from the smoke-stacks and beat down upon the houses, covering the roofs with lead-oxide which gets into the water-tanks, and so forth, are a matter of consequence to the general population? Oh, yes.
2610. You are quite clear about that? Yes. Of course there is not only the lead; there are other deposits, such as arsenic.
2611. Then I will ask you, have you met with any cases of arsenical poisoning? No; not pure arsenical poisoning. But it seems to me that the lead poisoning here is different from what we meet with in England. It is more acute, and it is a little masked—the ordinary symptoms indeed are very considerably masked by the effects of the dynamite fumes and other causes. It is not purely lead poisoning always. Of course in many cases it is. But there are many symptoms of lead poisoning which one does not get here, or very slightly.
2612. For instance? Well, I have only seen one case of optic neuritis here. That was in a man who had been a painter for fifteen years and had never had any symptoms of lead poisoning until he came to me with double optic neuritis, and a very marked blue line; it was unquestionably lead neuritis; and that was the only case I have seen. I have looked out for that specially.
2613. You say it is a very common case in England? It is a great deal more common than here, where it is very rare indeed.
2614. Have you practised in England among a population engaged in lead-works? No, but I have done a good deal of work in the hospitals at home, and have seen a good many cases of the class I refer to.
2615. What other symptoms do you miss here? Wrist-drop is very rare here. I have only seen one case, and that case was not my own. Paralysis is very rare; that I put down to the poisoning here being more acute. If the lead poisoning were more chronic and more gradual, the other symptoms no doubt would supervene.
2616. Can you express any opinion as to the value of the blue-line as a diagnostic? I think it is a valuable sign, undoubtedly. But a great number of persons come under my observation, who are not suffering from any of the usual symptoms of lead poisoning; but who yet have the blue-line. Many persons, of course, do not wash their teeth.
2617. Then, you look upon the blue-line as being caused by a deposit on the gums from outside? Yes; in many cases.
2618. And do you think it arises from causes operating externally merely? Not always. Of course, the typical blue-line could not be removed by washing the teeth; but I see that many cases come to me with the blue-line, in which it could be removed by washing.
2619. Do your leaded patients have albuminuria as a rule? I cannot say I have examined all the cases for that.
2620. Have you found any of them suffering from albuminuria? Yes, certainly; some of them. I cannot say how many.
2621. Then, lastly, on this subject, you say that lead poisoning at Broken Hill is not confined to persons who work about the mines? Well, I can only speak as to one or two cases of persons outside the mines; so perhaps I could say it is almost entirely confined to them.
2622. And as to children? I certainly think that children are affected by the fumes; but they do not present any typical symptoms of lead poisoning. Their health is generally affected; the various functions of the body seem to be a little deranged, and that I put down to the effect of the fumes.
2623. Are you now speaking of children brought to you as being ill, or from your general observation of the children here? I am speaking rather of those brought to me.
2624. What do you think could be done by way of prophylaxis by the workers or their employers? One very simple thing, I think, should be done, namely, to provide sulphuric acid beverages for the mine. It is done at Home in the lead factories, and would, I think, certainly be a very useful measure here.
2625. You are probaby not aware that that was done here four or five years ago, and it was found that the men would not take advantage of it? I did not know that it had been tried. It is certainly a good thing.
2626. Have you a personal knowledge of factories where it is kept? Not personally—I know from reading.
2627. Is there any other point of prophylaxis which has presented itself to you as being very important? Of course, ample washing is a necessity. The men should pay great attention to cleanliness; but want of water has been the difficulty in that respect. Then, it would be a good thing if the men could be persuaded to change their clothes on leaving their work, it would do a great deal to keep them from getting leaded. I understand there is on the Proprietary mine a changing-room which is not much used.
2628. Have you seen this changing-room? Yes.
2629. Do you think it is what it ought to be? It is merely a place set apart for the men to change and hang their clothes in. You could hardly call it a dressing-room, of course.
2630. Did you see any provision for washing there? No.

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2631. Are you of opinion that it is just sufficient to comply with the Mining Regulations and nothing more? As far as I recollect it was, I think, supplied at the suggestion of some one; I do not know anything about the regulation.
2632. *Mr. Hamlet.*] Have you heard, or known, in your own experience, of a case of insanity arising from lead poisoning in Broken Hill? Well, I have a case under my care now, in which, however, I should say, the symptoms do not point to lead. But I have not seen any other cases, except of course of a temporary character.
2633. Have you any opinion to offer as to the effects of intemperance in accelerating the effect of lead poisoning? I can only say from my experience that the men who are the heaviest drinkers get leaded more quickly than others, and get poisoned more acutely.
2634. *Chairman.*] Do you think it has a physical as well as a moral effect? I do not call it a moral effect at all. It is purely physical.
2635. But you have told us that careless habits tend to induce lead poisoning, and careless habits may be said to be almost characteristic of drunkenness, are they not? Yes. Lead poisoning is more prevalent among people of careless habits, and I include intemperance with it. Also heavy smokers are more affected by lead. In that case it is probably due to their cutting up the tobacco and rubbing it in their hands.
2636. *Mr. Hamlet.*] Do you meet with obscure cases among the townspeople, of slight indisposition, or *malaise*, that might be attributed to the lead fumes that emanate from the stacks? I do not remember meeting with any case of the kind that could not be ascribed to simple causes that might occur anywhere.
2637. Do you meet with any cases of lead poisoning in say Crystal-street, that you might attribute to the lead smoke? I have not met with any in Crystal-street. I have mentioned three cases of persons unconnected with mines that I remember. Two were in Argent-street. I have seen no cases of women.
2638. Can you make any recommendations with regard to precautionary measures which might be taken by the mine-owners? I think they should change the men from one working place to another, so that they may not work too long in the lead, and the stopes should be sprinkled to lay the dust as far as possible. These are well-known precautions which should be taken, together with ample opportunities of washing.
2639. Do you say that warm baths might be provided? Yes, they might be certainly. Of course there is some difficulty with the scarcity of water here. But better opportunities for washing certainly ought to be provided in the mines.
2640. With regard to the provision of the sulphuric acid you spoke of just now, do you know the suitable strength to recommend? I should say about 10 minims of the dilute to the ounce. It makes a pleasant acidulated drink.

[The witness withdrew.]

Dr. C. E. Thompson, called and examined:—

Dr. E. C. Thompson. 8 July, 1892.

2641-2. *Chairman.*] What are your qualifications? Member of the Royal College of Surgeons, F.S.A., London.
2643. Are you registered by the Medical Board of New South Wales? Yes.
2644. How long have you practised here? About four and a half years.
2645. You attend a proportion of the persons engaged in or about the mines, I suppose, and also a proportion of the general population? Yes.
2646. How many cases of leading do you think you have met with in the course of each year since you have been in practice on the Barrier? I should think an average of about 250 cases a year.
2647. I suppose the absolute number has increased since the first year? Yes; I think so.
2648. Have you any idea whether the proportionate number has increased? I think the proportionate number has decreased; but I have no notes to help me in forming an opinion.
2649. However, that is your opinion? That is my opinion.
2650. Do you think many people go away for treatment? Not a great number.
2651. Do you think the seasons have any influence on the prevalence of lead poisoning? I have no doubt of it at all. Lead poisoning occurs most frequently in summer.
2652. Can you account for it in any way? It may be that in summer the wet skin favours the absorption of lead through the skin.
2653. Wetted by perspiration? Yes.
2654. Do you observe that some of the mines furnish more cases than others? I do.
2655. Which are they? Block 14 and the British are those from which we seem to get the most cases.
2656. And do you get any cases from the other mines? Yes; we get a good many from the Proprietary, some from the Central, and some from the South.
2657. But from them you get many less than from the mines you first named? Oh, yes.
2658. Have you noticed whether any particular kinds of occupation about the mines are more likely to cause leading than others? Yes;—smelting, on the whole, yields more cases than mining here.
2659. And as smelting includes both charge-wheelers and tappers, do you distinguish between these two classes of smelting hands? Yes; and the tappers are those who suffer most, in my experience. The charge-wheelers do not suffer much. I have on my list a charge-wheeler—a shift boss—who has been on the charge floor a long time, I think nearly three years. He is now suffering from some indirect effects of lead poisoning; but he has never been leaded, that is, in the sense the men mean when they say "I am leaded"; he has never had colic, or symptoms of that kind. He is now suffering from nervous affection, neuralgia of the fifth nerve, and debility.
2660. Would you be inclined to look to lead anæmia as the cause of those symptoms? Yes; he had also the blue line and constipation, but no other symptoms of lead poisoning. As I have said, I think he was a long time engaged on the charge floor.
2661. Do you get any cases among the tradesmen engaged about the mine, such as mechanics, carpenters, engine-drivers, and the like? I have seen a case which is, I think, singular, in one of the fitting-shops on a mine where there is no lead at all and no smelting works.
2662. Which mine is that? Block 10. It was an aggravated case; the man became maniacal and epileptic. He said that when the wind was blowing in a certain direction the smoke from the Central stack blew right into the fitting shop of Block 10, where he was working. I am not aware whether any other cases occurred in the same fitting-shop; but they may have occurred without my knowing. Among other tradesmen, some of the men employed in timbering suffer, but the carpenters generally work on the surface.

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2663. The carpenters who go below to fix the timbers disturb a great deal of dust in hammering, and so forth? Yes; that is the way they get leaded.
2664. What is the longest time you have known a man to work about a mine without becoming leaded? I know a man, who, according to his own statement, worked for nearly five years on the tapping-floor of one of the smelters and escaped leading during that period; but he has since suffered from an acute attack. He has been ill for three months, and is still ill. Michael Toohey is his name. He will not be able to work in lead again, I think.
2665. Do you think he was entirely free from lead during those five years until he fell acutely ill? I do.
2666. Did you ascertain how it happened? Yes. He was exposed in some way to strong fumes. It was at the time we were very short of water, and the jacket got out of order, and in setting the matter right it appears he was exposed to the thick fumes from the furnace.
2667. Do you think every man engaged working in lead is sure to get leaded, sooner or later; or do you think that, by taking precautions, he can save himself? I am inclined to think it is largely a matter of predisposition. Some can work in lead, and, with precautionary measures, save themselves indefinitely, I believe; whilst others, I am convinced, cannot work in lead at all without suffering.
2668. You distinctly recognise a constitutional susceptibility not due to specially dangerous personal habits? Yes; that is what I mean.
2669. I believe lead poisoning causes different classes of symptons in different patients? Yes.
2670. Will you mention the classes? The commonest class of cases are cases of colic, generally without other symptoms, except obstinate constipation. The next class are the epileptics—they are not very common.
2671. Very much less in number than the cases of colic? Very much less; but I think next in the order of frequency. Then there are cases of motor paralysis, sometimes taking the form of wrist-drop, and sometimes taking the form of general muscular atrophy.
2672. Are motor paralyses in general common? No. Then there are cases—principally allied to the epileptic form of cases—in which a man becomes comatose at once. Those cases are frequently fatal. I have seen one or two recover; but they are generally fatal. They are happily very uncommon.
2673. What do you consider is the relationship of those four classes to each other;—do repeated attacks of colic lead to paralysis, and then, after a time, does paralysis lead to epilepsy, or coma? I cannot say so. I think not. I do not think they lead from one to the other in that way. A man, whose poisoning assumes the colic form, sticks to his type, as far as I have seen; he may have it again and again, but will not get anything else.
2674. Roughly speaking, you take it that lead absorbed preferentially affects different parts of the nervous system in different people probably? I think so. It is a poison which appears to affect the nervous system chiefly.
2675. What do you mean by "chiefly"? I say "chiefly" because there may be indirect secondary results which affect the circulatory system. They are not primary.
2676. In those cases of sudden coma and encephalopathy, have you found sometimes that the attack has been in reality sudden—that there have literally been no prodromal symptoms at all? So far as I have been able to ascertain, yes. The patient has been perfectly well until he has fallen down in a fit. I believe that kind of illness sometimes occurs to miners who have been following the same class of work all the time.
2677. What is your opinion of the value of the blue line as a diagnostic? Well, it is extremely uncertain; I do not think it is of much value. I pay very little attention indeed to it. I am satisfied with other symptoms. Some present the blue line and some do not.
2678. Do you think it is produced by merely taking the lead into the mouth? No; I do not think it is ever produced by the depositton of lead in the mouth.
2679. Do you think it not a merely local condition? No; it is a constitutional manifestation.
2680. If in any suspicious case you find the blue line absent you would not think that against the diagnosis of lead poisoning? Not at all. I regard it as being of no essential value. Being present, it is a corroborative sign, but if it is absent we can do without it.
2681. What affections of the circulatory system have you had opportunities of observing as the result of lead poisoning? Beyond retardation of the heart's action I have observed no disturbance of the circulatory system at all.
2682. As to the kidneys, do you find albuminuria sometimes as a result of recent poisoning by lead? No; not to my knowledge.
2683. If albuminuria occurs as the result of lead poisoning, are you of opinion that it must be in chronic cases, and after a period of years—in such cases as there has not yet been opportunity of watching in this place? Yes.
2684. What about optic neuritis—have you had any experience of that here? No case of the kind has ever come under my notice as the result of such lead poisoning as we get, nor have I ever heard of a case up here, although I have inquired of several medical men.
2685. Has any encephalopathic case ended in insanity in your experience? No; I think not. I do not recollect any such case. The case of the man who worked in Block 10 was not such a case. He was a lead-epileptic, and that resulted in insanity.
2686. Have you known it to result from any case of coma? No; they have either died or got well. I only remember one case of a man who got well, and I have reason to believe that he died subsequently from a second attack.
2687. Do you observe among the persons who are poisoned by lead, any of the various lesser forms, any evidence of mental dulness and muscular slowness? I think in cases where the poison is slow in its action, and where it is slowly eliminated, you do get a certain amount of mental dulness; but most of the cases I have seen here are sub-acute in nature. They are ill, and then get well again, and then they are well in reality.
2688. You have said that some people are more susceptible of lead than others; have you been able to explain that to yourself satisfactorily? No; I was never able to trace any reason why it should be so, although I have more than once observed that it was so.
2689. Can you describe one case of coma? Yes; one case I remember tolerably well. A youth of about 21 fell down underground at his work, and was picked up unconscious, and remained so fully forty-eight hours. His respiration was quick, his pulse was accelerated, and his face was very much suffused. He was treated in the hospital. I was not able to observe him the whole time that he was ill; but that was

his

his condition when I saw him. At length he became moribund. However, he did not die; he quite recovered. When I saw him, I did not think he would live more than an hour or so. But generally the cases I have seen—and I think I can recollect three other such cases—have ended fatally.

2690. But is that coma not followed by delirium or mania? I have not seen it; but such cases are uncommon. I think I can recollect only five cases in five years.

2691. You mean that you personally have never seen delirium or mania following? Certainly.

2692. But you know it has occurred here? Not as a sequel to a case of coma. I have known it as a sequel to epilepsy in more than one case.

2693. Do you regard epilepsy and coma as separate kinds of lead poisoning? Yes, I do.

2694. You do not think they constitute one class of illness? No; but we know from other experience that repeated epileptic convulsions will merge into coma, and the patient dies.

2695. Have you ever had any cases of lead poisoning among the general population? I have.

2696. You had the case of a barman, I believe? I did have one case. That was a case of lead poisoning through drinking beer out of a beer engine.

2697. It was due to one of the causes commonly met with in cities? Yes.

2698. Have you ever met with cases of indisposition among the general population not connected with the mines which might be attributed to the effects of lead? Never, except in one case, which was clearly one of lead poisoning, and that occurred to the child of a mine-manager, who lived just underneath the smelter stack.

2699. That child was 2 years and 8 months old, if I remember right? Somewhere thereabout.

2700. Did any other members of that family suffer then or at any other times? Not to my knowledge.

2701. How was it that that child alone suffered? She was permitted to run about in the garden, and it was her custom to pull the flowers and put them in her mouth, the flowers being covered with flue-dust. The case was fatal.

2702. Do the people show signs of anæmia? No; certainly not.

2703. What is your opinion of the children in general here—are they rosy and stout and active as children should be? Very much so. They are very healthy children indeed, even exceptionally so, I think.

2704. It has been given in evidence that the children here, that is, such children as were presented to the medical witness on account of some indisposition or another, exhibited anæmia with especial commonness? It has not come within my experience.

2705. Are you of opinion that the fumes which issue from the smoke-stacks, which beat down upon the houses and deposit lead dust upon the roofs, and therefore, ultimately in the iron-water tanks, are of no consequence to the inhabitants, speaking from your own direct observation? That has been my experience, that they are absolutely inert, so far as affecting the general health. The fumes do not practically affect the general health at all; that is, they have not so far.

2706. You have practised here five years? Yes.

2707. And you have always been alive to the possibility that harm might arise from the fumes? Certainly.

2708. And you probably hear it frequently alleged that they ought to be, or must be, dangerous? Frequently.

2709. So that it is not from overlooking results that you are of opinion that no results do ensue? No.

2710. There are among the deaths of persons under one year of age—I am now quoting from the Register for 1891—a certain number which are ascribed to wasting diseases; are you of opinion that lead at all events has nothing to do with such cases? I am.

2711. Do you think many of them were probably due to tuberculosis? A proportion, though not a larger proportion than elsewhere.

2712. Do you think that improper feeding is a main cause of such deaths? I am very strongly of that opinion.

2713. Are you of opinion that improper feeding conduces largely also to the class of deaths from intestinal diseases, such an diarrhœa, dysentry, gastritis, enteritis, and the like? I am.

2714. Then in the same year twenty-five deaths of persons under one year of age were ascribed to premature birth, defective devolpment, and so forth; do you think lead contributes to these in any degree, not as directly affecting the children, but through their parents? I have never had reason to think so; but on the other hand I am not prepared to say that I have made any special investigation of the question.

2715. Do you think that premature birth and malformation are commoner among this population than among others? No; I do not think they are commoner here than elsewhere.

2716. They do not occur especially, perhaps you can say, in the families of persons employed about the mines? No; not with more commonness than among people otherwise employed, as far as I know.

2717. As to menstrual disorders and abortions, are they more common here? I think not.

2718. Is impotence a common complaint among men? Not at all.

2719. When you meet with it are you able to ascribe it to the ordinary causes of impotence? I think I have only seen three cases of impotence since I have been here.

2720. And were you able to exclude lead as the cause of it? Yes.

2721. Do you agree that animals die here of what is called lead poisoning, and which probably is lead poisoning? They die of something which is probably a local condition anyway.

2722. They die in a way you have never seen elsewhere? I cannot say that. Cats and dogs die in fits here; and cats and dogs are everywhere subject to fits. But I do know you cannot keep pets in the town—that is to say, cats and dogs.

2723. Do you mean by "in the town," near the Hill? Yes.

2724. Now, as to prophylaxes, do you agree that personal cleanliness ought to be carefully observed by persons who work in lead? I do.

2725. Will you tell us whether in your opinion, under the circumstances of this town, a majority of the miners have in their houses sufficient accommodation for bathing, and whether they can get sufficient water to bathe in? The accommodation does not exist. There is no accommodation for bathing either in the houses which the miners build for themselves, or in the boardinghouses. The general custom is for a man to wash himself down to the waist in a basin of water when he comes off the shift—that is to say, when he comes from his work in the afternoon, after 4 o'clock. Whether they do the same at night I cannot say.

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2726. It has been given in evidence that the men do wash themselves down to the waist as you describe, but that they do not very often wash themselves below the waist, because there is no place to which they can retire out of view of the household? That is so; there is no sort of accommodation for it.
2727. Now, are you quite clear that personal cleanliness is an important part of the prophylaxes of lead poisoning? I am quite clear that it must be so. I cannot quote you any case or cases of dirty men being more subject to lead poisoning than clean men; but I am quite sure it must be so.
2728. In any case do you think the mines should provide baths for the men? Yes; I certainly think there should be some provision of that kind.
2729. Do you think that these baths should be provided with hot water? Quite so. In the winter it should be so, certainly, to induce the men to use them at all. If they were not supplied with hot water the men would not use them.
2730. And for a similar reason, I presume, you think a changing room should be something more than a shed merely sufficient to comply with the words of the Mining Regulations? A partitioned shed is all that is necessary—that is a series of partitions, forming little boxes.
2731. It has been given in evidence that at Bendigo the men are provided with suits in which they do their work, and are compelled, not by the law, but by the universal custom among the proprietors, to put on these suits when they go below, and take them off and put on their own clothes when they come up again. The rule was established in the first instance to prevent the stealing of gold; but it has been found a beneficial regulation as regards the health of the men, who there often work in wet ground;—do you think this rule might be enforced with advantage here? I do not think it is necessary. In fact, the men, as a rule, change directly they get home. They do not walk about the streets in the clothes in which they have worked. They go to and from their work in their working clothes; but they always change their outer garments.
2732. You cannot say whether they change everything? I cannot.
2733. Is it not a usual custom amongst all classes of working men to change their clothes when they are not at work. For instance, a blacksmith, I believe, does not loaf about the streets in his working clothes? No; I suppose it is the custom.
2734. Are you able to say whether the changing of clothes which is done here is done solely with the object of getting rid of the leaded garments? No; it is done because it is not considered dignified to walk about in working clothes.
2735. Are you of opinion that a miner should not walk about longer than necessary in leaded clothes? I am, certainly.
2736. It has been given in evidence, also, that the men employed about the smelters have twenty minutes crib time allowed them, but that they do not always have that twenty minutes clear. Do you think it desirable that the men employed about the smelters should have a clear time for their crib? I think it is on general principles, desirable that every man should eat his food leisurely—that he should have time in which to eat it.
2737. Do you think he should be able to wash his hands and mouth before taking his food, and that he should not be called upon to contaminate his hands and mouth again until he has finished eating? Certainly; I think that important.
2738. What other steps do you think might be employed besides general cleanliness, and attention to the way in which food is taken? Periodical purging I think.
2739. As to smoking for instance? I do not think smoking exerts any influence for or against, except in the matter of preparing their tobacco for the pipe, the men rub the tobacco in their hands, and I think it would be wise to forbid smoking at the works. A periodical purge is probably useful.
2740. Are you acquainted with any men who use it? Oh, yes; many men do, but get leaded all the same, however—some of them. But it is useful to a large number of people who never saw a lead-mine in their lives. I do not know that it is much good as a prophylactic measure. I think the employment of milk is an important measure, remedial or prophylactic, or both. I think, also, the free employment of water about the stopes is of importance to keep down the lead dust.
2741. Do you think it so important that it would be well to enforce it by law? I have not the experience of underground working to be able to say that, but any measure that would minimise the dust is very important.
2742. And the ventilation of the mine, I suppose ought to be especially good? Yes.
2743. *Mr. Hamlet.*] With regard to prophylactics, and specially of purges, do you find any special value in soluble sulphates? I always prescribe them as a prophylactic; they are in fact used by the majority of the men themselves in the form of sulphate of magnesia.
2744. Is that the usual form of purge they take? Yes.
2745. Does alcoholism seem to aggravate plumbism? Yes; very much. A man may drink, or work in a lead-mine, but he cannot do both with impunity.
2746. Would a man sleeping underground thus place himself in a favourable position for getting leaded? Certainly; if he slept where the work was going on.
2747. More so than if he were working himself? No; I do not think that.
2748. When the smelter-tappers describe their pains and symptoms, what do they say—that is, how does the lead usually affect them? It usually takes the form of colic. They begin with feeling "off colour"; they cannot eat, and have headache, and the bowels become constipated; then they suffer from obstinate constipation and colic.
3749. Generally you find no distinction between their complaints and those of the men who work underground? No; I think not.
2750. During your practice here, have you found general complaints made by the persons living in the town against the fumes that issue from the smoke stacks? No; I have not.
2751. They pass it by as a matter of every-day occurrence? Yes. Occasionally I have heard specific diseases, like pneumonia, for instance, attributed to the smelters; but I have not met with any disease that is really attributable to that cause.
2752. *Chairman.*] Fatal cases of lead poisoning are very rare, are they not? Very rare.
2753. Is it your opinion that lead poisoning eventually damages the constitution, and is an indirct cause of illness which may be fatal at a future date? I do not believe the lead poisoning that occurs here does damage the constitution permanently. However, it is a matter which could only be decided by many years of observation. I have never seen constitutional secondary effects such as chronic neuritis; and I do

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not think it does occur, in fact; because the men are not bound to stick to the work, and do not stick to it.
2754. Are you of opinion that in any mine which contains lead-bearing ore and other sorts of ores, there should be systematic shifting of the men periodically, from one part to the other? If possible, yes.
2755. And if a man gets leaded through working in the lead-ore, an effort should be made to find him work where he will not be exposed to lead? Yes.
2756. Is gout a common complaint here? No.
2757. How many cases have you met with during the five years you have been here? I think only two, and only one of them occurred in a lead subject—a man who was suffering at the time from lead poisoning.
2758. *Mr. Hamlet.*] It is sometimes alleged that lead is not the sole cause of supposed lead-ore poisoning, but that arsenic is frequently the cause? Yes.
2759. Do you find any symptoms to warrant that? I have never seen any symptoms that remotely suggested arsenical poisoning, to my mind.

[The witness withdrew.]

Mr. Joseph Wilks called and examined:—

Mr. J. Wilks. 8 July, 1892.

2760. *Chairman.*] What office do you hold? I am Inspector of Stock.
2761. How long have you been here? I have been in the district about two and a half years.
2762. Generally speaking, what are your duties? The supervision of all stock in the district.
2763. You travel about a great deal? Yes.
2764. Have you ever performed the same duties in any other part of the country? Yes.
2765. Do you see cattle and horses and other animals in this district ill of diseases that you have not seen elsewhere? Yes.
2766. What do you attribute that illness to? To minerals. I see cattle affected immediately round Broken Hill that I do not see similarly affected elsewhere.
2767. How far from the Hill do you see cattle affected in that particular way? Not above 2 or 3 miles from the main line.
2768. And you think it is mineral poison that they suffer from? Yes; I have at various times reported cases to my chief, and through him to the Government Veterinary Surgeon. I remember when I first came here, more especially, I reported several cases, and I think my opinion was upheld by the Government Veterinary Surgeon. I have never had reason to believe otherwise.
2769. What I want to know from you is this: whether you are acquainted with any case of an animal dead of supposed mineral poisoning in which the viscera were sent anywhere for chemical analysis? No.
2770. You do not know of any case in which evidence of mineral poisoning has been established? I do not.
2771. Can you form any independent opinion of your own as to whether the mineral poisoning you found the cattle to suffer from was due to mineralised water or to deposits of the fumes from the smoke-stacks either in the water or on the soil? I think it was from drinking the water, on these grounds. When I first came here, about two years ago, many cases were reported to me, and I found, upon inquiry, that those cattle which were affected had been drinking the deposit water, on the catchment area, whereas those that drank the good water from the Imperial tank at that time were not suffering.
2772. The water you refer to was not distinctly mineralised water—pools on the surface, you mean? Yes; and I think they were also affected by the fodder they picked up—that is, the cattle which were turned out to pick up what they could find.
2773. There was a difference in the diseases of the two classes of cattle you refer to? Yes; that was during the summer when we had a fairly good season. During the season last past there has not been nearly the quantity of poisoning, and I attribute that to the circumstance that there was really nothing for the cattle to pick up at all, nor was there any water, except that which was brought here.
2774. Then, in this last very bad season, they were protected because they had nothing except good water and food, so far as it went? Yes; with the exception of some outside the boundary which drank from mineralised wells. They were affected.
2775. And if the cattle drank from these wells they would be affected all the year round? This special lot of cattle had only come out during the last season, to the place I refer to. But they were not affected in a similar way to the cattle I had seen previously. Dr. Groves and I made a *post mortem* on them, and we did not trace the death in those cases to lead poisoning, so much as to bad food and water—probably mineral water. If they had had good food and water they would not have died.
2776. You think death was practically caused by partial starvation? Yes.
2777. Whose cows were they? Rammart's.
2778-9. Who made the *post mortem*? Dr. Groves and myself, and a person named Melville, who opened the cow under my direction.
2780-1. Did you see the lungs? Yes.
2782. Were they free from disease? Yes; they were discoloured a little, but not actually diseased; at all events not suffering from pleuro-pneumonia.
2783. *Mr. Hamlet.*] Do you remember having seen the spleen of those animals? Yes.
2784. Did you observe anything that would lead you to suppose they died of lead poisoning? No; not in those animals.
2785. Did you see anything remarkable about the spleen of those animals? Not about the spleen. It was to all intents and purposes healthy; the colour and size proper.
2786. Is it not a fact, that after a *post mortem*, sometimes some of the organs appear bluish-black in colour? Yes.
2787. And such appearence is due to decomposition? Yes; in nearly all cases it is due to decomposition—that is where the organs are sound. I may say I looked especially at the spleen of these animals, and I saw nothing to lead me to think that there was in any way disease of the spleen. The symptoms seemed to me to indicate an impoverished state of the body. The whole of the tissues contained water instead of blood.

[The witness withdrew.]

TUESDAY, 17 *JANUARY*, 1893.

Present:—

DR. ASHBURTON THOMPSON (CHAIRMAN).

W. M. HAMLET, ESQ., F.I.C., F.C.S. | J. HOWELL, ESQ.

J. THOMAS, ESQ.

Mr. C. Lawrey called and examined:—

Mr. C. Lawrey. 17 Jan., 1893.

2788. *Chairman.*] What is your name? C. Lawrey.
2789. What is your occupation? A tapper.
2790. *Mr. Howell.*] How long have you been in the employ of the Broken Hill Proprietary Company? About five and a half years.
2791. Working steadily all that time? Yes.
2792. What work were you doing when first employed? Slag wheeling.
2793. And then you went from slag wheeling to tapping? Yes.
2794. How long have you been tapping? About three and a half years.
2795. On the north or south smelters? I have been on the south, but I am on the north now.
2796. You have been at both? Yes.
2797. Are you a north smelter at present? Yes.
2798. Have you ever been laid off with sickness caused by lead poisoning? I have been laid up for over a week at a time, but I do not know whether it was lead poisoning or not. I have never been very seriously leaded.
2799. Do you think you positively have felt the effects of lead symptoms? Yes; I have felt the effects of fume.
2800. Did you apply to a physician for medicine or advice? No.
2801. How long was the longest time that you were laid off? Never above eight or nine days.
2802. You went back again? Yes.
2803. How many times do you think you have been laid off in the five years you have been employed? I could not say; a couple of times, I think. I have been laid off by an accident to my hand.
2804. Yes, but that is a different thing altogether. Are you aware, from your own knowledge, there are a great number of men disqualified from working by lead poisoning? I have known some cases where lead poisoning has laid the men off.
2805. The Chairman is very anxious to learn all particulars with regard to lead poisoning. I will be glad if you will give me all the evidence that you can, and I might say that you need not be in the least afraid of offending anyone by so doing, as we are all here with a desire to learn from the witnesses their feelings upon the matter; also any suggestions that they might make. You never fed? No.
2806. At what particular furnace do you think at which a man is most likely to become effected with lead fumes? I could not say anything about the upstairs. I only know of the lower portion.
2807. Do you think there is as much care exercised around the furnaces as there should be, in order to prevent men from getting lead poisoned. Could you suggest anything that you think would be an improvement? That is a question that I could not very well answer.
2808. You being there constantly, would as likely as anybody observe a thing of that sort? The only thing I know of is that if you could stop the wind from blowing, it would be far better.
2809. Well, you have plenty of air? Yes; rather too much.
2810. Do you think in the position you are in at your work, that you are as liable to become leaded as any other man? I think I am about as liable to become affected as any other man. I am as much in the fumes as anybody.
2811. *Mr. Hamlet.*] Have you ever noticed any difference on different days. Suppose you were at work on a very close muggy day, do you find any bad effects from the lead then? I do not know that the atmosphere has much to do with it. Certainly on a hot day, you see it laying about more than on a cool day.]
2812. Is your work connected with any particular smelting furnace? No; not particularly.
2813. In any of them? Yes.
2814. Who selects the furnace for you to work at—is it a matter of your own choice? No; it comes in our turn.
2815. There is one furnace worse than the rest, probably you will be sent there? Yes; there is a furnace a little worse than the rest.
2816. The one where matte is smelted? Yes.
2817. Every man will take that furnace in turn? I do not know that they do it on every shift, but they do it on our shift.
2818. In any of your cases of illness when you were laid up, was it through working on that particular furnace?
2819. *Mr. Howell.*] It was not in existence at the time; it is a recent construction.
2820. *Mr. Hamlet.*] So far as your experience goes, then, one furnace is just about as good or bad as another? Of course, the outside furnaces are always regarded as the best, as you get more air there.
2821. Have you worked at all different kinds of work on the smelting floor—have you worked at tapping and slag wheeling? Yes.
2822. And skimming the bullion? Yes.
2823. Which kind of work do you prefer as a matter of choice? The easiest.
2824. Which is the easiest? Well, I suppose that tapping is about the easiest.
2825. But then would you not be likely to get more fumes in tapping than slag wheeling? Yes.
2826. But you have never found the fumes to be so bad as to make you wish you were on some other job? No; I cannot say that I have.
2826½. I suppose if you complained of the fumes you could be put on to something different? I do not know now whether we could or not—one time we could.
2827. Supposing you found the fumes pressing you, and you would like to go slag wheeling—could you do that? Yes.
2828. Can you give us any ideas as to the kind of feeling you experience when laid up? A dull, heavy feeling mostly. Never had a severe attack.

Mr. C. Lawrey. 17 Jan., 1893.

2829. *Mr J. Thomas.*] You say you have not been leaded, not of any consequence yourself. Mr. Howell asked you if you had seen a doctor or physician when laid up, you said no. Did you ever go to a chemist's? No.
2830. You never took anything as a preventive? No.
2831. You have been here five years now, and I suppose you know a lot of men in Broken Hill? Yes.
2832. Have you heard of a large number of cases of lead poisoning? Yes; a good few.
2833. Amongst your friends, whom do you think are more likely to be leaded—underground men, or men around smelters? Underground men are.
2834. As far as the slag wheelers are concerned, I suppose they very rarely get leaded? I do not know. I am sure some of them get leaded.
2835. But there is less probability of a slag wheeler getting leaded than a tapper? Yes.
2836. A slag wheeler does not get the wages a tapper does? No; he gets a shilling a day less.
2837. The tapper is looked upon rather as in charge of a furnace; he is next to the foreman. Well, although the slag wheeler is the harder worked, do you believe, if the pay was exactly the same, that men would prefer slag wheeling because of less probability of getting leaded? I could not say. Some men like tapping, and some men like slag wheeling.
2838. Oh, there are some men who would prefer slag wheeling to tapping? No; I did not say that.
2839. You do not think it probable that if Mr. Howell was to tell a man he could go tapping instead of slag wheeling, that he would prefer to stay slag wheeling? No; I could not tell other men's thoughts.
2840. *Chairman.*] He has already said that it is much lighter work, and so it is;—but it may require a little more dexterity;—do you know of any friend of yours who has ever died from lead poisoning? No.
2841. *Mr. Howell.*] If you had your choice to-day to work on the surface on top of that hill in the sun in the open air for the same wages as you are getting now at tapping, which would you prefer to do? I think I would take the tapping.
2842. *Chairman.*] Are you a married man? No.
2843. How far from work do you live? About a quarter of an hour's walk.
2844. You work on one shift, I believe, one week, and the next week on another shift? Yes.
2845. Is it your custom to make a point of getting food before you go to work? Well, about an hour or an hour and a half, two hours sometimes, it depends upon the shift.
2846. You go on at 4 o'clock in the afternoon on one shift? Yes.
2847. Then you have had your dinner at 1 o'clock? About half past one.
2848. Then the next shift is 12 o'clock. Yes.
2849. Then you have your supper at 11 o'clock? Well, I mostly have my dinner at 6 o'clock, and have a little to eat about 11. Scarcely anything to eat at 11, just something light.
2850. Have you got your working coat on now? Yes.
2851. You have been at work to-day? Yes; working this morning.
2852. Then you change when you get home only? Yes; when I get home.
2853. Have you ever had anything to do with flue-dust? Well, I have never been connected directly with flue-dust, but I have been working with flue-dust near me.
2854. How old are you? Twenty-eight.

[Chairman examined witnesses gums, and showed that they had the blue line. He noticed that the witness was not evidently anæmic.]

2855. *Chairman.*] You take some food to the mine with you? Yes.
2856. What do you generally take? Mostly sandwiches.
2857. How do you carry your crib? Mostly wrapped up in paper.
2858. When you get to your work what becomes of your coat, where do you put it? Hang it outside the shed on the post.
2859. Your crib being still in the pocket? Yes.
2860. Do you get always a clear twenty minutes in which to eat your crib? Well, we have no specified time for crib at the furnaces.
2861. In fact when you think the time has come round you just take it in your hand and eat some of it, and do a little more work and take another piece, and get through it that way? We sit down till we are finished.
2862. How do you mean that you have not a specified time;—you have a right to twenty minutes, have you not? I do not know that we have ever had any specified time at furnaces, sometimes we get twenty minutes, if anything was wrong we might not get that much.
2863. Do you mean you get a little time by arrangement with other men, by arrangement between yourselves?
2864. *Mr. Howell.*] There is no specified time;—they can eat their crib any time they wish.
2865. *Chairman.*] Are the men allowed to smoke at their work? Yes.
2866. And those who smoke do smoke, I suppose, pretty often during the course of eight hours? Yes; every time they feel inclined.
2867. There is always some flue-dust lying about the tapping-floor? Well, I cannot say always, every time the flues want cleaning it is there.
2868. It is nearly every day, is it not, that either one part of the shed or another has it? Yes.
2869. Is the dust wetted as soon as it is brought out of the flues? Yes; it is immediately damped down.
2870. And that is done regularly? Yes.
2871. How is it raked out? With long rakes.
2872. There is a good deal of dust when it falls down of course? Yes; there is bound to be some dust.
2873. And then you wet it to prevent it flying about? Yes.
2874. Does the process of wetting cause much dust? None. The water runs on a level with the dust, and does not drop upon it.

[The witness withdrew.]

John

Mr. John Dimpsey called and examined :—

Mr. J. Dimpsey. 17 Jan., 1893.

2875. *Chairman.*] What is your name? John Dimpsey.
2876. What are you? I am a feeder of the smelters.
2877. You are on the upper floor? Yes.
2878. How old are you? Thirty-nine or forty.
2879. *Mr. Howell.*] You are in the employ of the Broken Hill Proprietary Company? Yes.
2880. How long have you been in their employ? Five years and five months.
2881. Engaged on the furnace all the time? Yes.
2882. In the capacity of feeder? Four years feeding.
2883. What first? Charge wheeling first; then feeding furnaces.
2884. On north or south smelters? I am on south now—have been on both.
2885. You fed on the old furnaces as well as the new ones? Yes.
2886. Did you find that there was much more fume coming out of the old than out of the new furnaces on the feed floor? There has not been so much fume since the new furnaces have been put up.
2887. Do you find any fumes on the feed floor now to amount to anything? No.
2888. Have you during your time been leaded at all? Never.
2889. Have you been laid off sick at any particular time? About twelve months last November for a fortnight, with influenza.
2890. You have not felt any serious effects from lead-poisoning at all? No; not in any way.
2891. *Chairman.*] You say you were laid off for a fortnight? Yes; with influenza, twelve months ago.
2892. You are one of the oldest hands on the furnace? Yes; only one or two are there now that were on when I came.
2893. You never worked below on the bottom floor? No.
2894. Do you think there could be any improvement made on the feed floor to prevent what is known as lead-poisoning, or do you know that there has been any lead-poisoning to any considerable extent? I never knew of any lead-poisoning. I hear some people talking of people being leaded, but I never heard of anyone being leaded on my floor.
2895. When the furnaces are all running regularly, do the fumes come up on the feed floor? No; it cannot come through to the feed floor.
2896. When a furnace is shut down for repairs occasionally a little fume will go up? Yes; a little.
2897. When the draft is off? Yes.
2898. *Mr. Hamlet.*] What time of the day do you have your crib? Twelve o'clock.
2899. That is once in a shift? Yes.
2900. The other meals you have at home? At 12 o'clock night-shift we have it. After 4 in the morning, and in the afternoon shift about 8.
2901. Where do you generally keep your food? In my pocket.
2902. Wrapped in paper? Yes.
2903. I suppose that is the custom of almost everybody? Yes.
2904. And what do you drink when you are thirsty on the mine? I drink tea or water.
2905. You bring tea with you? Sometimes I take it made at home, and other times I make it up at the mine. If I am not in a hurry in the morning I make it at home, but if in a hurry I make it at the smelters.
2906. Where do you get water to make tea at the smelters? Take it generally from the water-bags up stairs, and sometimes go down to the tank for it.
2907. Where is that water got from in the bags? From the condensing-plant.
2908. It is condensed water? Yes.
2909. Now, taking the hottest and stuffiest day that you can ever remember, do you think there is enough ventilation on feed floor? I think so. A hot day never troubled me any more than the ordinary days since the new floors were built. Of course the old floor was a bit warm in sultry, hot weather.
2910. I think your feed floor is quite open on one side to the sky? Yes. I think there is plenty of ventilation. Rather too much in winter time, when it is pretty cold.
2911. I suppose you know what is meant well enough by being leaded? I do not know. Of course, the person who was leaded would know better himself, but I do not know the result of it at all.
2912. But have you not seen any of it yourself? No; I have seen no man laid up with the lead. Only one, I think, who was treated for lead.
2913. *Chairman.*] Who was that? A man of the name of Toohey.
2914. So far as you yourself are concerned, you have never been leaded? No; never troubled with the lead in any way since I came to Broken Hill.
2915. *Mr. Thomas.*] You have been here six years? Five years and five months.
2916. And you have not been leaded yourself, and in that time you have only heard of one man who has been leaded? I said I heard of people being leaded, but I only knew the one man.
2917. You have only come across one man who has been leaded in that time? Yes; where I knew the case.
2918. There is very little sickness, then, amongst the smelters? Very little sickness on the top floor; I know nothing of the bottom floors.
2919. Do you think there is less sickness now than at the early time of the mine? I believe there is.
2920. They were worse off in the early days than they are now—I mean just as far as the smelters are concerned? As to the men working on the smelters, there are not as many here sick now as there was one time. I do not know of any one sick now. Some four or five years ago there were more sick.
2921. But now that rarely occurs? Very seldom.
2922. What would you put the increased health of the mine down to? That I could not tell you.
2923. You do not think it is through any improvements? Yes, that might be; there are improvements.
2924. You think the smelters that are there now are more conducive to the men's health than they were one time? Yes; there is less fume than there used to be in the old workings.

[Chairman here examined witness and showed that he had the blue line, but that it was less marked than in the former case.]

2925. *Chairman.*] Is it your opinion that men who work on the feed floor are free from danger of being leaded, speaking from your own knowledge and observation? Speaking from my own knowledge and observation, I do not think that there is anything on the top floors to hurt them.

Mr. J. Dimpsey. 17 Jan., 1893.

2926. Which nest do you work in? In the south nest.
2927. How many men on an average are engaged on the top floor? There are four men on the top floor to each furnace.
2928. That is twenty-four altogether? Yes; besides the men in the bins. There are three in the bins, three charge wheelers, and one feeder—that is, thirteen and a half men on each furnace in twenty-four hours.
2929. Do the same men always change shifts together? Yes; the one man always relieves me, except once in three weeks, when he takes his long shift off.
2930. What shift are you working on this week? Day shift.
2931. At the end of the week you will change? Yes; it will be my long shift off at the end of the week.
2932. Next week, whatever shift you are working on, shall you be working with the same men? Yes; they all change together.
2933. Are you an old hand up on that floor compared with others? There are some old hands and some new.
2934. How many, then, have worked there as long as yourself in your shift? There is one that I know of who was there when I first started, a Mr. Witkin.
2935. Has he ever been leaded? Not to my knowledge.
2936. If he had been leaded you would know by his being away from work? Yes.
2937. Well, do you say he has not been leaded? I do not think he has been leaded.
2938. *Mr. Thomas.*] Where do you think a man is more likely to get leaded—underground or at the smelters? I know nothing at all about underground.

[The witness withdrew.]

Mr. Henry Barnett called and examined:—

Mr. H. Barnett. 17 Jan., 1893.

2939. *Chairman.*] What is your name? Henry Barnett.
2940. What are you? A tapper.
2941. How old are you? Thirty-three.
2942. *Mr. Howell.*] How long have you been in the employ of the Broken Hill Proprietary Company? Six years.
2943. Always tapping? No; wheeling slag for three years, and from wheeling slag to tapping.
2944. How long have you been tapping? Three and a half years.
2945. Did you ever attend to the lead? I have been amongst lead now eight weeks.
2946. You are working on the matte furnace now? Yes.
2947. A matte furnace is the only one they consider that gives off the most fume? Yes.
2948. Have you ever been affected by lead? No; not to hurt me in any way.
2949. You have been laid off occasionally? Not by lead; I have had a spell now and then, and have gone to Adelaide.
2950. But not from any lead poisoning? No.
2951. During the time that you have been employed by the Broken Hill Proprietary Company, are you aware of any great number of men that have been seriously affected by lead poisoning? I have known a few that say they have been affected by lead.
2952. Do you of your own knowledge know of any men that have been laid off for any considerable length of time from what the physicians call lead poisoning? Yes; I do.
2953. Are they back working again—most of these men? Yes, some of them. Certainly a great many of them have left since I was first employed upon the mine.
2954. You do not think, then, that you have felt any serious effects from what you would call lead poisoning? No.
2955. These mates of yours that you are personally acquainted with, and have been laid off with lead poisoning, how long were they off? About eight or nine days.
2956. In talking with them, did you ever ask them how they felt? Yes; I asked them the symptoms of it. They said they had pains in the stomach. I could not speak for myself.
2957. You worked on the old furnace as well as the new? Yes.
2958. Do you think that the present furnace and the general system of the smelting there is better than it was on the old furnace? Yes.
2959. And the men are less liable to get poisoned? Yes.
2960. On what part of the furnace on the tapping floor do you consider a man would be most likely to get leaded? I could not say, as I know nothing about the top floor.
2961. But I mean on the bottom floor? I do not know that there is much difference that I am aware of, and I have been up and down all the furnaces.
2962. Do you think a man is more likely to become leaded if worked continuously on the lead well than if tapping or slag wheeling? No; I do not think so. Tap men are mostly inside, and the slag wheelers take their turn on the lead every third day.
2963. Is it not a fact that a man tapping is more likely to be among the lead fumes? Yes; he has to be there to watch his work.
2264. It is a pretty certain thing that a man tapping continuously would be far more likely to become lead poisoned? Yes; a wheeler has got the opportunity of going out into the open air. He is three-fifths of his time in the open air.
2965. How often do you draw off a charge of lead? It has to be considered what charges we are putting through.
2966. Say at the present time? At the present time we might get three, four, or five off on a shift. Sometimes we run more.
2967. How long does a man remain on the lead well;—how often does he change from the lead well to some other department? He changes every day. He only works one day in the one department. We have three wheelers, and they take a day on the lead. The tappers remain on the furnace.
2968. *Chairman.*] Why is the man on the lead well changed so often? It gives the men a spell at wheeling, as the wheeling is very hard work, and the lead well work is easier.
2969. *Mr. Howell.*] In taking out dust from flue chambers there, do you ever notice that dust flying around? Occasionally it does, until they put the water on. They put the water on almost instantly, then we do not notice the dust, if there is a very strong wind a very little of it might rise; it is damped down as soon as it is put out, and we find no more of it.

Mr. H. Barnett. 17 Jan., 1893.

2970. You generally find that the fumes are carried away by the ventilation air? Yes.
2971. And I suppose with the exception of a very warm still day? Yes; that is when we find it most.
2972. Where do you keep the water that you use for drinking purposes? That is generally kept in a bag which we hang on a verandah post outside.
2973. Do you ever cover the bag up? Yes; I generally make it a practice to cover it up to keep the dust out of it.
2974. Is that generally observed? No; sometimes they do not take that much notice of it.
2975. It would be a very easy matter to put a tin plate over it so as to cover it in? Yes.
2976. That water is good? Yes.
2977. Condensed water? Yes.
2978. Plenty of it? Yes.
2979. *Chairman.*] Cool? Yes; that is if they fill the bags regularly.
2980. *Mr. Howell.*] But then that is their own fault as the tank is there? Yes.
2981. Have you ever made use of these baths since we put them up? Yes.
2982. Do you find that they are a benefit to the men? Yes.
2983. The men say they are a benefit? Yes.
2984. *Mr. Hamlet.*] Are you a married man? No.
2985. Where do you live? At South Broken Hill.
2986. Do you live in a boarding house? No; I have got my own place.
2987. What is about the size of your house? 12 feet x 14 feet.
2988. *Mr. Hamlet.*] One or two rooms? One room. I simply live in it, I board out; I simply live in it, I have my meals out.
2989. What is the house made of? It is wood and iron.
2990. I suppose you do not require water there? I catch enough water to supply my wants; if I want any I buy it.
2991. You get the water off the roof? Yes.
2992. What provision for bathing had you before these baths were put up? I have got a big tub of my own.
2993. You used to have it at home? Yes; occasionally I go down to the baths. If I do not go there I have a bath of my own. I generally wash every night and put clean clothes on.
2994. Can you give me the estimated cost of living for unmarried men in Broken Hill at the present time? It costs me 18s. a week for boarding out, independent of my own room.
2995. You have your own property, and you pay rates? Yes.
2996. Then you have to pay for your board in addition? Yes.
2997. Would that, do you think, amount to 25s. a week altogether? Close upon it.
2998. You would reckon 25s. a week as the cost of your living? 20s. to 24s. a week, taking water and everything that I used to buy.
2999. *Mr. Thomas.*] I suppose you have known a good many men here during the six years you have been a resident? Yes; a great many.
3000. And none of those have been leaded? Yes; they have complained of lead.
3001. A large number have complained of lead? Yes.
3002. I suppose most of your friends are smelters;—have many of them been leaded? A few of them occasionally have stayed off on account of lead.
3003. And you know some miners? I cannot say that I know many.
3004. There are some baths up on the mines now that you can wash in;—how long have they been there? To my knowledge, three months.
3005. You think that the health of men who use these baths is a great deal better? I should think so; there is plenty of water there.
3006. You only think so? Well, I have been in there myself.
3007. *Mr. Thomas.*] As far as you are concerned, by taking that hot bath you are a better man? I do not feel any the worse for it.
3008. You feel better? Yes, certainly; any man who is clean always feels better.
3009. Then you think, to the extent that men have been using these baths there is that amount, of illness less than there was previously to their not using them? I could not express an opinion on that point. But you think it would be reasonable? Yes, I think so.
3010. Was there a time when you did not enjoy as good health as you do now? I do not know. I have never enjoyed bad health since I have been here. If I thought it would have injured me I would have left.
3011. You being a careful man, then, if you felt at all unwell, you would have the money to leave at once, say, to go to Adelaide? No; I have not got an extra lot of money.
3012. But I mean a young man would have that opportunity? If careful, he might go away.
3013. There is no difficulty at all if you go to the boss and say that you are unwell—that you are leaded—there is no difficulty in getting away? No; not if you give them some time.
3014. Then, if a man could not get away;—I presume it is general here if men feel the least ill they try and get away for a change, is it not? Yes.
3015. So that if a man could not possibly get away the lead would probably tell on him? Yes; he would have to lay up.
3016. Have you had any spells at all—that is, holiday spells—during the six years? Yes, two different spells.
3017. Three weeks each time? No; a fortnight once, and a three weeks at another time.
3018. These are the only two holidays spells that you have have had? Yes.
3019. Do you smoke? Yes.
3020. Are you a teetotler? Yes, for the present—for the last six months.
3021. *Chairman.*] Some men working under the same conditions as yourself among your acquaintances have suffered from the lead, you have told us? Yes.
3022. Do you attribute your own escape to any particular thing that you have done—to any particular care of yourself that you have taken? No; I think it lies in every man's power to do the same as I have done. I have certainly looked upon it that prevention is better than cure any time.
3023. What about changing your clothes;—you put on your working clothes in your own place and walk up to the mine, and walk back in them? Yes. 3024.

Mr. H. Barnett. 17 Jan., 1893

3024. Do you make it a rule of changing them when you get back? Yes, as soon as I get home.
3025. Is that a common rule? Well, it is common to me.
3026. Do you know the custom among the men—do they generally change their clothes when they have finished their day's work? Those that live near me do the same.
3027. Of course, there are some men who do not? Certainly, some are careless.
3028. In a general way, can you give us an idea what is the average custom;—do you look upon a man who does not take the trouble to change his clothes as an exception, and a very careless man, or is there a large portion who do not take that trouble? Yes.
3029. What do you think is the reason—is it pure carelessness? Well, certainly, it is people with different ways.
3030. Now, as to yourself, do you do it as a matter of personal habit merely, or do you do it as a protection? I have always made it a habit to dress again after work. No matter what we are employed on I have always made it a practice to change myself after work.
3031. You never had anything to do with flue dust? No, only simply round the furnace, when taking it from the flues. I consider that I get as much as a good many of them.
3032. You have no regular crib time? No; get it when we can.
3033. But when you find an opportunity to take your crib, do you have sufficient time to take it in? Yes.
3034. You do not have to take up your work again in the middle? No.
3035. Where do you take it? Under the verandah occasionally.

[The Chairman examined the witness, and showed that he had a very marked blue line on his gums, but no anæmia; in other respects, he appeared to be perfectly well.]

[The witness withdrew.]

Mr. J. Cogan called and examined:—

Mr. J. Cogan. 17 Jan., 1893.

3036. *Chairman.*] What is your name? J. Cogan.
3037. What are you? A feeder.
3038. How old are you? Thirty-five next birthday.
3039. *Mr. Howell.*] You are working for the Broken Hill Proprietary Company? Yes.
3040. On the feed floor? Yes.
3041. North or south smelter? South smelter.
3042. How long have you been in their employ? Five years.
3043. You have worked on the old and on the new furnaces? Yes.
3044. Have you worked continuously all that time? Very nearly, excepting holidays.
3045. Have you been laid up from what is termed lead poisoning? I do not know. I was bad for a fortnight once during the five years.
3046. Did you have any idea that you were lead poisoned;—you went to a chemist about it? Yes.
3047. What did he say was the matter with you? He said I was a little feverish, and wanted tuning up.
3048. He did not attribute it to lead poisoning? No.
3049. You did not feel cramps in your stomach? No.
3050. That was the only time you have been laid off with sickness? Yes.
3051. Have you been feeding continuously? No; I was wheeling first. I was charge-wheeling at the old furnace.
3052. You did work below, too? Yes, a little; not much.
3053. And then you went on to the feed floor, and then to charge-wheeling, and from that to feeding? Yes.
3054. How long have you been feeding? Since the new smelters started.
3055. That is two years ago? Yes.
3056. In bad windy weather do you notice any fumes coming out of the throat of the furnace? No.
3057. Is there always sufficient draft to keep them down? Yes.
3058. At times, when the furnace is out of repair, and they are fixing it down below, and the draft is pretty well off, do you ever see puffs of white smoke coming up through the floats? No.
3059. Generally, that feed floor is very clean? Yes.
3060. Do you notice, when charge-wheelers dump their charge of ore at the mouth of the furnace that any dust rises from it? No.
3061. The ore at that time has become very dry; it has been lying out in the sun three or four days? No; not in all cases.
3062. It is dry when it comes out of the mine? The draft of the furnace takes everything down in the way of dust.
3063. Have you ever heard amongst your mates and the men on your shift much complaint about what is termed lead poisoning? No.
3064. Do you, of your own knowledge, know of any of your associates who have been seriously affected by lead-poisoning? Yes; there are a few.
3065. Can you name one or more? Yes; there is Hughes; he looks very badly affected with it.
3066. How long was he laid off? I could not tell you.
3067. Is he working again? I do not think he is.
3068. As a general thing, you have not heard very much complaint in your department? No.
3069. Of course, the men talk about these things;—do you hear the men talking amongst themselves as if they thought that there is more sickness caused by lead-fumes below than above on the feed floor? No; I have not heard that.
3070. If you were at all afraid of being lead poisoned, and had your choice of working above or below, which place would you prefer? I have not had any knowledge of below, but I think I should prefer being on top.
3071. Then you have been constantly employed, with the exception of that fortnight? Yes.
3072. For about five years? Yes.
3073. Feeding, slag-wheeling a little, and charge-wheeling? Yes.
3074. You cannot say that you have suffered any inconvenience? No; no inconvenience.

Mr. J. Cogan. 17 Jan., 1893.

3075. You consider the ventilation of the feed-floor there about as good as it can be? Yes.
3076. You think the new furnaces are very much better protected in that way than the old ones? Yes.
3077. Can you, of your own knowledge, state that there was any more sickness on the old furnaces than on the new? I believe there was more sickness on the old.
3078. Are you acquainted with any of the underground men? No; not many.
3079. *Mr. Hamlet.*] Are you a married man? No.
3080. How do you live;—do you live at a boarding-house, or house of your own? I live in a house of my own, but board at a boarding-house.
3081. How far is the boarding-house from your house? Only a few yards.
3082. And then, starting off in the morning, you go off in your working clothes, do you not? Yes.
3083. And when you come home again, do you change those clothes? Yes.
3084. Before you have your meals? Yes.
3085. That has been your habit always? Yes.
3086. What is the size of your house? Ten feet by 12 feet.
3087. Made of wood? Wood and canvas.
3088. Have you any water supply of your own? No; I get it from the boarding-house.
3089. What do you do for water? I get it from the boarding-house.
3090. Carry it for yourself? Yes.
3091. You carry the water, and wash yourself in your own house? Yes.
3092. Do you know, for a fact, that there are certain regulations or instructions given to every man to regulate himself, so as to prevent sickness or prevent lead poisoning? I believe they were posted at the Proprietary office one time.
3093. Do you know them yourself? No.
3094. Suppose you were to go into another district, say to America, and you were going on to a very bad mine, would you know what to do to try and prevent leading? No; I might eat lemons and drink milk.
3095. Have you ever heard that milk is a good thing? Yes.
3096. Do you know, from your knowledge, that the men use milk? Yes. Some milk-men come on to the floor, and we have a pint of milk occasionally.
3097. What do you drink? I drink milk.
3098. And what is it;—where do you get it? The milk-man brings it round.
3099. To your house, or to the boarding-house? To the floor.
3100. The milk-man goes up to the mine? Yes.
3101. And what do you pay for a pint? Threepence.
3102. Do you know anything about concentrated milk? A little; I do not like it.
3103. What is the milk you generally have? Cow's milk.
3104. Good milk? Yes.
3105. Do many men besides yourself use the milk? Yes.
3106. And they all seem to know that it is a good thing? Yes.
3107. Where do you keep your tucker when you go on duty? Generally, I have got a small box.
3108. You try to keep it out of the dust? Yes.
3109. Is there any rule against smoking on the premises? No.
3110. Any man can smoke? Yes.
3111. *Chairman.*] You think it better to keep your crib in a box than to follow the other plan of keeping it in paper in your pocket? I do not know whether it is better.
3112. You do that in preference? Yes.
3113. Does anybody else? Yes.
3114. How many times a day do you drink milk? Once.
3115. *Mr. Hamlet.*] Once during a shift? Yes.
3116. *Chairman.*] You get milk on each shift? Not on the night shift, but in the day and afternoon shift.
3117. Have you ever heard anybody say that it was desirable that milk taken for the purpose of preventing lead-poisoning, should be taken before you go to work—that is, before you begin your work? No.
3118. Do you use the new baths at all? Yes.
3119. Do many men use them? Yes; crowds of them use them.
3120. Do they like them? Yes; they enjoy them.
3121. They are very glad of them? Yes.
3122. There is hot water, is there not? I have not seen it.
3123. *Mr. Howell.*] There is no need for hot water at present, but the connections are all ready for it when it is wanted in the cold weather.

[The Chairman examined witness, who showed a good deal of redness of gums, and a slight black line on the front teeth, otherwise he appeared to be perfectly well.]

[The witness withdrew.]

Mr. J. Seymore called and examined:—

Mr. J. Seymore. 17 Jan., 1893.

3124. *Chairman.*] What is your name? J. Seymore.
3125. What is your occupation? I belong to the smelters.
3126. *Mr. Howell.*] You are a feeder? Yes.
3127. For the Broken Hill Proprietary Company? Yes.
3128. How long have you been employed? Four years the 4th of this month.
3129. Have you been a feeder all the time? No.
3130. What did you start at first? Wheeling.
3131. Charge wheeling? Yes.
3132. You have been on the upper floor all the time? Yes.
3133. You were never down below? No.
3134. How long were you charge-wheeling? Three years.
3135. And then promoted to feeder? Yes.

Mr. J. Seymore. 17 Jan., 1893.

3136. Then you have been feeding about a year? Yes.
3137. On which furnace? I have been on every one of them, at one time I used to feed odd shifts.
3138. In the four years you have been employed there, have you been laid off on account of lead poisoning, or what you thought was lead poisoning? I have never been laid up at all.
3139. You have worked steadily all the time? I have only lost about five shifts, and then it was only for a spell.
3140. Do you know of any of your mates whom you are personally acquainted with, who have been laid off through lead poisoning, or have been sick through lead poisoning? I never knew but one, and what his complaint was I could not say.
3141. Did you hear him say that he thought it was lead poisoning? He did not know; the doctor told him that it was.
3142. How long was he off? He was often off odd shifts.
3143. Do you know if he was a temperate man? I do not know.
3144. Do you drink anything yourself? Yes; a pint of beer every day if I can get it.
3145. You do not drink very much? No; I cannot afford it.
3146. You have never noticed any considerable quantity of dust when feeding or when charge wheeling? Only when the wind comes round from the south-west; and then our shift boss orders the hose to be put on; he very often puts it on himself.
3147. When the wind is blowing in that direction, I suppose it is dusty everywhere? Yes.
3148. Of course, ore dropping down from trucks on to the floor would make a good deal of dust if the wind was blowing as you say? Yes; but the dust does not rise much, it does not come into the shed. Coke-dust is the worst, it makes us so dirty.
3149. Do you ever notice any fumes coming from the furnaces when they are running along regularly? Occasionally they will puff up.
3150. Little puffs? Yes.
3151. Not often? No.
3152. A furnace, I suppose, when shut down for repairs, and when being cleaned out—then there may be little puffs come up while they are working on them? I do not know; I have cleaned out a good many, and I have not seen much of that.
3153. You have worked frequently down in the furnaces when cleaning them out? Yes; as a rule, every man who is working on a furnace, that is his job to do.
3154. All have got to attend to their own furnace? Yes.
3155. After working in the furnace like that, did you feel any bad effects? Yes; once I did.
3156. Was the furnace hot at that time? Yes; I think it was warm.
3157. You do not hear many complaints about it? That is the only time. I have cleaned out every one in the north shed, and that was the only one I have felt bad from, but it passed away after I had a good vomit.
3158. Perhaps drinking water brought it on—you were very warm, and drank a good deal of water? Yes.
3159. Have you availed yourself of the new baths since put up? No.
3160. As a general thing, men do go there and bathe? Yes; some of the men who relieved us last week go there.
3161. *Mr. Hamlet.*] Did you not take the bath simply because you had your own bath? As a rule, when we get home we generally strip off and have a good wash.
3162. Was that your reason for not having baths on the mine? Well, it is time more than anything else, as I am glad to get home.
3163. Are you a married man? Yes.
3164. How many children have you? I have eleven alive.
3165. In Broken Hill? No. Two away from here, and the others are here.
3166. Have you nine in Broken Hill? Yes.
3167. And what are their ages? The eldest is in Broken Hill, she is 31; and the youngest is 11 years of age.
3168. I wanted to know how many children you had living at home in your dwelling? Two constantly.
3169. What size house have you got? A three-roomed house.
3170. Can you tell us the size of the rooms? Yes; each room is 11 ft. 6 in. square in the clear.
3171. What would be these rooms, would you call one the dining-room? Yes.
3172. And the other two are bedrooms? Yes.
3173. Have you got a kitchen besides? No; just a few stones I have put up outside, where the missis generally cooks.
3174. What is the house built of? Canvas and wood.
3175. When you come home from your work, do you change all your clothes? I do not change my flannels.
3176. But you change your outer clothes? Yes, as a rule.
3177. Do you have your wash? Yes.
3178. Where? Outside.
3179. You cannot wash outside all over can you? I just pull off my shirt.
3180. When do you wash all over? That is very rare for me to do, because when I change my flannel I often take cold.
3181. That is your reason for not washing all over? Yes. Of course, I wipe myself with a flannel.
3182. But you do not have a real good wash by getting in water? No.
3183. *Chairman.*] Are you an Englishman? I am a Cornishman.
3184. *Mr. Hamlet.*] You put off your outside working clothes on returning from work? Yes. When it is day or afternoon shift we go home and have a wash and go straight to bed. It is only one week out of three that we get a chance to change our clothes.
3185. You have two bedrooms;—how many beds are there in those rooms? One in each.
3186. Do you drink much milk? No; none, as I do not like it.
3187. Can your wife get plenty of milk? Yes.
3188. And what water supply have you at home? We have been favoured lately during the last six months; we have had it off our own roof.
3189. What is the roof? Galvanised iron.
3190. You collect the water yourself? Yes.

Mr. J. Seymore. 17 Jan., 1893.

3191. Can you tell me the price of bread in Broken Hill? I think it is 4d. a loaf.
3192. But is it always about that price? We have had it for 3½d. a loaf; but, as a rule, I think it is 4d
3193. Does your house belong to yourself? Yes.
3194. I suppose most of the small houses belong to the dweller—the one who lives in them? As a rule
3195. Do you ever make use of the changing-rooms on the mines? When I used to work underground I did; but I have not used them in Broken Hill, as I have never worked underground here.
3196. I suppose on the feed-floors you just hang up your clothes in the shed somewhere? Yes.
3197. *Mr. Thomas.*] How old are you? Fifty-six.
3198. I suppose you know a good many people in Broken Hill? Yes, a good many.
3199. Men that are working underground? No; I am not very much acquainted with many of them.
3200. Have you any sons working here? I have two.
3201. What do they do? One is feeding up at the Proprietary, and the other is feeding at the British.
3202. Have they ever been leaded? Not that I am aware of.
3203. Have you ever heard that if you drink milk you are not likely to get leaded? No.
3204. There is a good deal of milk drunk at the smelters, is there not? Yes; one or two men generally come around on our shift every day, when we are day or afternoon shifts.
3205. And the men do not drink the milk, then, to keep away lead poisoning, but simply because they are thirsty? I am sure I could not tell; I do not make use of it myself.
3206. If you had the chance of working at any smelter at any of the mines, which mine would you prefer to work at? I could not tell you, because I have not worked a day anywhere else only where I am now.
3207. You have not heard of any smelters in any of the mines that are likely to be worse for the men than the others? No.
3208. How long since have you been in the Colony? I came to Australia in 1849. I was then very small.
3209. Have you enjoyed as good health in Broken Hill as in any other place where you have been in the Colonies? Yes; I have enjoyed better health since I came to Broken Hill, and I have a family, and we have never had a doctor inside of our doors.
3210 Some little while ago for close on three months there were no fumes going over the town;—do you think it was at all healthier to live in town during that period than when the smelters were working? I am sure I could not tell you that. Of course, I did feel better, because I had a long spell; I felt fresh and nimble, but as for fumes I could not say anything about that.
3211. For some reason you felt better? Yes; of course, after having six months spell.
3212. Were your wife and family any better? No, I do not think they were. They have enjoyed good health since we have been here.
3213. *Chairman.*] Where did you work underground? At a mine in Cornwall and at the Burra.
3214. The Cornish mine was a wet one? Yes.
3215. Is the Burra? No; it is dry.
3216. You changed your clothing before going underground at the Burra mine? I did not, as a rule; although there was a place for us to do it.
3217. Some men did change? Yes; those who lived a long way from their work.
3218. Those who lived reasonably near preferred to change at home? Yes, as a rule.
3219. What is their reason;—when they have done their work, I suppose they want to get away? It differs according to the different places where they work. At some places in the bottom levels it is very wet; then, as a rule, all those working there change on the mine.
3220. In Cornwall, was there any rule about that, or could a man please himself there just as he could at the Burra? I was very small; I know we lived 3 miles from the mines, and we had to change.
3221. *Mr. Thomas.*] Did you work underground in Cornwall? Yes.
3222. How old were you when you left? I had just turned twelve.
3223. Did most of the men change at the mine you worked at? Yes.
3224. Nearly all? Yes.
3225. In connection with those changing-houses there would be any amount of water for the men to wash? I really could not say.
3226. Would there be a man in charge of that to look after the clothes of the men and dry them for the men? Yes.
3227. They could go there and take off their clothes as they came to and from work, and that man would have charge of them? I could not tell you that; but I know there was a man always there, and when a shift came back their clothes would be hung up to dry on their own pegs.

[Witness withdrew.]

THURSDAY, 19 *JANUARY*, 1893.

Present:—

DR. ASHBURTON THOMPSON (CHAIRMAN).

WM. M. HAMLET, ESQ. | J. HOWELL, ESQ.

J. THOMAS, ESQ.

Mr. William Gilbert called and examined:—

Mr. W. Gilbert. 19 Jan., 1893.

3228. *Chairman.*] What is your name? William Gilbert.
3229. What are you? A miner.
3230. Which mine do you work at? The Proprietary mine.
3231. *Mr. Thomas.*] How long have you been working at the Proprietary mine? Six months. I was working at Block 14 and British mines for about eighteen months.
3232. You were working six months at the Proprietary? Yes; and about eighteen months at the other mines.
3233. You have been two years on the Barrier, then? Yes—a short two years.
3234. And during the six months, at what part of the Proprietary did you work? I have been taking ordinary shifts at the mine, timbering mostly, at that part near McCulloch's.
3235. At McCulloch's? Yes.

Mr. W. Gilbert. 19 Jan., 1893.

3236. You have not been working at Jamieson's? Yes; but most of my time at McCulloch's.
3237. You have changed? Yes.
3238. But most of your time at McCulloch's? Yes.
3239. You are a timber-man? Only at times.
3240. You have spent a good deal of time in timbering at McCulloch's? Yes.
3241. Have you ever been leaded? No.
3242. Never suffered from it in any way? No.
3243. Do you believe that a good many men were leaded in McCulloch's? I could not say.
3244. You have had very little experience at McCulloch's;—you have not spent above three months here? Probably four months.
3245. Still, your experience, as far as the "big" mine is concerned, would be a very limited one? Yes.
3246. You would not know very many men in six months? No; I am not given to making many acquaintances; I know a lot of men merely by facial expression.
3247. You would not know them to speak to? No; but I know them by facial expression.
3248. You say that you have actually worked six months in the Proprietary? Yes.
3249. You do not know, then, many instances of lead poisoning? No.
3250. How long did you work in Block 14? Three months; the greater portion of my time I put in at the British.
3251. Were there many men leaded while you were there? No, not many.
3252. Did you work in the face? Yes.
3253. In the lead the whole of the time? Yes.
3254. You had some mates with you? Yes.
3255. Did any of them get leaded? No; one or two of them have been away ill, but not leaded.
3256. What did they say was the matter with them? They had only been indulging.
3257. They did not complain of lead? No.
3258. They simply stayed home because they had been indulging? Yes; they stayed away longer than the usual time allowed at the mine, and the consequence was they were not required again.
3259. They had been drinking? Yes.
3260. *Chairman.*] You worked three months in Block 14? Yes.
3261. What provision is made for ventilation in that mine? The matter of ventilation, as far as I could see, generally speaking, as a miner, is carried on as is usual in any other mine.
3262. Did you see any provision for artificial ventilation? Yes; all that I thought was necessary.
3263. What did you see? There were pipes to bring in fresh air put in wherever it was thought it would be beneficial to the miners.
3264. In your opinion, as a miner, the ventilation was sufficient in those parts that came under your notice? Yes.
3265. What provision for drinking-water is made underground—any at all? Yes; I always take plenty with me myself. Whenever I chance to go short I have always been able to get it by going to the platt chambers.
3266. You have been working there three months? Yes.
3267. What were you doing? Mostly at the face breaking down the ore.
3268. How many were there in your gang? I could not say—perhaps four, six, seven, or eight, sometimes ten, working within a short distance of one another; sometimes not as many.
3269. But the same individuals worked together in the same place all the time? Yes; very nearly so in my time.
3270. *Mr. Howell.*] On what floors were you working in McCulloch's shaft—above the 200 or below it? I have worked above the 200, and below the 200; I have been all through McCulloch's.
3271. All through the different stopes? I have been in most of the lead stopes in McCulloch's.
3272. The stope, now what they call the big lead stope, is the most important lead stope on the line, and contains the greatest quantity of lead? Yes.
3273. Did you yourself work in any close drives running through that ore at any time, or do you know of others who were working in close cross-cuts or drives for the purpose of opening up ground? I could not name them, but I know them by facial expression; I could pick them out.
3274. You know that men do work there? Yes.
3275. It is the custom of the mine, when a drive like that is started, to open up a piece of ground for a little engine of compressed air to be put down there? Yes.
3276. It is very rarely that there is any bad air in that mine? Yes; as far as ventilation is concerned, I think that every precaution has been taken.
3277. Always plenty of ventilation in the stopes? Yes.
3278. Have you worked below the 300 in McCulloch's? Yes.
3279. That is pretty well a sulphide ore at 300? Yes.
3280. How often do you change from one portion of a mine to another? Usually every fortnight.
3281. You change from McCulloch's to the vicinity of Jamieson's? Yes.
3282. What is the character of the ore at Jamieson's? It is kaolin mostly.
3283. What they call a dry ore? Yes.
3284. Free from lead? Yes.
3285. Then you are quite certain that there is not any portion of the mine in which you have worked but what is, in your opinion, quite well ventilated? Yes, I should think so.
3286. How long did you work in Block 14? I think over three months.
3287. What is the character of the ore there? All lead-ore.
3288. As a matter of fact, lead-ore all over the mine? Yes.
3289. Did you notice much dust in breaking down that ore along the line of the 200 level, immediately above and below it, at McCulloch's shaft? Sometimes I have experienced a little, but I have always found water and buckets convenient, which I have always used.
3290. There is water all through the mine for that purpose? Yes.
3291. And men are allowed free use of it? Yes.
3292. You have not been laid off at any time on account of sickness? No.

[Witness withdrew.]

Mr. Francis Daykin called and examined:—

Mr. F. Daykin. 19 Jan., 1893.

3293. *Chairman.*] What is your name? Francis Daykin.
3294. What are you? A miner.
3295. What mine do you work in? Block 11, at the Proprietary.
3296. *Mr. Thomas.*] How long have you been on the Barrier? Five years.
3297. During the whole of that time have you worked in the Proprietary? I have worked in the Proprietary four years on and off out of the five years.
3298. Where were you working the remainder of the time? At the Pinnacles and other places.
3299. But during the whole of your time in Broken Hill you have worked in the Proprietary? No; I worked in the British for a short spell of about six months.
3300. You have been about four years in the Proprietary? Yes.
3301. Have you worked in any other portion of the big mine? Only Block 11.
3302. What is the nature of the ore in Block 11? Most of it is pretty loose ground, except in the ironstone.
3303. Is it kaolin or ironstone? In M'Gregor's end it is mostly all lead.
3304. But there are a larger number of faces of ironstone than of lead? Yes.
3305. Then a man could work (we will say) two weeks in the lead, and then the shift-boss would take him away and put him in the ironstone for six or eight weeks? Yes; the shift changes to kaolin, and from kaolin to ironstone before it goes back to lead again.
3306. If you are two weeks in lead you will be eight weeks out of it before you get back again? Yes.
3307. Have you ever been leaded? No.
3308. Ever had any mates leaded? No.
3309. Very few get leaded at Block 11? I have not heard of very many.
3310. Do you know many men among the miners in the town? A good many.
3311. Do you think many get leaded? I have heard of a few cases.
3312. How many? I might have heard of perhaps twenty or thirty cases altogether.
3313. From what mines? From different mines—from British, Block 14, and big mine.
3314. What part of the big mine would men be more likely to be leaded? In the north end.
3315. In M'Culloch's? Yes; all over that way.
3316. I presume you know some men who have worked at M'Culloch's? I could not quote an instance where a man has been leaded in any particular place in the mine.
3317. You have come across men during the four years who have worked in M'Culloch's? Yes.
3318. They have spoken of lead in M'Culloch's? Yes.
3319. You have met some who have been leaded? Yes.
3320. Would a man be less likely to be leaded in Block 11 than in any other portion of the big mine? Of course, the lead over there is damp. You can catch hold of handful of lead ore, and by squeezing it in your hand it will remain in a ball.
3321. You think a man working where lead is dry is more likely to be leaded? Yes.
3322. Do you think that this would have anything to do with it as far as M'Culloch's end is concerned? I do not know.
3323. At M'Culloch's men work two weeks in lead? I do not know. I never worked in M'Culloch's; I do not know what the rules are over there.
3324. You do not know that they work in M'Culloch's two weeks and two weeks in Jamieson's;—you never knew that? No.
3325. *Mr. Howell.*] I might say for your information, Mr. Thomas, if you will permit me, that the mine is divided into three sections, and the miners know very little about one another, except in their own section.
3326. *Witness.*] I have heard the men say that they have been working in lead or ironstone, but I have never asked them where.
3327. *Mr. Thomas.*] You say you have worked in the British for a while? Not in the lead part, but in the No. 5 shaft.
3328. No lead there? No.
3329. You have never stayed at home or lost any time from the effects of lead? No.
3330. Block 11 is considered one of the best places in the line? Yes.
3331. Why so? Because not so many men get laid up there and the ore is damp.
3332. And there is still a large amount of lead in Block 11? Yes.
3333. Are there a number of men working in the lead in Block 11? No; not a great many men at present.
3334. The majority of the men are, I believe, working in ironstone and kaolin at the present time;—that is, at Block 11? Yes.
3335. Of course, not many men working in the lead now; the time will come when there will be a number doing so? Yes.
3336. And so that when the iron and kaolin is finished there will be a greater proportion of men in the lead than there are now? Yes; quite likely.
3337. As soon as the iron and the kaolin portions of the mine are smaller the men would not be able to be out of the lead so long? No.
3338. Now they can stay out eight weeks, but if the iron and kaolin became less the men would have to be shifted back into the lead oftener, and they would be more liable to get leaded? Yes.
3339. When you go underground you take tea with you? No; I take water.
3340. Is there any water underground that you can drink? Sometimes there is a water-bag there.
3341. No pipes underground? Not for drinking purposes, but plenty for sprinkling about.
3342. But none for drinking in the pipe? No; I do not think the water in the pipes is good enough to drink.
3343. How long has that water been down in those pipes? It has been there since the strike.
3344. You did not see it before the strike? I do not know; the pipes were there, but I do not know whether the water was there.
3345. The men do not drink the water? I have not heard of anyone drinking it.
3346. Of course, it is for boring purposes? Yes; and for damping the levels.
3347. Of course, a man could wash himself with it? Yes.
3348. Do you think men use it much now for washing—say for washing their hands before crib? No; I do not think so.

3349.

Mr. F. Daykin. 19 Jan., 1893.

3349. *Chairman.*] Why do they not? The water is in the level, and some distance from where some of men are working. They would have a long way to come.
3350. What do you call a long way? A man working up on the tenth or eleventh floor would have to come right down that many floors to the level to get the water.
3351. The floors are 6 or 7 feet apart? Yes.
3352. He would have a good many steps to go up and down? Yes.
3353. If water were conveniently provided, do you think men would take advantage of it? I believe some would, but others would not.
3354. Do you know what kind of ore it is that you are in at Block 11? It is carbonate of lead ore that I work in.
3355. *Mr. Howell.*] We are in sulphides in the 300-foot level.
3356. *Chairman.*] You think it is important to keep lead dust down? Yes.
3357. You are working in a moist kind of ground? Yes; no water, but merely damp—not quite so damp as clay.
3358. Still there is some sprinkling done in that part of the mine? Yes; the water is there for any one to use.
3359. Do they sprinkle it? Yes.
3360. Would the use of too much water for sprinkling lead to any other objectionable state of things? Men working in the floor underneath would be annoyed by the water running through the floor.
3361. Nothing else? No.
3362. You are a married man? Yes.
3363. You live in your own place? Yes.
3364. Have you taken advantage of the bath that has been recently put up? No.
3365. You have plenty of accommodation in your own house? No, not a great deal of accommodation; but I use water pretty freely on myself.
3366. At present you have plenty of water? Yes.
3367. Is your house connected with the water service? No.
3368. What did you do a year ago, when the drought was? We had to do the best we could without.
3369. You would still have to do without it if another drought came? Yes; you cannot afford to have many baths when water is 7s. or 8s. 100 gallons.
3370. You have no objection to using the baths put up by the Proprietary Company? No; the only thing is when you go there, you have to wait so long, there are so many after them.
3371. But I believe there are three tank baths and sixteen showers;—are they always full? Yes; every time I have been there I could not get in. I have been there three different times.
3372. After what shift has that been so,—day or afternoon shift? Any shift, and before I would go on the afternoon shift at 4 o'clock.
3373. I suppose the number of men coming off each shift is about the same? Yes.
3374. *Mr. Howell.*] A little more on the day than on the night shift, but far more men come off on the 4 o'clock shift than on any other shift during the twenty-four hours, as the day men or surface hands all knock off at that time. [*The Chairman examined witness' gums. He showed a slight blue line.*]
3375. *Chairman.*] How old are you? Thirty-three.
3376. Have you ever had any sickness? No.
3377. *Mr. Hamlet.*] Have you any children. One.
3378. What is the age? Very nearly seven months old.
3379. How far is your house from the mine? I am living about 250 yards from Mr. Howell's place.
3380. Did you ever find, in your experience, that your wife suffered in any way from the smoke? She has not been up here long enough for that.
3381. Nor the child? No.
3382. What is the size of your house? 24 x 12.
3383. Two rooms? Yes.
3384. Do you think you have escaped lead-poisoning from anything you have done, or from having taken care of yourself, or is it simply because you were in a part of the mine where there was not much lead? I do not know. I have always taken plenty of medicine. I have kept myself well regulated. I think that has a great deal to do with it. I never abused myself in any way with drink.
3385. You knew when you first went to work at the mine that there was danger? Yes; I was frightened of it.
3386. So you have generally taken care of yourself? Yes.
3387. *Mr. Howell.*] Speaking about the quantity of lead in Block 11, you understand that the only body of carbonate of lead ore in that place extends from about M'Gregor's shaft 260 odd feet north of western side? Yes.
3388. The balance of Block 11, as far as you know, is either manganic iron or dry silicious ore? Yes.
3389. Quite a patch of it yet, below and above the 230-foot level? Yes.
3390. The ground is of a damp character, and very little dust? Yes.
3391. But all the balance of Block 11 is pretty much made up of kaolin ironstone and silicious iron? Yes
3392. There was one time when nearly one-half of the men working in Block 11 were working in lead? Yes.
3393. That lasted for about two years? Yes; close on two years—not quite.
3394. You consider the ventilation good in all parts of the mine where you have worked? Yes; I consider the ventilation better now than it was before the strike.
3395. How do they produce ventilation in the cross-cuts? They have fans and pipes.
3396. They are always put up? Yes.
3397. *Mr. Thomas.*] You say that for two years in Block 11 about half the number of men employed there worked in lead? Yes.
3398. During that period then they would only work two weeks out of the lead and two weeks in? Yes.
3399. Can you tell me what two years they were? Two years ending last Christmas twelve month.
3400. That would be from Christmas, 1889, to Christmas, 1891? Yes.
3401. What portions of those two years did you work in Block 11? From the 24th , 1889, to 3rd April, 1892.

Mr. F. Daykin. 19 Jan., 1893.

3402. During nearly the whole of that period there was half as many men in lead as out of it? Yes.
3403. How many weeks out of every four did you work in lead out of that time? I do not suppose I have averaged one week in four, nor would any man.
3404. How would that be worked then? They changed round, different men going on to lead for a fort night, and then changed along to ironstone and kaolin for a fortnight each.
3405. But you said half the men were working in lead? I should think half the men were working in lead.
3406. You say you were only in lead one week out of four? Yes.
3407. Would not that mean that there were only one-fourth of the men in lead and three-quarters out of it, if you work one week out of four in it and three out of it? Others may be in the lead more than me.
3408. You said just now that not only you, but you did not think the men generally did;—you did not work in the lead more than one in four; you must have been favoured in some way? No; I do not think I was favoured much, as previously to that I had worked twenty-one months in lead.
3409. You could not have worked as much in lead during these two years as the ordinary run of men? No; not during that time.
3410. How was this? I do not know. One time I was twenty-one months in it, and never shifted out of it.
3411. But still you have not worked as much in lead in Block 11 as the average men? No; not for that two years.
3412. And during that sime there was the greatest quantity of lead in Block 11? There is just as much always. Even the twenty-one months I was in the lead there was just as much then as in the two years.

[Witness withdrew.]

Mr. J. Christopher called and examined:—

Mr. J. Christopher. 19 Jan., 1893.

3413. *Chairman.*] What is your name? J. Christopher.
3414. What are you? A miner.
3415. Where are you working? In the Proprietary Mine.
3416. Which part? In Jamieson's; in fact, all over it.
3417. *Mr. Thomas.*] How long have you been on the Barrier? Rather over two years.
3418. And during that time what mines have you worked at? Only at the Proprietary.
3419. Then you have been practically working two years at the Proprietary? Yes.
3420. And during that time you have been working on M'Culloch's and Jamieson's end? Yes; I have taken my turn right round.
3421. You have not worked in Block 11? No.
3422. The custom in that end is to work two weeks in M'Culloch's and then two weeks in Jamieson's? It has been.
3423. It is not now? Yes; as far as I know.
3424. And you have changed regularly? Yes.
3425. M'Culloch's is the lead end, is it not? Yes.
3426. But Jamieson's? Is the kaolin. Of course, there is a little lead.
3427. Not enough to affect you? No.
3428. If you had your desire, would you change from M'Culloch's to Jamieson's, or would you prefer to remain the whole time in Jamieson's? I believe myself in the lead end the air is better.
3429. Which would you prefer? I would not care what end I was in.
3430. Why would you not prefer altogether to stay at M'Culloch's, what advantage is there against that? There are gases in both ends, and changing from one end to another is like change of climate. I would just as soon stay in one end as another.
3431. You gave us some reason that in M'Culloch's the air was rather better? Yes.
3432. Which end would you prefer to remain in permanently? I could not say that I would prefer one end in particular to the other.
3433. But still the air is better at M'Culloch's;—why do you not prefer to remain in M'Culloch's? I would as soon stay in M'Culloch's as Jamieson's.
3434. Do you think that the majority of men would rather be in Jamieson's;—why would you not prefer to remain in M'Culloch's, seeing that the air is better? I do not know that men change for that. There is a difference in the working of the stuff. In working in lead you get into sand; in the other end you are not. Of course, it is unpleasant for a man when sweating to be covered with dust. It would be uncomfortable.
3435. You think there is less of that uncomfortable feeling in Jamieson's? Of course, it does not hang about the body the same there.
3436. So you think that advantage goes against the better air in M'Culloch's end, and you would just as soon be in one as another? The unpleasantness of working in M'Culloch's takes away a little of the advantage of better air? Yes.
3437. You have had a number of mates during that two years? A good many; of course, a lot of these have left.
3438. Have you any reason why they have left you during the two years? I do not know, only that they have gone back to their homes.
3439. Have any of them gone away ill? No, not one of them.
2440. Is it the custom at the big mine if a man is leaded to give notice of it to the time-keeper, and then go away for a short holiday, and then when he comes back start work again? I never heard of that.
3441. You never came across a man who left the big mine leaded and came back to work again? I have come across men who have gone away for a holiday, and who have come back again; of course, whether they went away leaded, I could not say.
3442. They have left their work, have gone away, and have come back and went to work again? Yes.
3443. You have not met one of your acquaintances that has gone away, who, as far as you know, was leaded when he went? No, not one.
3444. Can you have all the water that you require underground? Yes.
3445. How long has that been so? In fact, all along.

3446. Do you use that water for drinking purposes? I carry my drinking water with me.
3447. Is there any water under ground that you could have for drinking purposes? You can always send to the surface for it.
3448. There are no pipes laid down underground that you can go to for drinking water? No, not for drinking water; there is other water.
3449. What is it used for? For wetting levels and boring.
3450. If you want any drinking water you send to the surface for it? Yes.
3451. You put your can in the skip and send it to the braceman? Yes; but the understanding generally is that each man takes enough water for drinking purposes down below in his can.
3452. *Chairman.*] You said this moment that you are expected to take enough water with you? We generally take our can with us, and that filled generally lasts us out a shift. It is always understood that men are supposed to take enough drinking water into the mine with them. If a man runs short he can get it down from the surface.
3453. *Mr. Thomas.*] There is no pipe in any of the places underground to which you could go to for water for drinking purposes? No.
3454. But there is water for boring purposes or sprinkling? Yes.
3455. How long has that pipe been there? I do not know.
3456. You have been there two years? Yes.
3457. Was it there when you came? I could not say.
3458. Was it there twelve months ago? I do not know.
3459. You are sure it was there six months ago? I would not swear. I remember some of the pipes coming down as the level was continued.
3460. Do you think they were there three months ago? Yes, longer than that, I think.
3461. Do you think six months? Yes.
3462. Are these pipes carried out into the main levels? Yes; right along the main levels.
3463. Are you a married man? Yes.
3464. Have you any children? Five.
3465. All enjoy good health? Yes.
3466. For about three months there was no work going on here, and no fumes going over the town;—do you think the town was healther then? I could not say. I have never felt anything up with me since I have been on the Barrier.
3467. But did you feel any better during that three months? No.
3468. Do you think the men looked better? Yes; some of them looked a bit better.
3469. You go into the street sometimes? Very seldom.
3470. Where do you live? Brown-street, North Broken Hill.
3471. So that by the time you get home you are rather tired;—you do not mix up with men much? No; I do not go down the street at all.
3472. *Mr. Howell.*] Do you find much dust in the ore in the neighbourhood of M'Culloch's shaft? Not a great lot now, there was a time when there was a lot of dust.
3473. The ore is not nearly so dusty now as it was formerly? No; it is all damp now.
3474. The ore is increasing in dampness the deeper you sink? Yes.
3475. Do you think that the ventilation through the mine is sufficiently good for all purposes? Yes; I do not think they could better the ventilation.
3476. *Mr. Hamlet.*] Did you know when you went on to the mines that there was certain mining regulations in force? Yes; I saw them posted up at the shafts.
3477. Do you notice the men reading those regulations, and do they understand them? Yes; as far as I know.
3478. And when you first began working on lead-mines had you any idea that there was any possible danger of working in them? Yes; I was told about them. I was told to be very careful in the way I eat my food, not to take it in my hand, to keep it in the paper, and also to wash my mouth out before I had a drink, and not to fill my pipe in the mine.
3479. You have tried to do that? Yes.
3480. Did you ever see any men suffering from lead in any way? I have seen men who have complained of being ill; of course, the doctors have said it was lead.
3481. If you thought that you were leaded what would you expect to find wrong with yourself? I would certainly go to a doctor and inquire.
3482. But have you any idea as to how it would be likely to affect you? No; I have never felt any effects from lead yet.
3483. How did you feel the first six months after you started working? Just the same as I do now at the present time.
3484. You have never felt any different? No; I am only a little shorter in my wind.
3485. That is the only difference? Yes.
3486. You told us you had five children? Yes.
3487. Are they all alive and well? Yes.
3488. You live a good distance from the mines? Yes; about one and a half mile.
3489. What do you generally drink? I always drink water underground.
3490. And at home? I drink tea, and have a glass of beer occasionally when I feel inclined for it.
3491. You smoke? Yes.
3492. Do you smoke underground? Sometimes.
3493. With regard to washing, what is your practice? To wash myself thoroughly after work.
3494. Have you the convenience to wash at home? Yes; I have a large tub; generally in the summer time I go down once a week to Silverthorne's dam, and have a plunge and shower bath.
3495. If you came home hot and dry and dusty you have the convenience at home to wash all over? Yes.
3496. Some men in Broken Hill have not the convenience—if they had a little bit of a place they cannot do it very well, but you have? I do not know; a man with a tub can wash himself all over with it anywhere.
3497. Have you used the new baths? No.
3498. Is that because you have got your own convenience for washing? No.

3499.

Mr. J. Christopher. 19 Jan., 1893.

3499. Why is it? Because it is just as handy to have it at home.
3500. The fact is, when you have done your work you want to get home? Yes; and have a little clean up.
3501. Is there much blasting going on now in the place where you are working? Yes, sometimes, in certain places; of course I am not always working in the one place.
3502. How many shots do you think would be fired in a place where you are working while you are down there say eight hours? I suppose men will bore from 8 to 10 feet a shift, and have got to shoot for everything.
3503. Which do you think is the worse—the smoke from the blasting, or the dust? I think myself the dynamite is equally as bad as the lead.
3504. Of course a man is not forced to go into his face just as the shot is fired? He has time allowed him for the dust to settle before he is expected to go into the face.
3505. In firing the shot there is a good deal of dust stirred up? Yes.
3506. There would be more dust then than by the ordinary work of picking? No; I think myself I prefer shooting a mine to picking, especially on a lead face.
3507. Is that because you are close to it;—of course when a shot is fired you go away from it? Yes.
3508. How long after firing a shot before you go back? After the smoke has gone.
3509. How long would that be? Ten minutes; perhaps seven or eight minutes; it all depends upon the air; sometimes the air won't carry the smoke away so quickly as at other times; some places you can go directly in after the shot is fired, and there is no smoke there; it depends upon the ventilation.
3510. But, in spite of the dust and the firing of shots, you have never been laid up? No; I was laid up with quinsy once, but that had nothing to do with the lead.
3511. *Mr. Howell.*] Are you working on contract? Yes, I have been, off and on.
3512. Did you work on contract before the strike? Yes.
3513. And now you are working on contract? Yes.
3514. How many are working with you? Six of us.
3515. You have never heard any complaints since working on contract about any increased sickness amongst the men? No.
3516. *Mr. Thomas.*] You have a contract, in what part of the mine? The one we are doing at the present time is at Wigg's, at the 85 level, on No. 2 stope.
3517. There is no lead? Not much where we are.
3518. It is mostly kaolin-ore around Wigg's? Yes, kaolin and ironstone.
3519. No lead? A little lead.
3520. *Mr. Hamlet.*] Are you related in any way to Henry Christopher, who died in Broken Hill? No. [*See Appendix , Table .*]
3521. You never had and illness here at all? No.
3522. Have you got any relatives? I have a brother here who is working up in the mine.
3523. Has he a family? Yes; four children.
3524. Has he lost any of the four children? Only one, years ago.

[Witness withdrew.]

Mr. Thomas Ellery called and examined:—

Mr. T. Ellery. 19 Jan., 1893.

3525. *Chairman.*] What is your name? Thomas Ellery.
3526. What are you? A miner.
3527. Where do you work? I am in Jamieson's end this week.
3528. *Mr. Thomas,*] How long have you been on the Barrier? I came on the 17th March, 1888.
3529. Nearly five years? Yes.
3530. During that time, have you been working underground the whole of the time? No, not the whole of the time. During the strike we were not working underground.
3531. But barring that? A few months before that I was not working underground for a short period.
3532. But you have been working about the whole of the time underground? Yes.
3533. Have you been working at the big mine the whole of that time? I was working at Block 10 for six months.
3534. You were the whole of the time at the big mine excepting six months? Yes.
3535. What portion of the big mine? Block 11, Jamieson's, and M'Culloch's, from one end to the other. I am at Wigg's end now.
3536. What portion of that time did you work in Block 11? I could not exactly say. Most of my time I put in at Jamieson's and M'Culloch's.
3537. There they change over regularly? Yes.
3538. You are a fortnight in Jamieson's and a fortnight in M'Culloch's? Yes.
3539. This present fortnight you are in Wigg's? Yes.
3540. That would be Jamieson's end? Yes.
3541. You have never been leaded? No.
3542. You have had several mates during the time you have been working? Only two.
3543. Has either of them ever been leaded? One had fever. They said it was lead, but I did not think it was.
3544. What reason have you for not thinking that it was not lead? The other men thought it was, but I did not think so.
3545. Did he see a doctor? I suppose he did.
3546. He had the fever? Yes.
3547. And he suffered from lead too? I could not say whether he suffered from lead too.
3548. You presume he saw a doctor? Yes.
3549. As far as drinking water underground is concerned, can you have any amount of drinking-water underground? I always take my own water.
3550. Suppose you are working in a very hot place, and you finish the water in your billy-can, what would you do then for some? Go to the platt, and send to the surface for it. We can always get water.

3551.

3551. You cannot get it in the platt? I never noticed. I have seen bags hanging in the platt.
3552. But no pipes from the surface underground? Yes.
3553. Bringing drinking-water? I do not know.
3554. Is it good enough to drink? Yes, I think so.
3555. Why do the men send up to the surface for it, then? I do not know.
3556. They could have this water from the pipes if they liked? Yes.
3557. But they do not do that—they send up, and the braceman gets it? Yes. I do not know their idea for sending up to the surface for it, unless for getting it cooler out of the bags.
3558. You say there are bags underground? There used to be bags underground, but I have not noticed them lately, because I always take a water-bag myself.
3559. Do you know a number of men in Broken Hill? I know two or three.
3560. Are you a married man? No.
3561. Do you knock about the streets? No. I might on a Saturday night take a walk into town, but as a rule I spend my time elsewhere.
3562. You would have an ordinary number of acquaintances? Yes.
3563. Have you met men who have been leaded? I have met one, I think, who said he was leaded. I helped to treat him. He was bound up.
3564. Where had he been working? In Block 14.
3565. In moving about amongst the men, do they discuss lead-poisoning at all—do they speak of it as one of the ills of Broken Hill—do you hear men say that there is such a thing as lead-poisoning going on? Yes; all through the streets.
3566. They talk a great deal about it? Yes.
3567. Do you ever hear them say what mines are the worse to work in? Yes—Block 14.
3568. Then, although you have had no experience yourself there, from what you have heard people say, you would fancy that a number of men do get leaded in Block 14? Yes.
3569. Very few get leaded at the big mine? Very few; ventilation is so good.
3570. You simply infer that ventilation is not so good at Block 14? I know nothing at all about Block 14. I never worked there.
3571. But you would infer that ventilation is not so good at Block 14? I could not infer at all. I can only speak of where I have been working.
3572. But still it is generally understood that more men are leaded in Block 14 than in the big mine? I do not know. You hear a lot of men talking sometimes when they have no occasion to talk.
3573. Do you know anyone that has died through lead-poisoning? No; I do not.
3574. You have never heard of anyone being leaded at Block 11? No.
3575. At Jamieson's? No.
3576. At M'Culloch's end? No.
3577. *Mr. Howell.*] As a matter of fact, would not the miners going down below prefer to take their water with them than get it out of the pipes? Yes.
3578. How long has that pipe been in the mine? I could not say exactly. It has been there a good while.
3579. For a year, do you think? Yes—longer, I think.
3580. That water is used for the purpose of sprinkling and drilling? Yes.
3581. Are you working on contract now? Yes.
3582. At what part? Wigg's.
3583. Have you worked on contract in any of the lead stopes? I have worked on 316, at M'Culloch's, between M'Culloch's and Wilson's—working in a rise.
3584. How high did you run it up? From 31·6 to 216.
3585. How were you furnished with air? We had a machine and fans there.
3586. They were driving the air up to you? Yes.
3587. That is invariably the case where they are running a rise? Yes.
3588. Do you think that the air is as dusty now as it used to be above the 200 level? No; it gets more damp as you get down.
3589. As far as you are concerned yourself, you have never experienced any inconvenience from the effects of lead? No; I have always enjoyed good health.
3590. Do you hear the men complaining about dynamite fumes? Yes; we all know that that is equally as bad as lead, if not worse; that is my opinion on the matter.
3591. But there are very few places in the mine but what the ventilation is sufficiently good to drive those fumes out, and the men have sufficient time allowed them to let the fumes get away? No one ever forces me back before the fumes have gone out.
3592. So far as your own knowledge is concerned, you do not know of any spot, of any portion, where you have been working, where the ventilation could be improved? No; the ventilation is very good.
3593. *Mr. Hamlet.*] Can you account for the reason why you were not leaded? I cannot; but I have always been accustomed to have a bath, and besides I always take porridge every morning. I do not know whether that makes any difference.
3594. Porridge and milk? Yes; I have recommended it to a good many young fellows, and they all consider that it has improved them.
3595. And that is generally the precaution that you have taken? Yes; I had a box of pills when I first came here, as they were recommended, but I found that the sooner I left them off the better. I always take porridge, and I recommend every man to take it every morning. I know it has acted very well on me.
3596. With regard to ventilation in the rise;—a rise is an upright channel from one level to another? Yes.
3597. When the ventilation becomes bad in a rise it is customary to put in a fan? Yes.
3598. The fan is always there working? Yes; that is the case with me.
3599. What is the size of the pipe that brings down the fresh air? Ten inches in diameter.
3600. You could not work on the rise, and have the air going up full force—it would be too smart? Yes.
3601. How do they prevent candles going out? We regulate the engine accordingly.
3602. On the other hand, did you ever see ventilation so bad that the candle would go out? No; I have seen the air blow it out many a time in the drives and stopes.

Mr. T. Ellery. 19 Jan., 1893.

3603. What clothes do you generally have on when working in the mine? I generally pull my shirt off, and work in my flannel; that is generally the way with all miners.
3604. I suppose if the blast was too strong, you would object to it? We have the engine under our control, and we can go down and turn the blast off.
3605. You can regulate it yourself? Yes, it is in our own hands; it is placed there for us.
3606. So if you find a place becoming more hot and stuffy than usual, you could go and put on a greater blast if you liked? Yes; we always put on an extra blast when we fire to blow the smoke out.
3607. How long does it take for the fumes to get away, so as to be able to get back to work? I have seen it ten minutes.
3608. It depends upon the place you are working in? Yes.
3609. *Chairman.*] On what ground are you so confident that men would prefer to carry water below with them? Because they think it is purer: you know what you are getting then.
3610. And lots of men carry tea with them? Yes; some cannot drink water.
3611. No man who takes his water or tea below, when he gets through it, hesitates to send his billy up to the surface to be filled? No; I have had many a drink from the surface, it has always been good water; you can get a drink any time you like.
3612. I suppose if a regular arrangement for bringing drinking water underground were made that would remove any doubt the men may have about its being pure? I never heard the men say it was not pure; I have heard some of the men say that they have drunk the water out of the pipes.
3613. If some recognised arrangement for furnishing men with water were made, they would not, I suppose, be so anxious to take it down below themselves? I could not say; I suppose they would have a drink, if they saw pure clear water.
3614. You say they drink it now, because they like to know what they are drinking? Yes; it is the custom on all mines to always bring your own water. I have never seen a mine where they have provided water for the men. In the coal-mines in Newcastle you always bring your own water.
3615. What do you carry water in? A water bag.
3616. Are these commonly used? Most of them carry their water in bottles and tins.

[The witness withdrew.]

TUESDAY, 7 FEBRUARY, 1893.

Present:—

DR. ASHBURTON THOMPSON (CHAIRMAN).

WM. M. HAMLET, ESQ. | J. THOMAS, ESQ.

Dr. T. R. Belgrave recalled and examined:—

Dr. T. R. Belgrave. 7 Feb., 1893.

3617. *Chairman.*] We have thought it necessary, Dr. Belgrave, to recall you in order to ask you the names of the women and child mentioned by you in answer to questions 2076 to 2081? The name of the woman is Jones. I have lately seen her again. She is at this present moment still suffering from lead. She would have come with me, but she has lately been confined of twins, and does not like to go out. She has been suffering from lead for nearly three years. As regards the baby named Forde, she was removed by her parents to a distance, and has recovered perfectly.

[The witness withdrew.]

Dr. C. E. Thompson recalled and examined:—

Dr. C. E. Thompson. 7 Feb., 1893.

3618. *Chairman.*] I understand that you have lately come across a case of leading in one of the townspeople such as you had not met with when you gave evidence before? Yes.
3619. Would you kindly give the Board some account of it? The patient was a child, four years of age, living in Crystal-street, nearly opposite to the south smelters. She presented well-marked symptoms when I saw her of lead poisoning. She was anæmic, and was suffering from colic. Her mother stated that she had suffered from colic and want of appetite and vomiting fourteen days before I saw her. The symptoms yielded to treatment readily, but she is still anæmic. She has been removed from the place where she was. I handed to Mr. Hamlet some water out of the tank that the family drinks from for examination, and he reported 5½ grains of lead to the gallon. Of course the sediment was well stirred up, and the water they had been drinking would not contain so much. That is the only case of leading among the townspeople that I have met with, with the exception of those mentioned previously.

[The witness withdrew.]

Dr. W. Blaxland recalled and examined:—

Dr. W. Blaxland. 7 Feb., 1893.

3620. *Chairman.*] I understand, Dr. Blaxland, that since you gave evidence last, you have come across a case of leading in some person not engaged at the mines? Yes.
3621. Would you be good enough to tell the Board about it? The patient is a little boy nine years of age.
3622. Where does he live? He lives just north of the British concentrator, close under the British Mine.
3623. On the north side of the hill? Yes.
3624. How did he suffer? Wasting, loss of appetite, and pain in the abdomen, also vomiting.
3625. Has he recovered under treatment? Not yet; he is still under treatment.
3626. Had he any blue line? Yes. Not a line exactly, but a blue mark at the base of one of the central incisors, and at the point of junction between the lip and the gum immediately below this, and on the mucous membrane of the gum, there is a small blue patch.
3627. Does he live in any particular street? No; he lives on the British Lease.
3628. Do you know if he went to school? I should think he would be old enough to attend school.
3629. You did not hear whether he did or not? No.
3630. To what do you ascribe his leading? I consider it due probably to the water partly. They have been drinking the water they have caught from the roof. I tried to see the other children, but they were away

away at school when I was there, and I could not see them. I saw one of the elder ones; she shows a slight blue mark at the base of the teeth, but she has not suffered from colic or anything.

3631. How old was that child? About 14 or 15 years of age.

3632. Not doing any work? She is working in the house.

3633 A female? Yes. The mother said the little boy was very fond of playing about up close to the mine, but I do not know whether that would make any difference. I advised them not to drink any more of the roof water and they are not doing so now.

3634. In answer to questions 215 to 217, whether you had met with any case of plumbism among the general population, that is, among persons not in any way connected with the mines, you answered that you had only one case, about which you had not made up your mind when the patient disappeared? Yes.

3635. Now you have this case, which is well marked, and in the same family apparently another case not so well marked, but also one of lead poisoning;—are these the only cases you have met with among the general population? Yes.

3636. Suppose such cases were only met with within a certain distance of the smelters and to the leeward of them, is it not possible that there might be a good many of the townspeople affected with lead living in those places who yet might not have come under your observation? Yes.

3637. Suppose that other practitioners said they had met with a good many cases of leading among the townspeople, is it not possible that they may have more patients among those who live thus near the mines than you happen to have? Probably the bulk of them have gone to other people, you mean?

3638. Yes;—that there is a number who suffer, but since they live in particular streets may possibly not have applied to you for advice? Certainly, it is possible; but I am attending a good many people close to the mines, and have been doing so all the time.

3639. And those are the only cases that you have seen? Yes.

[The witness withdrew.]

LEAD POISONING INQUIRY BOARD.

APPENDIX.

APPENDIX A.

WEDNESDAY, 16 AUGUST, 1891.

Legislative Assembly.

11. MR. CANN *to ask* THE SECRETARY FOR MINES,—Will he cause an inquiry to be made as to the effect of lead upon miners and others working in silver and lead mines at Broken Hill and other places?

Department of Mines, Sydney, 28 September, 1891.

THE serious effects of lead dust upon the health of persons, especially young people, employed continuously at sorting ore in silver mines, demand most careful consideration with a view to measures being adopted to minimise the dangers to which such persons are exposed.

There are a number of instances on record in which severe illness has followed such employment, and several deaths in this Colony are also directly traceable to the effects of the continual breathing in of air contaminated by the presence of lead dust.

In the silver-minining industry, which may be said to be in its infancy only in this Colony, there is likely to be at no very distant date a much larger number of persons employed than now, and the question that I have brought under the notice of my honorable colleagues is one of great moment to the mining community. Especially is it so to the miners of Broken Hill and Sunny Corner; and I therefore propose, with the sanction of the Cabinet, to appoint a Board of Inquiry consisting of a medical man, an intelligent representative of the miners, and an analytical chemist, to investigate the matter at Broken Hill, and present a report giving the most reliable information obtainable as to the amount of sickness and the percentage of fatalities due to the present conditions of working in these mines, and the measures they would recommend to be taken to overcome, as far as possible, the unsatisfactory state of matters now existing.

S. SMITH.

EXTRACT from a Report on the sanitary state of Broken Hill, October 3 to 9, 1891.

(Cf. Minutes of Meeting, Introductory, p. 3.)

The Chief Medical Inspector to the President of the Board of Health.

"12. *Plumbism.*—Although this appears as a registered cause of death only twice in the record of 1890, I have reason to believe that lead-poisoning is a frequent cause of serious illness here, and that all the cases do not fall under medical treatment within the town. Men sometimes come to work from a distance, expect to fall ill, and at the approach of symptoms retire to their own neighbourhoods. Besides this, it seems to be an established fact that cats and dogs cannot be kept within a considerable distance of the mines, but invariably die; while it is certain that milch-cows kept in the town become poor, have staring or rough coats, and sometimes die, while they recover from these symptoms soon after removal to a short distance away. It appears to me that this matter is one of great general importance. Lead poisoning does not, as a rule, speedily cause death, but it very often, indeed, causes permanent damage to the constitution, and is an indirect cause of death; and, when the sufferer survives, it often incapacitates him from getting his own living. It is, therefore, desirable that in a town which contains so many persons who are directly exposed to the danger of lead-poisoning, as well, perhaps, as others less directly exposed to it, an attempt should be made to ascertain the degree in which it exists here, and the circumstances under which it arises; with a view of making the facts known if they should turn out to be of sufficient importance, and of taking such precautionary measures as may seem useful and practicable."

J. ASHBURTON THOMPSON.

Sir, Department of Mines and Agriculture, Sydney, 18 January, 1892.

It having been approved by the late Government of the appointment of a Board to inquire into the cases of lead poisoning at the silver-mines in the Barrier Ranges District, and as such Board is to consist of a medical man, and analytical chemist, and a representative of the miners, I have the honor to request that you will be good enough to select the medical man and the analytical chemist.

I have, &c.,
HARRIE WOOD,
Under Secretary.

The Secretary to the Board of Health.

See reply to Mines Department, 22/1/92.—E.S.

Sir, Board of Health Office, 127, Macquarie-street, Sydney, 22 January, 1892.

In reply to yours of the 18th instant, respecting the appointment of a Board to inquire into the cases of lead poisoning at the silver-mines in the Barrier Ranges District, I have the honor, by direction, to suggest that, Dr. J. Ashburton Thompson, M.D., D.P.H., the Chief Medical Inspector of this Department, and Mr. W. M. Hamlet, F.I.C., F.C.S., the Government Analyst, should be appointed on the proposed Board, and that Dr. Thompson should be the Chairman of such Board.

It appears desirable that the report of the proposed Board of inquiry should be made to the Board of Health, in order that the latter body may be in a position to furnish the Minister for Mines with such remarks thereon as may appear necessary.

It will be necessary that the sanction of the Colonial Secretary should be obtained before Dr. Ashburton Thompson and Mr. Hamlet are appointed.

I have, &c.,
EDMUND SAGAR,
Secretary.

The Under Secretary, Department of Mines and Agriculture.

Sir, Amalgamated Miners' Association of Australasia, Broken Hill, 1 February, 1892.

I have to inform you, in reply to yours of the 18th January, ref. No. 91-21,201, that Mr. R. Sleath has been appointed on behalf of the Miners' Association on the Commission appointed to inquire into cases of lead poisoning amongst the miners on the Barrier.

I have, &c.,
M. BOURKE,
President, A.M.A., N.S.W.

The Under Secretary for Mines.

Sir, Department of Mines and Agriculture, Sydney, 5 February, 1892.

I have the honor to inform you that the late Minister for Mines and Agriculture approved of a Board being appointed, which was to consist of a medical gentleman, an analytical chemist, and a representative of the miners to inquire into the cases of lead-poisoning at the silver-mines in the Barrier Ranges district, and, with a view to the appointment of such a Board, the Board of Health and the Secretary of the Miner's Association were asked to nominate gentlemen for those positions, and in response to the Department's request the Board of Health nominated Dr. J. Ashburton Thompson and Mr. W. M. Hamlet, F.I.C., F.C.S., the Government Analyst, as the medical gentleman and the analytical chemist respectively,

respectively, and I am directed by the Minister for Mines and Agriculture to request that you will be good enough to move the Colonial Secretary to sanction the appointment of such officers as members of such Board. I am further to ask that the Board of Health may be invited to say what allowance should be made to Dr. Thompson and Mr. Hamlet for such services.

I have, &c.,
HARRIE WOOD,
Under Secretary.

The Principal Under Secretary.

Refer to Department of Mines and Agriculture.—C.W., B.C., 23/2/92. I approve of the appointment of a Board, consisting of Dr. Ashburton Thompson, Mr. Hamlet, analytical chemist, and a practical miner to inquire into this matter.—G.R.D., 24/2/92. Mr. Vialoux may be appointed secretary, at £5 per week, 23/2/92. The usual allowance will, of course, have to be paid to each member of the Board and the secretary.—C.W., 8/3/92.

Sir, Colonial Secretary's Office, Sydney, 17 March, 1892.

Referring to your letter of the 15th instant, I am directed to state, for the information of the Secretary for Mines and Agriculture, that the Colonial Secretary approves of the report of the Board recently appointed to inquire into the cases of lead poisoning at the silver-mines in the Barrier Ranges District being sent through the Board of Health, in order that the benefits of any remarks of the latter Board may be received.

2. I am further desired to state that instructions have been given with a view to Mr. R. Sleath being informed when the Board will sit.

I have, &c.,
CRITCHETT WALKER,
Principal Under Secretary.

The Secretary for Mines and Agriculture.

Sir, Department of Mines and Agriculture, Sydney, 18 May, 1892.

I have the honor to inform you that the Barrier Ranges Mining Companies' Association are desirous of having a member of such Association appointed to the Board on "Lead Poisoning," and to request that you will be good enough to say whether you have any objection to that appointment being made.

I have, &c.,
GERARD HERRING,
Assistant Under Secretary.

The Chairman of the Board on Lead Poisoning, Sydney.

I think such a member would be a useful addition to the Board, and I shall be glad to hear that an appointment has been made.—J. Ashburton Thompson, Chairman. The Under Secretary for Mines, B.C., 19/5/92. The Barrier Ranges Mining Companies' Association may be invited to nominate a member of the Lead Poisoning Board.—H.W., 20/5/92. Submitted. Approved.—T.M.S., 21/5/92. Mr. Knox reminded, 26/5/92.

The Barrier Ranges Mining Companies' Association, Queen-street, Melbourne, 3 May, 1892.

Dear Sir,

The attention of the Barrier Ranges Mining Companies' Association has been drawn to the constitution of the Commission which has been appointed by you to inquire into the lead question at Broken Hill, and we have received a very strong requisition from the mining managers of the district urging that experts only should be appointed to inquire into this important matter, and in this view the Mining Companies' Association must thoroughly concur; indeed they are of opinion that the owners of properties interested should be in some way represented upon the Commission, and they beg to submit for your consideration whether some representative should not now be added to that Commission.

The companies interested feel very strongly on the matter that serious misunderstanding of the whole of the surroundings may ensue, unless those who are taking the evidence are in a position to estimate justly its value and importance, and the mining companies confidently hope that you will see your way to comply with this request.

Yours truly,
WM. KNOX,
Hon. Secretary.

The Honorable the Minister for Mines, Sydney.

This is a suggestion that the mining companies at Broken Hill be represented on the Board appointed to inquire into lead poisoning at Broken Hill. The miners are represented, and it would only be fair that the owners should be if it is not now too late.—H.W., 5/5/92. Submitted.

Approved. I think the Board should make the inquiry as promptly as possible.—T.M.S., 7/5/92. W. Knox and A. Vialoux (Sec.), 10/5/92. Ask the Chairman of the Board on Lead Poisoning if he has any objection to the addition of another member of the Board to be chosen by the Barrier Ranges Mining Companies' Association.—H.W., 17/5/92. Chairman, Board Lead Poisoning, asked, 18/5/92.

The Barrier Ranges Mining Companies' Association, 31, Queen-street,
Melbourne, 25 May, 1892.

Dear Sir,

I have to acknowledge receipt of your letter of the 10th May, which has been under the consideration of the Executive Committee of this Association, and I must explain to you the delay which has arisen in replying, that it has been necessary to write to the Mining Managers' Association to advise us on the subject.

I have, therefore, now to request that you will be good enough to add the names of Messrs. John Howell (who is General Manager of the Broken Hill Proprietary Company, Ltd.), and Uriah Dudley (who is Manager of the Umberumberka Silver-mining Company) to the Commission.

We understand, from communications which we have received from Broken Hill, that you have agreed that the mining managers should be represented, as well as the mining companies, and that is the reason why the two names are suggested to you.

Yours, &c.,
WM. KNOX,
Hon. Secretary.

The Under Secretary, Department of Mines and Agriculture, Sydney.

So far as I know there has been no request made that a representative of the mining managers should be put on the Board, and I do not think it would be wise at this late hour to raise the question. Mr. John Howell might, perhaps, be added, as representing the companies.—H.W., 27/5/92. Submitted. Approved.—T.M.S., 28/5/92.

APPENDIX B.

Broken Hill.—Registered Causes of Death in the four years 1888–91, distributed under sex and age.

This town has grown up in a waterless, timberless, and nearly desert salt-bush country in the north-west of the Colony since 1883, in which year the Broken Hill silver-lead lode was discovered. At that date the only residents were the few hands employed on the Mount Gipps sheep-run. In 1885 the Broken Hill Proprietary Company began its regular operations, an unestimated population having collected who lived in tents. Water was got from the surface after rain, being ponded in some largish dams and in small tanks dug by individuals. The population increased as follows:—

Estimated population, end of 1889	14,000
,, ,, 1890	19,000
Census population, April, 1891	19,789
Estimated population, end of 1891	22,500

Down to the end of 1888 there was no form of local government, but towards the end of that year the inhabited area was incorporated, and vigorous attempts began to be made to cleanse the town. The state into which it had fallen may be inferred from the causes of death recorded in 1888 (*see* Tables I and V below). That was a year of drought, and there was no water for the mass of the people except that they had conserved in the way mentioned above, which was not only originally befouled by surface washings and by overflowed cesspits, but also putrid and stinking. Some pure water was got in small quantity from Stephens' Creek (a channel 9 miles away, which runs during heavy downfalls of rain, and then only for twenty-four or thirty-six hours, but whose bed consists of very deep sands which hold water for long and yield it readily) at a cost of 12s. and upwards for 100 gallons. At that time and afterwards there were but a small number of well-built houses. In consequence, the inhabitants in general were exposed (as the poorer inhabitants still are) to the extreme heats of summer, and in the winter to the cold winds which then sweep over the plains, in small huts built of iron. At a later date, however, house-building began, and at present the better-off classes reside for the most part in substantial buildings

buildings of brick and stone, and the proportion of such houses to temporary structures is now so considerable that the town has in great part assumed a usual aspect. In 1891 another drought was experienced, but for a time the state of the townspeople was not so bad as in 1888 because some large dams had been constructed which yielded a fairly good water at reasonable rates, and when these gave out water was brought by rail from the nearest available point, and distributed under supervision of the corporation; besides which the state of the town area as regards cleansing had been very much improved. During the latter half of 1892 a water conservation scheme was completed at Stephens' Creek and the town reticulated. At the end of the year a large supply was in store.

During the whole of this time supplies of food were always sufficient; but down to 1889 or 1890 vegetables and milk were deficient in quantity and rendered articles of luxury to most of the residents by their price. During two years past matters have much improved in this respect.

There is a considerable circulation of people through the town and district; the number of passengers carried on the railway, which forms practically the sole channel of communication, fairly illustrates this :—

Year.	Number of Passengers carried.
1887	.....
1888	49,551
1889	47,057
1890	.....
1891	78,362

But it is supposed that the resident population does not greatly fluctuate, nevertheless.

Under all the circumstances here briefly glanced at, it is not possible to present a fuller analysis of the death-records than follows below. It is, indeed, highly creditable to the organization of the department of the Registrar-General that the details should be as fully recorded as I found them to be. The first two Tables were compiled by me from the records in 1891 in the course of an ordinary official tour; the other two in the course of and for the purposes of the present inquiry. I am indebted to the District Registrar (Mr. R. Mends Gibson) for much information and assistance.

Broken Hill.—Registered Causes of Death in the four years 1888–1891 distributed under Sex and Age.

Table I.—1888.

		All Ages.			Under 1 month.		1 to 6 months.		6 to 12 months.		1 to 5 years.		Persons under 1 year.	Persons under 5 years.	5—		15—		25—		45—		65—	
		Males.	Females.	Persons.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.			Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.
Zymotic	Typhoid	93	30	123	...	...	...	...	1	1	5	3	2	10	8	3	34	8	41	15	4	...	...	...
	Diarrhœa	16	18	34	...	1	3	4	4	6	7	7	18	32	...	...	...	...	1	...	1	...	...	...
	Dysentery	6	4	10	...	1	1	1	2	...	3	2	5	10	...	...	...	...	...	...	...	...	...	...
	Septicæmia	1	2	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	2	...	...	...	...
Dietetic	Alcoholism	4	1	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	1	...	...	1	...
Constitutional	Cancer	1	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...
	Tabes mesenterica	5	1	6	...	...	2	...	...	1	3	...	3	6	...	...	...	...	...	...	...	...	...	...
	Tubercular meningitis.	...	1	1	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...
	Phthisis	4	...	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	...	...	...
	Tuberculosis	1	...	1	...	...	...	...	1	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...
Developmental	Premature birth	6	1	7	5	1	1	...	...	...	...	...	7	7	...	...	...	...	...	...	...	...	...	...
	Congenital defects	2	...	2	1	...	1	...	...	...	...	...	2	2	...	...	...	...	...	...	...	...	...	...
	Old Age	2	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...
Local — Nervous System.	Inflammation of brain.	2	2	4	...	...	...	...	...	1	1	...	1	2	...	...	1	...	...	1	...	...	...	...
	Apoplexy	2	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
	Convulsions	5	8	13	1	...	1	3	1	2	2	3	8	13	...	...	...	...	...	...	...	...	...	...
Circulatory System.	Syncope	3	...	3	...	...	...	...	...	...	...	...	...	...	...	...	1	...	2	...	...	...	...	...
	Heart disease	1	2	3	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	1	...	...	...	...
Respiratory System.	Laryngitis	...	1	1	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...
	Croup	...	1	1	...	..	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...
	Bronchitis	7	4	11	1	...	1	2	...	1	2	...	5	7	...	...	...	...	1	1	...	2	...	...
	Pneumonia	30	13	43	...	1	...	...	...	1	4	4	2	10	2	3	11	2	12	2	...	1	...	...
	Others	2	...	2	...	...	...	...	...	1	...	1	...	1	1	...	...	...	...	...	...	...	...	...
Digestive System.	Dentition	6	6	12	...	...	...	2	2	4	4	...	8	12	...	...	...	...	...	...	...	...	...	...
	Intestinal obstruction.	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
	Peritonitis	1	1	2	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	1	...	...	...	...
	Hepatitis	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...
	Abscess of liver	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
	Others	3	2	5	...	...	1	...	1	...	...	2	2	4	...	...	...	...	1	...	...	...	...	...
Urinary System.	Bright's disease	1	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...
	Uræmia	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...
Dis. of Parturition.	Accidents of childbirth.	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...
Violence	Poison	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
	Heatstroke	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...
	Homicide	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
	Thirst	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...
	Traumatic tetanus	1	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...
	Exposure	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...
	Exhaustion	3	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...
	Accidental violence	13	1	14	...	...	...	...	...	...	2	...	...	2	...	...	2	1	6	...	2	...	1	...
Ill-defined and Not Specified.	Tumour	1	...	1	1	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...
	Intestinal hæmorrhage	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...
	Marasmus	8	9	17	1	2	4	4	2	...	1	3	13	17	...	...	...	...	...	...	...	...	...	...
	Inanition	10	2	12	7	2	3	...	...	...	...	...	12	12	...	...	...	...	...	...	...	...	...	...
	Debility	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...
	Asthenia	1	1	2	...	...	...	...	1	...	...	...	1	1	...	...	...	...	...	1	...	...	...	...
	Want of vitality	...	2	2	...	2	...	...	...	...	...	...	2	2	...	...	...	...	...	...	...	...	...	...
	Heat	3	4	7	...	...	2	1	1	2	...	1	6	7	..	...	...	...	...	...	...	...	...	...
	No cause assigned	8	...	8	2	...	...	...	1	...	3	...	3	6	...	..	...	...	...	...	2	...	...	...
	Others	2	2	4	1	...	...	1	...	...	1	...	2	3	...	...	...	1	..	..	...	...	...	...
	Totals	261	126	387	...	...	...	...	...	...	...	...	104	172	...	...	...	...	...	...	...	...	...	...

Note.—Of the above causes, 12 were assigned after inquiry by a Justice; 17 after a Magisterial Inquiry; and 1 after a Coroner's Inquest. The register does not note whether medical evidence were taken. In 33 other cases the cause was assigned by irregular practitioners.

BROKEN HILL.—Registered Causes of Death distributed under Sex and Age—*continued.*

TABLE II.—1889.

		All Ages.			Under 1 month.		1 to 6 months.		6 to 12 months.		1 to 5 years.		Persons under 1 year.	Persons under 5 years.	5—		15—		25—		45—		65—	
		Males.	Females.	Persons.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.			Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.
ZYMOTIC AND SEPTIC	Typhoid	55	29	84	...	...	2	1	...	1	3	4	4	11	10	5	14	10	20	8	6	...	...	...
	Diphtheria	4	3	7	...	...	...	...	1	2	...	...	1	3	2	2	...	...	...	...	...	...	...	...
	Dysentery	11	7	18	...	...	...	3	3	1	1	...	7	8	1	...	...	...	2	...	3	3	1	...
	Diarrhœa	5	5	10	...	...	1	2	2	1	2	2	6	10	...	...	...	...	...	...	...	...	...	...
	Pyæmia	1	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...
	Puerperal fever	...	2	2	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...
PARASITIC	Aphtha	...	1	1	...	1	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...
DIETETIC	Alcoholism	2	1	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	1	...	...	...
CONSTITUTIONAL	Cancer	2	1	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	...	...
	Tabes mesenterica	1	1	2	...	...	...	...	...	1	1	...	1	2	...	...	...	...	...	...	...	...	...	...
	Tubercular Meningitis.	1	1	2	...	...	1	...	...	...	...	1	1	2	...	...	...	...	...	...	...	...	...	...
	Phthisis	5	1	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	1	2	...
	Others: Consumption of brain	1	1	2	...	...	...	...	...	1	...	...	1	1	1	...	...	...	...	...	...	...	...	...
	Others: „ bowels	1	3	4	...	...	1	2	...	...	...	1	3	4	...	...	...	...	...	...	...	...	...	...
	Others: Tuberculosis	...	1	1	...	...	...	...	...	1	...	...	1	1	...	...	...	...	...	...	...	...	...	...
	Purpura	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
DEVELOPMENTAL	Premature birth	1	1	2	1	1	...	...	...	...	...	...	2	2	...	...	...	...	...	...	...	...	...	...
	Imperfect development.	...	2	2	...	2	...	...	...	...	...	...	2	2	...	...	...	...	...	...	...	...	...	...
	Senile decay	2	2	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	2
LOCAL: Nervous System.	Inflammation of brain.	2	...	2	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	1	...	...	...
	Convulsions	9	5	14	4	3	4	2	1	...	...	...	14	14	...	...	...	...	...	...	...	...	...	...
	Epilepsy	1	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...
	Others	1	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...
LOCAL: Circulatory System.	Heart disease	4	1	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	4	...	...	...
LOCAL: Respiratory System.	Laryngitis	2	...	2	...	...	...	...	...	...	2	...	...	2	...	...	...	...	...	...	...	...	...	...
	Croup	4	1	5	...	...	...	...	...	...	3	...	...	3	1	1	...	...	...	...	...	...	...	...
	Bronchitis	2	...	2	...	...	...	...	1	...	...	...	1	1	..	...	...	...	...	...	1	...	...	...
	Pneumonia	18	8	26	2	...	2	1	1	1	2	2	7	11	1	1	1	...	6	3	3	...	...	...
	Congestion of Lungs	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...
	Pleurisy	2	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...
	Others	...	1	1	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...
LOCAL: Digestive System.	Dentition	5	1	6	...	...	1	...	2	...	2	1	3	6	...	...	...	...	...	...	...	...	...	...
	Ulcer of Stomach	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...
	Enteritis	1	2	3	...	...	1	...	...	...	...	2	1	3	...	...	...	...	...	...	...	...	...	...
	Peritonitis	2	1	3	...	...	...	...	...	...	...	1	...	1	...	...	...	...	2	...	...	...	...	...
	Gall Stones	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
	Cirrhosis of liver	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...
	Others	3	3	6	...	...	2	1	...	...	1	...	3	4	...	...	...	...	...	2	...	...	...	...
LOCAL: Urinary System.	Calculus	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
	Cystitis	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...
	Stricture of Urethra.	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...
	Retention	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...
LOCAL: Organs of Locomotion	Spinal caries	1	...	1	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...
VIOLENCE	Burns	1	...	1	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...
	Scalds	1	1	2	...	...	1	...	...	...	...	1	1	2	...	...	...	...	...	...	...	...	...	...
	Drowning	5	1	6	...	...	...	...	...	...	1	1	...	2	1	...	...	...	3	...	...	...	...	...
	Plumbism	3	...	3	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	1	...	...	...
	Accidental Violence	11	1	12	...	...	1	...	...	1	...	...	2	2	2	...	4	...	4	...	...	...	...	...
	Homicide	2	...	2	...	...	...	...	...	...	1	...	...	1	...	...	...	...	1	...	...	...	...	...
	Suicide	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...
ILL-DEFINED AND NOT SPECIFIED	Syncope	1	...	1	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...
	Marasmus	13	4	17	...	1	9	2	1	...	3	1	13	17	...	...	...	...	...	...	...	...	...	...
	Inanition	5	1	6	2	...	2	1	...	...	1	...	5	6	...	...	...	...	...	...	...	...	...	...
	Indigestion	2	...	2	...	...	1	...	1	...	...	...	2	2	...	...	...	...	...	...	...	...	...	...
	Atrophy	1	...	1	...	...	1	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...
	Others	14	2	16	9	1	...	1	1	...	1	...	12	13	...	...	...	...	...	...	3	...	...	...
	Consumption	5	5	10	...	1	...	3	1	1	2	...	6	8	...	...	...	...	1	...	1	...	...	...
	Heat	3	...	3	2	...	...	...	...	...	1	...	2	3	...	...	...	...	...	...	...	...	...	...
Totals		224	105	329	...	...	...	...	...	...	...	...	103	154	...	...	...	...	...	...	...	...	...	...

NOTE.—Of the above causes 14 were assigned after inquiry by a Justice, 17 after a Magisterial Inquiry, 6 after a Coroner's Inquest; the register does not note whether medical evidence was taken. In 13 other cases the cause was assigned by irregular practitioners.

BROKEN HILL.—Registered Causes of Death distributed under Sex and Age—*continued.*

TABLE III.—1890.

		All Ages.			Under 1 month.		1 to 6 months.		6 to 12 months.		1 to 5 years.		Persons under 1 year.	Persons under 5 years.	5—		15—		25—		45—		65—	
		Males.	Females.	Persons.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.			Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.
ZYMOTIC AND SEPTIC	Influenza	3	...	3	...	...	1	...	...	...	...	...	1	1	...	...	1	...	1	...	...	...	...	...
	Whooping-cough	8	7	15	1	1	2	3	3	1	2	2	11	15	...	...	...	...	...	...	...	...	...	...
	Diphtheria	7	5	12	...	...	...	...	...	...	5	4	...	9	1	1	1	...	...	...	...	...	...	...
	Typhoid	17	10	27	...	...	...	1	1	1	2	3	3	8	3	1	5	1	5	3	1	...	...	...
	Diarrhœa	11	7	18	...	...	4	1	4	4	1	2	13	16	...	...	...	...	...	...	1	...	1	...
	Dysentery	5	6	11	...	...	...	2	4	1	2	1	7	10	...	...	...	...	...	...	...	1	...	...
	Septicæmia	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...
	Puerperal Fever	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...
PARASITIC	Aphtha	1	1	2	...	1	1	...	...	...	...	...	2	2	...	...	...	...	...	...	...	...	...	...
DIETETIC	Improper feeding	3	1	4	...	...	2	1	1	...	...	...	4	4	...	...	...	...	...	...	...	...	...	...
	Starvation (neglect)	...	1	1	...	...	...	...	...	1	...	...	1	1	...	...	...	...	...	...	...	...	...	...
	Want of breast-milk	1	...	1	...	...	1	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...
	Alcoholism	2	...	2	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...
CONSTITUTIONAL	Rheumatic Fever	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...
	Cancer	1	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...
	Tabes Mesenterica	...	2	2	...	...	...	2	...	...	...	...	2	2	...	...	...	...	...	...	...	...	...	...
	Tubercular Meningitis	1	...	1	...	...	...	...	1	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...
	Tuberculosis	2	...	2	...	...	...	...	...	...	1	...	...	1	...	...	...	...	1	...	...	...	...	...
	Diabetes M.	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...
	Phthisis	4	3	7	...	...	...	...	...	...	...	...	...	...	...	...	1	1	2	2	1	...	...	...
	Others	6	3	9	...	...	3	...	2	1	1	1	6	8	...	...	...	1	...	...	...	...	...	...
DEVELOPMENTAL	Premature Birth	5	5	10	4	5	1	...	...	...	...	...	10	10	...	...	...	...	...	...	...	...	...	...
	Malformation	1	2	3	1	1	...	1	...	...	...	...	3	3	...	...	...	...	...	...	...	...	...	...
	Old Age	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...
LOCAL — Nervous System.	Apoplexy	2	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...
	Epilepsy	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...
	Convulsions	8	9	17	...	1	2	4	2	2	4	2	11	17	...	...	...	...	...	...	...	...	...	...
	Tetanus	1	...	1	1	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...
	Others	6	2	8	...	...	...	1	...	...	...	...	1	1	1	...	1	1	3	...	1	...	...	...
LOCAL — Circulatory System.	Endocarditis	1	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...
	Pericarditis	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
	Aneurism	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...
	Others	5	...	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	4	...	...	...
LOCAL — Respiratory System.	Croup	1	6	7	...	...	...	...	...	1	1	3	1	5	...	2	...	...	...	...	...	...	...	...
	Asthma	1	2	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	1
	Bronchitis	5	4	9	1	1	1	1	...	...	2	...	4	6	...	...	...	...	...	...	...	1	1	1
	Pneumonia	22	4	26	...	...	...	1	2	...	2	2	3	7	...	...	4	...	6	1	7	...	1	...
	Pleurisy	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...
	Others	4	2	6	...	...	...	...	...	...	2	1	...	3	...	...	...	...	...	...	2	1	...	...
LOCAL — Digestive System.	Stomatitis (gangrenous)	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...
	Dentition	4	3	7	...	...	...	1	2	2	2	...	5	7	...	...	...	...	...	...	...	...	...	...
	Enteritis	8	1	9	...	...	3	...	1	...	1	1	4	6	...	...	...	...	2	...	1	...	...	...
	Others	3	2	5	...	...	...	...	...	2	1	...	2	3	...	...	...	...	...	...	2	...	...	...
LOCAL — Urinary System.	Nephritis	...	2	2	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	1	...	...	...	...
	Nephria	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...
	Cystitis	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
LOCAL — Diseases of Parturition	Abortion	...	2	2	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...
	Puerperal Convulsions	...	2	2	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...
VIOLENCE	Plumbism	3	1	4	...	...	...	...	...	...	...	1	...	1	...	...	...	...	2	...	1	...	...	...
	Dynamite fumes	1	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...
	Burns and scalds	5	4	9	...	...	...	...	...	...	2	1	...	3	...	2	1	...	1	1	1	...	...	...
	Accidental violence	12	1	13	...	...	1	...	...	...	...	...	1	1	...	...	2	...	7	1	2	...	...	...
	Suicide	3	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	1	...
	Others	1	2	3	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	1	...	...	...	...
ILL-DEFINED AND NOT SPECIFIED.	Wasting diseases	11	18	29	1	2	3	9	4	5	3	2	24	29	...	...	...	...	...	...	...	...	...	...
	Heat (exhaustion from.)	1	...	1	1	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...
	Others	8	12	20	3	2	2	7	...	...	2	1	14	17	...	...	...	...	1	...	...	2	...	...
	No cause assigned	1	1	2	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	1	...	...	...
Totals		204	138	342	...	...	...	...	...	...	...	...	137	202	...	...	...	...	...	...	...	...	...	...

NOTE.—Of the above causes 10 were assigned after inquiry by a Justice; 8 after a Magisterial Inquiry, and 14 after a Coroner's Inquest. The register does not note whether medical evidence were taken.

BROKEN HILL.—Registered Causes of Death distributed under Sex and Age—*continued.*

TABLE IV.—1891.

		All Ages.			Under 1 month.		1 to 6 months.		6 to 12 months.		1 to 5 years.		Persons under 1 year.	Persons under 5 years.	5—		15—		25—		45—		65—	
		Males.	Females.	Persons.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.			Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females
ZYMOTIC	Influenza	25	11	36	1	...	1	2	...	2	1	2	6	9	...	...	2	2	12	1	7	2	1	...
	Whooping-cough	2	4	6	...	...	1	...	...	...	1	4	1	6	...	...	...	...	...	...	...	...	...	...
	Diphtheria	13	7	20	...	...	...	...	1	...	6	4	1	11	5	3	1	...	...	...	...	...	...	...
	Typhoid	21	15	36	...	...	1	1	...	...	...	2	2	4	...	...	13	4	7	6	...	2	...	...
	Diarrhœa	17	13	30	...	...	9	4	3	4	3	3	20	26	...	...	...	1	2	...	...	...	...	1
	Dysentery	10	9	19	...	...	3	2	2	3	4	1	10	15	...	...	...	1	1	1	...	1	...	...
	Malignant Pustule	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...
	Congenital Syphilis	...	1	1	...	...	...	1	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...
	Puerperal fever	...	3	3	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	1	...	...	...	...
DIETETIC	Alcoholism	2	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...
	Improper feeding	...	1	1	...	...	...	1	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...
CONSTITUTIONAL	Cancer	2	1	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	1	...	...
	Tabes Mesenterica	3	3	6	...	...	...	1	1	1	2	1	3	6	...	...	...	...	...	...	...	...	...	...
	Phthisis	12	6	18	...	...	...	...	...	...	...	...	...	...	...	...	3	2	2	4	6	...	1	...
	Consumption of Bowels.	9	3	12	...	...	4	1	2	1	3	1	8	12	...	...	...	...	...	...	...	...	...	...
	Others	2	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...
DEVELOPMENTAL	Premature birth	10	11	21	10	10	...	1	...	...	...	...	21	21	...	...	...	...	...	...	...	...	...	...
	Malformation	5	1	6	5	1	...	...	...	...	...	...	6	6	...	...	...	...	...	...	...	...	...	...
	Old age	3	5	8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	2	4
LOCAL — Nervous System.	Meningitis	3	1	4	...	...	...	...	...	...	1	...	1	...	...	...	1	...	1	...	1	...	...	...
	Apoplexy	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
	Convulsions	14	20	34	2	2	2	5	5	3	5	7	19	31	...	...	...	2	...	1	...	...	...	...
	Others	6	1	7	...	...	1	...	...	...	...	1	1	2	1	...	1	...	...	...	3	...	...	...
Circulatory System.	Aneurism	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
	Others	9	2	11	...	...	...	...	...	...	...	...	...	...	...	...	3	...	3	2	3	...	...	...
Respiratory System.	Laryngitis	...	1	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...
	Croup	2	1	3	...	...	...	...	...	...	2	1	...	3	...	...	...	...	...	...	...	...	...	...
	Asthma	2	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...
	Bronchitis	10	6	16	1	...	3	1	1	1	2	1	7	10	1	...	...	...	...	1	2	1	...	1
	Pneumonia	36	9	45	...	...	1	...	...	...	4	5	1	10	...	...	6	1	14	2	10	1	1	...
	Pleurisy	3	2	5	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	3	...	...	1
	Others	3	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	2	...	...	...
Digestive System.	Dentition	8	4	12	...	...	1	...	...	3	7	1	4	12	...	...	...	...	...	...	...	...	...	...
	Enteritis	8	1	9	...	...	1	...	2	1	2	...	4	6	...	...	1	...	1	...	1	...	...	...
	Gastro-enteritis	3	4	7	...	...	2	2	1	...	...	2	5	7	...	...	...	...	...	...	...	...	...	...
	Intestinal Catarrh	10	12	22	1	...	3	6	3	3	3	3	16	22	...	...	...	...	...	...	...	...	...	...
	Intussusception	1	...	1	...	...	1	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...
	Others	6	...	6	...	1	...	...	...	...	...	...	1	1	1	...	...	...	1	...	3	...	...	...
Urinary System.	Nephritis	...	1	1	...	...	...	1	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...
	Nephria	1	1	2	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	1	...	..	...
Diseases of Parturition.	Puerperal Convulsions.	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...
VIOLENCE.	Burns and Scalds	3	1	4	...	...	...	...	...	...	1	...	...	1	...	...	...	...	1	1	1	...	...	...
	Heat-stroke	1	...	1	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...
	Poisoning (accidental	1	...	1	...	...	1	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...
	Plumbism	4	...	4	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	2	...	...	...
	Accidental Violence	20	1	21	...	...	...	...	...	...	1	...	...	1	...	1	8	...	7	...	2	...	2	...
	Thirst (bushed)	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
	Suicide	2	1	3	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	1	...	...	...
ILL-DEFINED AND NOT SPECIFIED.	Marasmus	14	4	18	...	...	4	2	7	2	3	...	15	18	...	...	...	...	...	...	...	...	...	...
	Malnutrition	2	2	4	1	...	1	2	...	...	...	...	4	4	...	...	...	...	...	...	...	...	...	...
	Indigestion	1	1	2	...	...	1	1	...	...	...	...	2	2	...	...	...	...	...	...	...	...	...	...
	Exhaustion from heat	2	...	2	...	...	2	...	...	...	...	...	2	2	...	...	...	...	...	...	...	...	...	...
	Debility	8	8	16	5	6	2	1	1	1	...	...	16	16	...	...	...	...	...	...	...	...	...	...
	No cause assigned	6	4	10	...	1	...	...	...	...	1	2	1	4	...	1	...	...	4	...	...	...	1	...
	Others	10	3	13	2	...	3	1	1	...	...	...	7	7	1	1	1	...	...	...	2	1	...	...
		337	188	525									188	282										

NOTE:—Of the above causes 24 were assigned after inquiry by a Justice, 4 after a Magisterial Inquiry, and 7 after Coroner's Inquest. The Register does not note whether medical evidence were taken.

BROKEN HILL.—Summary of causes of death under classes and five age groups for the four years 1888–91.

TABLE V—1888.

Births, 290; deaths under 1 year, 104; infantile mortality, 358.

	Total	0—	1—	5—	15—	45—
Class I Zymotic	170	25	27	11	102	5
III Dietetic	5	...	...	...	4	1
IV Constitutional	14	4	4	...	3	3
V Developmental	11	9	...	...	...	2
VI Local	109	26	26	6	46	5
VII Violence	23	...	2	1	13	7
VIII Ill-defined	55	40	9	...	3	3
Totals	387	104	68	18	171	26

TABLE VI—1889.

Births, 424; deaths under 1 year, 103; infantile mortality, 243.

	Total	0—	1—	5—	15—	45—
Class I Zymotic	123	18	14	20	58	13
II Parasitic	1	1	...	...	...	...
III Dietetic	3	...	...	...	2	1
IV Constitutional	21	7	3	1	1	9
V Developmental	8	4	...	...	...	4
VI Local	90	29	19	4	24	14
VII Violence	27	3	5	5	12	2
VIII Ill-defined	56	41	10	...	1	4
Totals	329	103	51	39	98	47

TABLE VII—1890.

Births, 663; deaths under 1 year, 137; infantile mortality 206.

	Total	0—1	1—	5—	15—	45—
Class I Zymotic	88	35	24	6	19	4
II Parasitic	2	2	...	...	...	...
III Dietetic	8	6	...	...	2	...
IV Constitutional	25	9	3	...	8	5
V Developmental	14	13	...	...	...	1
VI Local	120	32	25	3	28	32
VII Violence	33	1	4	4	18	6
VIII Ill-defined	52	39	9	...	1	3
Totals	342	137	65	13	76	51

TABLE VIII—1891.

Births, 892; deaths under 1 year, 188; infantile mortality, 210.

	Tota	0—	1—	5—	15—	45—
Class I Zymotic	152	41	31	8	57	15
II Dietetic	3	1	...	...	2	...
IV Constitutional	41	11	7	...	14	9
V Developmental	35	27	...	...	...	8
VI Local	194	60	47	5	45	37
VII Violence	35	1	3	1	22	8
VIII Ill-defined	65	47	6	3	5	4
Totals	525	188	94	17	145	81

TABLE IX.—Showing the Percentage borne by the Deaths under each Class of Causes to Deaths from all causes in each of the years 1888–91.

Year	Total Recorded Deaths.	Zymotic.	Parasitic.	Dietetic.	Constitutional.	Developmental.	Local.	Violence.	Ill-defined.
1888	387	44·	.....	1·	4·	3·	28·	5·	14·
1889	349	37·	·3	·9	6·	2·	27·	8·	17·
1890	342	26·	·5	2·	7·	4·	35·	10·	15·
1891	525	29·	.....	·6	7·	7·	37·	7·	12·

TABLE X.—Age Distribution of the People at the Census enumeration April, 1891.

Proportion to 1,000 borne by the numbers living at the age-groups shown in the Municipal District of Broken Hill and in the Metropolitan District.

District.	Enumerated population.	Less ages unspecified.	Proportion to 1,000 borne by the numbers living at age-groups.										
			—5	5—	10—	15—	20—	25—	35—	45—	55—	65—	75—
Broken Hill	19,789	99	131	111	87	88	136	227	114	70	30	5	1
Metropolitan	383,283	287	142	120	99	92	104	194	117	72	39	16	5

TABLE XI.—Sex Distribution of the People at the Census, 1891.

Proportion per cent. of Males and Females.

	M.	F.
Broken Hill	59·8	40·2
Metropolitan District	50·54	49·46

TABLE XII.—Particulars of Deaths ascribed to Lead Poisoning during the *five* years, 1888–92.

Date.	Name.	Age.	Registered cause of Death.	Occupation.	Remarks.
1889—April 2	Joseph Bennetta	12	Lead poisoning, epilepsy, 3 days	Ore-picker.	
,, 2	Henry Christopher	13	Epilepsy, 9 days	Child (ore-picker)	See Q. 2070
July 25	James Patrick Durkin	54	Heart disease, accelerated by lead poisoning.	Miner.	
1890—Jan. 3	Abraham Olds	26	Lead poisoning, 9 days	Miner.	
July 23	John Bent	25	Acute anæmia and exhaustion, lead poisoning, 3 weeks.	Miner.	
Sept. 6	Marion Lane	2 y. 8 m.	Lead poisoning, 8 weeks	Child	See Q. 2701
Dec. 26	Samson Hall	62	Lead poisoning, 4 weeks	Miner.	
1891—May 17	Edward Giles	23	Lead poisoning, 40 hours	Miner.	
,, 18	Edgar Stephen Plane	25	Lead poisoning, 7 days	Miner.	
Oct. 15	William John Grigg	50	Extreme debility through chronic lead poisoning, several months.	Miner.	
Dec. 28	John Davies*	56 (or 62, as given in the depositions).	Epilepsy, the result of chronic lead poisoning, accelerated by excessive heat (Magisterial inquiry).	Boilermaker.	See foot-note
1892—June 21	Charles Tytherleigh	49	Chronic lead poisoning; acute do., 5 days.	Miner.	

* A medical witness testified, but he had not seen the patient alive. After reading the depositions I concluded without hesitation that, in the absence of any post mortem examination, the finding should have been "death from natural causes."—J.A.T.

J. ASHBURTON THOMPSON.

APPENDIX C.

EXAMINATION OF PUBLIC SCHOOL CHILDREN, February 6th, 1893.

Central Public School: master, Mr. Dwyer; average attendance, 800; time of inspection, morning school.

Lower section of Infant School: mistress, Miss Ferguson; contained about seventy pupils. Miss Ferguson stated that she had herself noticed that children who lived outside the town were as a class much healthier than the children as a class who lived within the town. Having looked at the scholars, I picked three out of many pallid children. On inquiry it appeared that two of them lived in Crystal-street and one in Chapple-street.

In the upper section of the Infant School, of two pallid children chosen from many, one was found to live on Central Blocks, and one in Argent-street, not quite as far north as the British Mine. Miss Beryman, in charge of this class, had not noticed any difference between children such as was mentioned by Miss Ferguson.

The Junior Infants: On two children being picked out at hazard from among several who were manifestly pallid it was found that they had lived in Argent and Chapple Streets respectively. Another pallid child was found to live in Gaffney-street, but she was too young to say exactly whereabouts.

Lower second class, Boys' School: Of two pallid boys, one lived at Crystal-street, and one in Beryl-street.

In the higher classes one pallid boy who was interrogated lived on Billy-goat Hill. Another lived in William-street Lane, near the North School. He was very anæmic; gums pallid, showing a deep red line at the margin; said he was in good health. Another pale boy picked out said he lived in Pell-street.

Among the girls, the pale children picked out at hazard lived in Crystal, Argent, Mica, Slag, and Beryl Streets.

South School: master, Mr. M'Phie; average attendance, about 600; time of inspection, afternoon school.

All the class-rooms were visited, and the children inspected *seriatim*; not more than three showed any pallor, and their general appearance was ruddy, although many seemed to be not strong. Their faulty physical conformation, however, showed that this was due to no local or temporary condition.

North School: master, Mr. Wallace; average attendance, about 500; time of inspection, afternoon school.

The remarks made in the case of the South School apply on the whole; perhaps the appearance of the children was not quite so good, but they still formed a strong contrast to the children at the Central School; than whom one teacher, who had formerly taught there, thought they were decidedly healthier, and not much below classes she had taught in other parts of New South Wales (but 75 per cent. or more of the children at Broken Hill are South Australians by birth).

Waters analysed at the Central School.—Examinations of waters used for drinking purposes at this school will be found in Appendix L. That in tanks attached to the school-rooms was free from lead; that in one attached to the teacher's residence had one-fourth of a grain of lead in each gallon. The explanation of this discrepancy is that the former had been cleaned out at the end of a long drought, and had recently been refilled by heavy falls of rain; but the latter had been saved up through the drought as a source of drinking-water of supposed purity. All these tanks are exposed to the same source of contamination, namely, flue-dust from neighbouring smelters, and are stores of dangerous drinking-water; they should be immediately removed, and the premises connected with the public water-mains.

J. ASHBURTON THOMPSON.

APPENDIX D.

* NOTE.—Probably this would be the best way to supply water.

APPENDIX D.

List of Boarding-houses, North Broken Hill.

Number of boarders (families excluded) and water supply.

Name.	No. of boarders.	Street.	Water laid on.	Name.	No. of boarders.	Street.	Water laid on.
Ensoll and Manners	35	Argent	...	Burley, Mrs.	10	Beryl	No.
Oke, Mrs.	17	,,	Yes.	Cotter, Mrs.	7	,,	Yes.
Coen, John	12	,,	No.	Phillipson, Mrs.	6	Beryl, North	No.
Morton, D.	15	,,	Ordered.	Pool, Mrs	7	Iodide	,,
Glasson, Mrs.	11	,,	Yes.	Reed, Mrs.	4	Beryl	,,
Ridgeway, Mrs.	2	,,	No.	Mahon, James	14	Cobalt and Chloride	Ordered.
Wang, John	18	,,	Yes.	Arnold, Mrs.	8	Cobalt	No.
Baum, Mrs.	13	Crystal	,,	Phillips, Mrs. J.	3	,,	,,
Hutchins, Jane	4	,,	,,	Alexander, E.	37	,,	Yes.
Carns, D.	6	,,	No.	Gleeson, Mrs. K.	3	,,	No.
Herreen, Mrs.	3	,,	,,	Stephens, Mrs.	7	Wolfram	Yes.
Mines, Mrs.	8	,,	Ordered.	Chapman, Mrs. E.	21	Mica and Choride	No.
Sloss, J.	16	,,	No.				
Hayes, Mrs. W.	28	,,	Yes.	Total boarders...	514		
Smith, Mrs.	8	,,	No.				
Vergin, Mrs.	3	,,	,,				
Triplett	24	,,	Yes.	*South Broken Hill (or Alma).*			
Harding, Mrs. J.	23	,,	,,				
Doyle, Eliza	9	Blende	No.	Trenberth	5	Eyre	No.
Whitelaw, J.	12	,,	,,	Roemer	2	,,	,,
Moyle, Ed.	12	Beryl	,,	Voumard, T. H.	10	,,	,,
Walsh, Fred.	8	,,	,,	Cory, A.	5	,,	,,
Manley, John	4	Cobalt	,,	Davitt, P.	3	Piper	,,
Travan, J.	1	Beryl	,,	O'Brien, Mrs.	4	,,	,,
Verran, C.	4	Wolfram	,,	Hebbard, Mrs.	6	,,	,,
Sack, Mrs.	40	Crystal-lane	,,	Merrifield, Mrs.	6	,,	,,
Shinnick, Mrs.	9	,,	,,	Burley, J. R.	7	Patton	Yes.
Lack & Co., R.	27	Argent	Yes.				
White, Mrs.	15	Oxide and Beryl	No.	Total boarders...	562		

Living in houses supplied with pipe-water 288
,, not supplied ,, ... 274

S. ALKER,
Inspector of Nuisances and Dairies.

January, 1893.

APPENDIX E.

Hospital Returns.

Statement (handed in by Dr. Bartley), 1890, 1891, and part of 1892, showing the number of cases of Lead Poisoning treated in the Broken Hill Hospital, the distribution of those cases according to the class of illness, and also according to the occupation of the patients :—

Colic—	1890.	
Miners	68	
Labourers	4	
Boiler-maker	1	
Smelters	5	
Plumber	1	
Concentrator	1	
Engine-fitter	1	
Trucker	1	
	—	82
Paralysis—		
Miners	3	
Dementia—		
Miners	2	
Encephalopathy (including epilepsy)—		
Miners	8	
Labourers	3	
	—	16
Total for 1890		98
Colic—	1891.	
Miners	91	
Trucker	1	
Smelters	5	
Labourers	7	
Carpenter	1	
Painter	1	
Cook	1	
	—	107
Paralysis—		
Labourer	1	
Dementia—		
Miner	1	
Encephalopathy—		
Miners	11	
Ore-picker	1	
Smelter	1	
Mason	1	
	—	16
Total for 1891		123

1892.

Colic—	1892. (First six months.)	
Miners	43	
Concentrator	1	
Labourers	7	
Fitter	1	
Smelters	7	
Trucker	1	
Boiler-maker	1	
		61
Paralysis—		
Miners	2	
Dementia	0	
Encephalopathy—		
Miners	8	
Smelter	1	
Labourer	1	
		12
Total first six months, 1892		73

APPENDIX F.

FRIENDLY SOCIETIES' RETURNS.

Grand United Order of Oddfellows, Silver Star Branch, Broken Hill.

PARTICULARS of number of Members on Roll, &c., and Lead Poisoning cases from 1 January, 1890, to 30 June, 1892.

No. on Roll at 31 December for.		Approximate No. employed on Mines.	No. cases Lead poison.	Mines on which working.	Deaths from Lead poison.	Date and duration of illness in each case.				
						Year.	Cases.	Date Commencing.	No. days.	Total.
Year.										
1890	137	100	.....	Unable to say.	.....	1890	.....	.....	...	...
1891	201	150	3		.....	1891	1	18 January	14	
							1	9 February	14	
							1	28 December	56	
										84
Half-year.										
1892	216	170	5		.....	1892 (Half-year)	1	4 January	16	
							1	6 ,,	6	
							1	13 ,,	103	
							1	15 February	14	
							1	20 April	12	
										151

28 June, 1892.

E. A. ARCHBALD,
Secretary.

HIBERNIAN AUSTRALASIAN CATHOLIC BENEFIT SOCIETY.

Sacred Heart Branch, No. 208 (Sydney District), Established at Broken Hill, 4th day of October, 1888.

No. of Members, January 1, 1890, 151; No. of Members, January 1, 1892, 235.

NAMES of Members who have suffered from Lead Poisoning from July, 1890, to July, 1892. (See Certificates.)

						Days.
Patrick Liddy	from August	8, 1890,	to August	15, 1890		6
Mathew O'Halloran	,, December	16 ,,	,, December	24 ,,		7
Thomas Brew	,, ,,	6 ,,	,, ,,	15 ,,		7
Nicholas Ziss	,, ,,	3 ,,	,, January	10, 1891		33
Daniel O'Callaghan	,, January	15, 1891	,, ,,	21 ,,		5
Michael Rodgers	,, June	28 ,,	,, July	13 ,,		12
John Critchley	,, July	13 ,,	,, ,,	25 ,,		11
Phillip Brady	,, December	27 ,,	,, January	10, 1892		12
Bryan Devitt	,, ,,	21 ,,	,, December	30 ,,		8
John Fitzpatrick	,, January	8, 1892	,, January	14 ,,		5
Frank M'Kernan	,, ,,	21 ,,	,, February	7 ,,		15
Bryan Devitt	,, ,,	23 ,,	,, ,,	14 ,,		18
Joseph Sullivan	,, ,,	20 ,,	,, ,,	3 ,,		12
Edward Donnelly	,, February	22 ,,	,, March	6 ,,		12
Daniel Quinn	,, March	7 ,,	,, April	26 ,,		33
John Scanlon	,, ,,	21 ,,	,, ,,	2 ,,		11
Frank M'Kernan	,, May	20 ,,	,, May	30 ,,		8
Thomas Brew	,, ,,	16 ,,	,, ,,	22 ,,		6
Cornelius Donovan	,, ,,	13 ,,	,, ,,	17 ,,		3
			Total			224

J. HYNES, Secretary,
Argent-street North, Broken Hill.

BROKEN HILL LODGE, No. 65, I.O.O.F., instituted at Broken Hill, October 3, 1888.

End of 1890 we had ... ... 145 members.
,, 1891 ,, ... 169 ,,
Present Number ... ... 175 ,,

LEAD POISONING.

Year.	Name.	Duration of Sickness.	Amount of Sick-pay.	
		Days.	£ s. d.	£ s. d.
1890	H. Holland	10	1 13 4	
,,	H. T. Rabbich	37	6 3 4	
,,	R. Riley	4	0 13 4	
,,	E. Stokes	7	1 3 4	
				9 13 4
1891	H. Holland	12	2 0 0	
,,	W. Gluyas	15	2 10 0	
,,	W. S. Howard	25	4 3 4	
,,	S. G. Woods	7	1 3 4	
,,	F. Luckman	10	1 13 4	
				11 10 0
1892	F. Luckman	22	3 13 4	
,,	W. N. H. Newton	23	3 16 8	
,,	H. Holland	6	1 0 0	
				8 9 0
				£29 12 4

BENJAMIN B. HODDINOTT,
Secretary.

THE Loyal Silver City Lodge, No. 157, Independent Order of Oddfellows, Manchester Unity, Report on Lead Poisoning.
Taken from records in use by the Order in Broken Hill.

Year.	Number of members on register.	Number of members connected with the mines.	Number of members called miners.	Number of members sick.	Number of members suffering from lead.	Total length of sickness, in days.	Duration of sickness from lead, in days.	Number of deaths from lead poisoning.	Amount paid in sick pay.	Amount paid in sick pay from lead poisoning.
									£ s. d.	£ s. d.
1889 ...	40	27	16	+	+	+	+	.....	+	+
1890 ...	64	38	25	7	.....	136	.....	.....	22 13 4	.....
1891 ...	125	80	41	19	.....	636	.....	.....	107 13 4	.....
1892 ...	164	112	51	16	1	190	9	.....	43 3 4	1 0 0

NOTE.—The marks + signify that no record was kept, during 1889, of those particular items. The Lodge was in existence during 1889 for nine months, having been established on the 11th April, 1889; and the figures for 1892 only apply to the first six months of the year.

I hereby certify that the above figures are correct, according to the books.

W. R. STEWART,
Financial Secretary, Loyal Silver City Lodge, Broken Hill.

To the Chairman of the Lead Commission, Broken Hill.

APPENDIX G.

MINE MANAGER'S REPORTS.

MINE Manager's Reports of number and classification of men employed and quantities of ore raised during the years 1890, 1891, and 1892.

	Average number of hands employed during 1890.	1891.
Miners	86	119
Truckers	18	26
Platmen	6	10
Smelter feeders	.....	15
General smelter hands	.....	30
Tradesmen	46	77
Labourers	43	71
Boys	11	23
Ore dressing hands	30	44

CENTRAL BROKEN HILL SILVER MINING COMPANY, LIMITED.

Men employed at Central Mine.

1890.—Miners, 148; platmen, 6; truckers, 16; timber-cutters, 5; carpenters, 3; blacksmiths and strikers, 6; engine-drivers, stokers, and surface labourers generally, 50. Total, 233.

1891.—Miners and shift bosses, 278; bracemen and platmen, 12; truckers, 62. Smelters, &c.—Shift bosses, 3; tappers, 10; feeders, 10; slag-wheelers, 37; charge-wheelers, 39; dumpmen, binmen, coke-screeners, ironstone-breakers, and general labourers about sheds and bins, 63; timber-cutters, 11; carpenters, 6; fitters, engineers, masons, labourers, &c., 80. Total, 611.

CENTRAL

CENTRAL BROKEN HILL SILVER MINING COMPANY, LIMITED.

Quantities of Ore despatched.

1890.	Tons.	cwt.	qrs.
To Dry Creek, silver and lead ore	21,893	19	3
„ Sydney „ „	366	4	2
1891.			
To Dry Creek, silver ore	1,461	19	1
„ Wallaroo „	1,127	12	0
„ Sydney, sulphides	562	18	0

Quantities of Ore treated at Company's Smelters, Broken Hill, 1891.

Carbonates, 20,776 tons. Silver Ore, 25,110 tons. Sulphides, 2,744 tons.

BROKEN HILL PROPRIETARY COMPANY.

Memo. of men employed, &c.

Underground.—984 miners; 76 brace and platmen; 318 truckers and labourers. Total, 1,378 men.

Surface.—14 foremen; 41 carpenters; 5 tinsmiths; 18 blacksmiths; 17 blacksmiths' strikers; 33 turners and fitters; 6 boiler-makers; 9 masons; 39 ore-shunters and truckers; 16 horse-drivers; 250 labourers. Total, 448 men.

Smelters.—39 tappers; 39 feeders; 132 slag-wheelers; 162 charge-wheelers; 57 labourers (on dumps and bins); 45 labourers handling slag, buebori, &c. Total, 474 men.

For year ending May 31, 1891, there were 219,145 tons ore mined, averaging 27 per cent. lead, 37 oz. silver, smelted n quantities of about 50 per cent. lead, 36 per cent. kaolin and silicious, 14 per cent iron ore.

The ore is oxidised-carbonate ore.

BLOCK 10 COMPANY.

Statement of Men employed.

	1890.		1891.
Manager	1	.....	1
Engineer	1	.....	1
Foreman	1	.....	1
Pitman	.....	.....	1
Fore-timberman	1	.....	1
Shift bosses	6	.....	6
Miners	140	.....	127
„ (contract)	18	.....	36
Timbermen	6	.....	10
Bracemen and platmen	6	.....	8
Truckers and Labourers	32	.....	40
Timekeeper	1	.....	1
Saw-mill hands	5	.....	3
Engine-drivers	7	.....	7
Firemen	3	.....	3
Smiths and assistants	10	.....	10
Carpenters	13	.....	4
Masons	8	.....	3
Fitters and labourers	5	.....	8
Bagging ore, &c.	17	.....	14
Surface hands	23	.....	6
Assayer and assistants	5	.....	5
Accountant and storekeeper	2	.....	2
Total	311	.....	298

June 28, 1892.

JOHN WARREN,
General Manager.

ORE RAISED IN 1890 AND 1891.

	Ton.	cwt.	qr.			
In 1890	23,333	13	2	.....	Average lead	16 per cent.
„ 1891	50,006	14	2	.....	„	12 „

June 28, 1892.

JOHN WARREN,
General Manager.

BROKEN HILL SOUTH COMPANY.

DURING the early part of the year 1890 the mine was in a very small way, only about fifty men being employed. As the year wore on the number was increased until about 130 men were employed. During 1891 this number was increased to 300, and on the starting of the smelters in August, 1891, a further increase to 400 took place. The following were the approximate numbers employed in each department:—Miners, 205; truckers, 55; platmen, 12; smelters, 86; ordinary, surface, &c., 42. Total, 400.

The ores broken from the various parts of the mine are of similar character to those of the other mines, consisting of carbonate, oxidised and sulphide ores. The carbonates, generally speaking, are of a massive nature, breaking freely in blasting with comparatively little dust. The average contents of a.g. and p.c. vary considerably from 10 to 40 per cent. p.b., and from 15 to 50 oz. a.g. (sulphides average is not included in this). Until the past six months more than half of the miners were employed in work of an exploratory nature—through hard barren ground for the most part. Generally speaking the ventilation in the mine is good, and miners in consequence enjoy good health, very little time being lost through sickness. Quantities of ores raised can be obtained from the ordinary half-yearly reports issued by the company.

APPENDIX H.

APPENDIX H.

STATEMENT showing number of men employed at the Broken Hill Silver-mines during the fortnight ending the 19th December, 1892:—

[Furnished by Mr. Hibbard, Inspector of Mines.]

	Surface.	Underground.	Total.
Broken Hill Proprietary Mine	1,764	1,158	2,922
British Mine	203	195	398
Block 14 Mine	198	167	365
Broken Hill Junction Mine	.....	.....	17
Broken Hill Junction North Mine	.....	.....	20
Broken Hill Consols	.....	.....	54
Australian Broken Hill Consols	.....	.....	42
Broken Hill, Block 10	50	256	306
Broken Hill South Mine	130	150	280
New Broken Hill Extended	.....	.....	20
Central Blocks	.....	.....	12
North Central Mine	.....	.....	9
Totals	2,345	1,926	4,445

APPENDIX I.

RECORD OF RAINFALL AT BROKEN HILL DURING TWO YEARS ENDING JUNE, 1892.

1890.—July	139	points.
August	111	,,
September	22	,,
October	50	,,
November	91	,,
December	10	,,
Total	4·23	inches.
1891.—January	270	points.
February	.....	,,
March	94	,,
April	172	,,
May	22	,,
June	81	,,
July	12	,,
August	161	,,
September	31	,,
October	81	,,
November	.....	,,
December	13	,,
Total	9·37	inches.
1892.—January	46	points.
February	38	,,
March	.....	,,
April	10	,,
May	192	,,
June	58	,,
Total	3·44	inches.

Total for last two years, 17·04 inches. Southerly winds prevailed.

APPENDIX K.

APPARATUS FOR SEPARATING DUST FROM AIR.

I.

LAKE'S apparatus for separating dust from air was designed chiefly for use in flour-mills, but might perhaps be adapted to the present purpose; I therefore give a reference to the specification of patent, and a brief description of its principle and construction. The former is the tendency of dust to settle out of still air; and the latter is such that dust is conveyed out of a moving atmosphere into a still one. This is effected by the following means:—The air to be freed from dust is forced by a fan through a flue, in the course of which a cylindrical chamber is inserted. Within this chamber beaters, whose extremities very nearly touch its wall, are caused to revolve with great rapidity, and the cylinder is so constructed that in section its wall is seen to be louvred. If this were all the apparatus, then the dusty air would be forced through the flue by the fan, it would be violently carried round in the cylinder by the beaters, part would be forced outwards between the slats to mingle with the general atmosphere, and part would escape by the continuation of the flue; thus there would be no separation of the dust. But the cylinder is enclosed in a perfectly air-tight case of small capacity. Within this case the air is at rest, for the beaters can force no more into it; for the same reason, the air passing into the cylinder by the flue entirely escapes by the continuation of the flue. But it is otherwise with the dust particles floating on that air; these are so whirled by the beaters that the centrifugal motion imparted to them carries them out of the cylinder, between the slats, and into the still air beyond, which is contained by the case; when, of course, they settle to the bottom thereof, and can be removed periodically by a suitable air-tight valve, which allows this to be done without opening a passage through the case, and thus causing a current of the air contained in it. (Specification No. 4,038, February 27, 1884; printed by order of the Board of Trade, and published at the Patents Office, Sale-branch, London, E.C.)

II.

Goodfellow's is another apparatus, in use at English lead-works, and constructed as follows:—The flue-gases, &c., pass first through a screening chamber, where the coarser particles are detained, and then are forced by a fan into a hollow axle, which carries arms or beaters; at the base and in front of each beater is an opening to the interior of the axle by which the said gases escape. The axle is many feet long, and is caused to revolve rather rapidly within a closed brick chamber, at the bottom of which a few inches of water stand; and as the beaters nearly reach the walls of the chamber the result is that the air in it is thoroughly impregnated with a fine watery spray, which, moreover, is brought into intimate contact with the solid particles contained in the flue-gases. A comparatively small iron flue of no great height serves to carry off all that issues from the chamber, including some watery vapour; and I have been assured that it was found in practice that the water was thus made to wet the fume-particles and so to retain them, which, as is well known, is very difficult to do, and a source of the failure which usually attends on such inventions.

J. ASHBURTON THOMPSON.

APPENDIX L.

Interim Report upon Chemical Analyses made by Mr. W. M. Hamlet, F.I.C., F.C.S.

30 August, 1892.

During the intervals between the various sittings of the Lead Inquiry Commission all the information possible was collected with a view towards the elucidation of the chemical aspect of the question.

The kinds of ore met with in our preliminary visits underground were chiefly cerussite, or * white lead ore (lead carbonate); galena, lead sulphide; blende, zinc sulphide—all more or less rich in silver; native silver in kaolin or China clay, together with a great variety of less frequently occurring minerals of more interest to the mineralogist than to the practical smelter. These include phosphates, sulphates, arsenates, carbonates, chlorides, iodides, bromides, chloro-bromides sulphides, and selenides of lead, silver, zinc, iron, copper, manganese, mercury, and antimony.

The prevailing ores are, however, the sulphides and carbonates of lead containing silver, together with native silver disseminated through kaolin or decomposed felspar.

The carbonate of lead was found to be easily disintegrated to a fine powder, and the proprietors of some of the mines evidently were aware of the danger to life from inhaling the dusty lead ore, to counteract which the workings were kept sprinkled with water. A sweetish-astringent and somewhat metallic taste was observed as I passed through some of the workings, especially where lead carbonate ore most abounded. From such workings it transpired in evidence that most of the cases of lead poisoning originally came.

On coming into the stopes, and more particularly in those places where new bodies of ore were being opened out, the air was found to be close, warm, and stuffy. Where blasting was carried on this state of things was much more unpleasant, the air in the stopes where such shots were fired could only be described as being very oppressive and close.

The air in some of the stopes visited was tested to see what proportion of carbonic acid existed.

The following estimations of the quantity of carbonic acid present in the underground workings were made actually within the lead stopes:—

	Volumes of carbon di-oxide in ten thousand volumes.	Per cent.
Lead stopes—No. 1	6½	·065
,, No. 2	5¾	·057
,, No. 3	6	·060
,, No. 4	7	·070
,, No. 5	6½	·065
,, No. 6	6	·060
Above ground.		
At the blast furnaces, tapping floor	4 1/10	·041
On the charging floor	4	·040
In the assay office	3 8/10	·038
Fair quantity in good air	4	·040
Hurtful quantity	7–8	·07 to ·08
Noxious limit	10	·10

In consequence of the strike among the miners, many further tests, including the following important data and analyses had to be abandoned:—

(1.) Quantity of lead in the fumes arising from each nest of blast furnaces.
(2.) Quantity of lead given off in the fumes at each operation of tapping. (This was in progress on the day preceding the strike, the analysis being quite spoiled by the cessation of work.)
(3.) Quantity of lead in the dust floating in the air near where the men are at work.
(4.) The same with regard to different varieties of ore.
(5.) Quantity of lead in the expired air from miners' lungs.
(6.) Quantity of lead in excretions, sputa, &c., while miners at work.

Some flue dust obtained from one of the mines yielded upon analysis 30·74 per cent. of metallic lead, no arsenic, and 26 oz. 15 dwt. 16 grs. of silver per ton.

Samples of soil were obtained from several points from the middle line of the hill, all of which were found to contain varying quantities of lead ranging from a quarter of a per cent. to four and three-quarters per cent. of metallic lead.

Samples of Soil.	Percentage of metallic lead.
No. 1.—Soil collected from the surface of the ground in Carbon-street, 10 chains from the Proprietary Mine	0·93
No. 2.—From the surface of the earth in Slag-street, 25 chains off Block 14	2·90
No. 3.—Soil taken from the bottom of a dam or empty water-hole situate a little over ¼ mile from Block 14 at the corner of Iodide and Wolfram Streets	0·23
No. 4.—Soil scraped off the surface at the corner of Iodide and Wolfram Streets, collected at six different points, all within a radius of 30 feet	0·10
No. 5.—Sample of soil shovelled up off the surface from six different points within a radius of 30 feet at the corner of Gossan and Wolfram Streets, about ¼ mile from Block 10	0·05
No. 6.—Soil from the corner of Mica and Sulphide Streets, taken from six places within a radius of 30 feet, distant more than a ¼ mile from the Proprietary Mine	0·15
No. 7.—Sample of the surface soil taken at Crystal-street, 20 chains from Block 14	4·81
Sample of herbage (a stunted grass) taken in its natural condition from a point situate ¼ mile in a northerly direction from the British Mine	0·008

Water Supply at Broken Hill.

At the time of our visit the mains were being laid to connect Broken Hill with the new water supply from Stephen's Creek.

The actual supply, however, was from the little rain water collected from the galvanised iron roofs of the houses, supplemented by water brought by rail from other places. Nearly all the samples here enumerated were collected by me personally, and whilst going round to the different houses. It was very generally understood by the people that the first water caught from the roof was to be discarded as quite unfit for either washing or drinking purposes, such water having a hard metallic or cankered taste. The practice of most house-wives was to divert the shoot or gutter leading from the roof into tubs, and throw away the first two or even the third tubful before allowing the water to flow into the storage tanks. Many people even suspect arsenic from the lead fume, and when their tanks are empty, which is a frequent occurrence, the tanks are carefully cleaned out prior to the expected rainfall. In more than a dozen houses in Crystal-street, which is only 22 chains distant from the principal mine, I found no trace of lead in the drinking water.

Underground tanks have the disadvantage of not being cleansed very readily, and most of the waters found in such tanks were very dirty and often contained lead.

Samples

* Somewhat similar in composition to the article of commerce known as white lead, and which is recognised to be a fertile source of lead poisoning.

Samples of water examined for lead only, no opinion being given of the character of the waters from possible animal impurities.

	Metallic lead expressed in grains, per gallon
Melloship's dam, an old brick pit	0·2
Sample from a roof in Crystal-street	traces
Another sample from a roof in Crystal-street	,,
Three samples from a house in Crystal-street after rain	none
Four ,, ,, ,, while strike on	,,
Tracey's boarding-house in Crystal-street	,,
Another house in Crystal-street	,,
,, ,,	,,
,, ,,	,,
,, ,,	,,
Three samples examined at some cottages in Burke's Ward	,,
In Railway Town, an old brick pit called Craven's dam, near the Railway Depôt	traces
Kennedy's Hotel, an underground tank not cleaned out for three years	·08
Water at the Police Station	none
Town Hall	,,
Freemason's Hotel	,,
A dam near Carbon-street	·10
A brewery company's well	none
Public school, 400-gal. iron tank at the teacher's residence	·25
Public school, school tank No. 1*	none
,, ,, No. 2	,,
,, ,, No. 3	,,
,, ,, No. 4	,,
,, ,, No. 5	,,
,, ,, No. 6	,,
Quinn's well, in Oxide-street	traces
Eastman's well, Wolfram-street	·10
Dam at the Brisbane blocks	none
Imperial Dam	,,
Berg's well, Chopple-street	,,
McLoughlin's well, Chopple-street	,,

Lead in the bodies of Animals suffering from Plumbism.

A favourite dog belonging to Dr. Blaxland having died a few days before leaving Broken Hill, the viscera was removed and taken to Sydney. Upon chemical analysis lead was distinctly recognised in all the organs. The liver was found to yield one-fifth of a grain of metallic lead, besides traces of iron, manganese, and copper.

The gizzard of a fowl was found to contain no trace of lead.

A horse's stomach forwarded to Sydney by a veterinary surgeon contained no lead.

WILLIAM M. HAMLET.

FURTHER AND FINAL REPORT OF CHEMICAL ANALYSES &C., MADE BY MR. W. M. HAMLET, F.I.C., F.C.S.

THE scientific aspect of the question of lead-poisoning on the Barrier Ranges silver-field, although beset with some difficulties, is simple in character, and resolves itself into a chemical and metallurgical inquiry touching the following points, namely :—

(I) The variety and nature of the ores worked.
(II) Methods of mining and smelting.
(III) The environment of the men whilst engaged at their work.
(IV) The disposal, both of economical and of waste products.
(V) Meteorological conditions.

The Barrier District yields the most wonderful variety of mineral wealth. Excluding the country district, and confining one's attention to the Broken Hill lode alone, the minerals hitherto discovered may be classed into five distinct groups :—

1. Iron-ores and maganiferous iron-ores.
2. Native silver and silver-ores associated with kaolin and silica.
3. Lead-ores and argentiferous lead-ores, including blende.
4. Native copper, with copper and zinc ores.
5. Other minerals occurring in small quantities, and which may be termed the rare ores of the lode.

The first group, forming the cap of the lode, is rapidly being used up as a flux. The entire top of the hill, known as Broken Hill, is now being quarried away, and to such an extent as to lay bare the old workings of the mine, the timbers from which are being used over again.

The second group includes free metallic silver (the so-called "slugs") and silver in plates, lamina and wire, embedded in pure white kaolin ; horn silver, or kerargyrite, occurring in dense masses of silver chloride, which change by the action of light from the original green colour to a dark gray, and which is composed of nearly theoretically pure silver chloride ; embolite (silver chloro-bromide), containing 60 to 70 per cent. silver ; silver bromide, or bromargyrite ; silver iodide, or iodargyrite, both found in kaolin, silicious iron manganese ores, and in garnet sandstone.

The foregoing are technically called "dry ores," not from their freedom from water or moisture, but because they require the addition of lead or lead-ores to render them easily fusible in smelting. They may again be classed as non-poisonous ores, for in practice they are not found to exert any noxious effect on the miners who hew them.

The lead-ores are, *par excellence*, the poisonous ores, and consist of carbonate, sulphide, arseniate, sulphate, phosphate, and oxy-chloride of lead. The most commonly-occurring ore is cerussite, white lead ore, or carbonate of lead, and which differs only in composition from the very well-known poisonous pigment white-lead, in the fact that the latter is merely hydrated lead carbonate, or a mixture of hydrate and carbonate, whereas cerussite is simple crystallised lead carbonate. Associated with this compound is found silver in varying proportions ; indeed, the argentiferous cerussite occurs in vast bodies of ore, and is generally known as "carbonate ore," although it may contain a number of other metals and silicious gangue. Besides the carbonate ore, there is found native copper, with oxide, iodide, carbonate, and silicate ; zinc sulphide, carbonate and silicate, together with mercury, manganese, antimony, arsenic, sulphur, selenium, gallium, and indium, which form a group of rarer metals present in varying quantities along the lode.

For the purpose of this inquiry, the chief feature of the carbonate ore is that it is very friable—easily broken down into a very fine powder, which lodges on the walls and floor, and in every cranny of the underground workings, easily blown about in the form of an impalpable dust. This dust being highly poisonous, it follows that where there is much dust, no sprinkling, and imperfect or no ventilation, there will be the most favourable conditions for lead-poisoning.

Ordinary mining-shafts are sunk into the hill at various points on the different mining properties, at depths from 100 to 700 feet. Branching off at right angles are the many "drives" and "cross-cuts" leading to the large masses or "bodies" of ore ; the horizontal gallery or opening cut into a body of ore is known as a "stope," and is the locality where the miners are to be found hewing and raising ore. The solid front or mineral mass is technically known as the "face," against which the miner is discovered at work with picks, shovels, and drills. After large masses of ore have been removed

* All the tanks used by the children had been empty and cleansed out before the rain came in May-June, 1892.

removed by blasting with dynamite, heavy logs of timber are placed into position, forming square chambers, each called a "set." The gases given off by the gunpowder or dynamite compel the men to retire until sufficient fresh air has entered the working-place or stope. Besides this, there are found sometimes natural cavities termed by the miners "vuggs" or "vughs." When these are opened, considerable volumes of carbon-dioxide are liberated, which are sufficient at times to extinguish the candles. Frequently the men have to retire until the air is good enough to resume work.

In visiting the stopes I found that the lead-dust from the ore, the choke damp or carbon-dioxide from the enclosed cavities, together with the expired air from the men's lungs and the gases from the explosives used, all combine to render the air intolerably hot and impure. Happily, in some instances the mine managers recognise the danger to which the men are thus exposed, and forced ventilation is made use of by means of fans worked by compressed air; water is laid on and sprinkled over the "face" to lay the dust, while air-passes are provided to bring fresh air from some neighbouring air-shaft.

For the percentage of carbon dioxide in stopes see particulars given in my interim report.

Temperature in the stopes would be, moreover, a simple and reliable guide as to the extent of the impure air and need for ventilation.

Smelting.

The extraction of the silver and lead is effected in water-jacketed blast-furnaces, rectangular in shape, and constructed to hold charges of upwards of 80 tons each. The charge is wheeled from the ore-bins and shovelled into the furnace-mouth from an upper floor called the charge-floor. It consists of silver-lead ore, manganiferous iron-ore, coke, and limestone, together with as much slag, flue-dust, and skimmings as is deemed necessary, the proportion being controlled by the skilled metallurgists, regulated by frequent assay and analysis of the materials.

The reduced metal is allowed to run through a syphon into the lead-well, which is situated at the base of the furnace, on the tapping-floor. From time to time at frequent intervals the liquid slag is drawn off from the surface of the molten metal, and received every few minutes into cast-iron pots on wheels and wheeled off to the edge of the "dump" or slag-heap, where the slag is allowed to run down over the steep edge of the dump, and forms a conspicuous and characteristic sight after dark.

A powerful blast is urged through each set, or nest of furnaces, and the products of combustion, particles of unconsumed coke, ore, flux, smoke and lead fumes, pass away up through the smelter-stacks out into the atmosphere.

The highest of these chimneys discharges its smoke at a height of not less than 300 feet above the level of the streets, and the immense volume of smoke is the constant and most characteristic feature in the landscape at Broken Hill. The smoke is easily discernible for fully 15 miles around.

The men employed on the mines are subject to the fumes arising from the oxidation of molten lead and flue-dust if working on the surface; while those who work as miners underground are in constant danger of inhaling lead-dust, more particularly so in the lead-stopes, or where carbonate ore is being mixed.

These lead-stopes are usually spaces or chambers cut in the earth, measuring 6 feet in height, and varying from 10 to 50 feet in width, according to the quantity of payable ore met with.

The fine dust settles everywhere on timbers, tools, ore-waggons, and upon the men's bodies and billycans, and upon the parcel of food in the men's coat-pockets awaiting "crib-time." Some of the dust obtained from one of the lead-stopes was analysed and found to contain 8 and 15 per cent. of lead respectively, while some sputum obtained from miners, contained 2·0, 1·6, and 1·8 grains of lead respectively. Many men strip to the waist while working, but the majority worked with singlet and trousers on.

Some of the air in the stopes was found to contain ·58, ·40, and ·51 grains of lead per cubic foot in suspension as dust or solid particles. In places where no work was going on only the merest trace of lead was found. It is easy to see that under the usual conditions of warmth, moisture, and carbon-dioxide, the lead-dust could easily be absorbed into the men's bodies; and especially by rubbing up their tobacco in dusty hands, and by allowing their food and drink to become contaminated by the poisonous dust.

The disposal of the economical as well as of the waste products, in other words, what becomes of the minerals is a wide and important matter, whether approached from the commercial or the sanitary aspect of the question.

The disposal of the lead, argentiferous copper matte, antimonial lead, Doré silver, fine silver, and the silver bullion generally calls for no special remarks, since these products are shipped to London or the continent of Europe.

From some of the mines ores are regularly sent away to the seaboard, where they are smelted, and the products find their way into European markets. The disposal of the waste products, however, is of far greater importance from the sanitary point of view, and these, moreover, are not so satisfactorily disposed of. The slag, copper matte, and lead bullion are run out of the furnaces in the molten condition in contact with air. Chemical union of the lead and the oxygen of the air produces lead oxides, and, in the presence of sulphur, chlorine, iodine, and bromide, sulphates form haloid compound of lead. The familiar example of the metal magnesium and its oxide, formed by burning the metal in air is an analogous phenomenon; a fume containing magnesium oxide is produced.

The lead fume may be always seen whenever a furnace is tapped either for metal or for slag, or whenever the hot lead bullion is skimmed in the lead-well, or whenever an escape occurs from the throat of the furnace, or whenever a furnace is shut down for repairs. At all times, whenever a slag-pot is emptied over the dump, lead fume is produced. But the quantities of volatile lead escaping from the tapping and feeding floors, or from the slag, is very insignificant compared with the immense volumes of lead fumes that are allowed to pass out into the atmosphere through the smoke-stacks. The evident intentions of the mine managers was to construct tall chimneys so as to convey the fumes away from the town, and to prevent lead-poisoning in the town. One notable example is that of one of the stacks delivering its fumes 300 feet above the town-level. In this, and in all other instances, mere height is inadequate to cope with the evil.

A parallel case is that of the alkali manufacture in Great Britain, where tall chimneys were built with a view of carrying off the fumes of muriatic acid. The nuisance was not abated; the fumes were merely deposited further away. A law was passed compelling the manufacturers to condense. The result was that both the interests of the manufacturers as well as that of the people was well served, since the former condensed and saved a valuable commodity. At Broken Hill the fumes consist of volatile lead bullion, which at present is lost along with the smoke.

Two methods were adopted to arrive at an estimate of the lead passing away into the atmosphere, and thus polluting the air of the town.

The fume passing up the stack was drawn through pure dilute nitric acid into an aspirator of 1 cubic foot capacity. Another method was to expose plates covered with glycerine to the air at various distances from the smelter. It was thus proved beyond all doubt that lead, silver, and arsenic were being discharged over the town, the former in quantity. Samples of the air were tested from a point distant 22 chains from Block 14, and somewhat more than one twentieth of a grain of lead (·052) was obtained from 1 cubic foot, equivalent to 52 grains per 1,000 cubic feet of air.

Glycerine-coated plates exposed on the verandah of the "Freemason's Hotel," in Argent-street, for eight hours, were found to collect 3⅛ grains of lead and traces of arsenic per square foot of surface.

On 31st January the smoke from the British and Block 14 was blown downwards, immediately over the town, and was found to pollute the atmosphere very considerably. As much as 165 grains of lead was estimated per 1,000 cubic feet.

The quantity of lead-fumes noticed on the tapping-floor of the Proprietary Mine was very slight; never in any case exceeding 28 grains per 1,000 cubic feet, while in no instance was any observed on the feed-floors at the same mine. On the feed-floors of both Block 14 and the British, frequent gusts of lead-fumes issued from the throats of the furnaces and from the cracks in the charging-floors.

The lead-smoke was very offensive on very many occasions, and the existing arrangements are quite inadequate to suppress the nuisance. The prevailing winds, coming from the south and south-west, blow the fumes directly over the town, which is, unfortunately, so situated as to be constantly enveloped in the smoke. Lead-fume is the volatile metallic vapour arising both from the contact of atmospheric air with the molten metal, as well as from the metal itself, at the high temperature of the hot zones of the blast-furnaces, which has been estimated to be as high as 1,200° C*.

A very considerable quantity of the lead-fume is condensed in the flues and chimneys, and settles down along with minute particles of matter driven out by the blast, which is known as flue-dust. This is collected and returned again to the smelters, but in spite of which large quantities escape and fall to the ground, or on to the roofs of the houses, eventually contaminating the soil, and the water collected in the rain-water tanks.

Flue-dust consists of small particles of coke, argentiferous lead and iron ores, quartz, and limestone, together with partially-reduced globules of metal, oxide, and sulphate of lead, and traces of arsenic. No

* Melting point of lead, 330° C; of silver, 1,000° C.

No exact determination of the amount of lead escaping into the atmosphere as lead-fume and flue-dust could be arrived at, since it was only possible to ascertain the lead per cubic foot at the base of the stacks. This would obviously be greater than the actual escape at the top of the stack, since condensation is being effected all the way up the chimney.

The means adopted was to insert a long tube with a bulb-tube at the end of it into the centre of the chimney through the port at the base of the stack, whereby the lead-fume is collected, afterwards dissolved in pure nitric acid, and the amount estimated; the lead being then found according to the equation :—

$$L = Q\ D^2\ 0{\cdot}7854\ V.$$

Where L = lead in grains per cubic foot per second.
,, Q = grains of lead found in tube.
,, D = diameter of the stack.
,, V = velocity of the lead-smoke per second.

One of Guyard's conclusions* regarding smelting operations at Leadville is "that the quantity of lead completely lost in the atmosphere is sensibly twice as large as the quantity of lead caught in the dust-chambers generally used."

Seeing the large quantities of flue-dust raked out of the dust-chambers of the Broken Hill furnaces from time to time, it became necessary to estimate the amount of lead passing out of the smelter-stacks. An air-meter was used in ascertaining the velocity of the flue-gases, and the following values were obtained :—

12·5	feet per second.	
12·5	,, ,,	
14·8	,, ,,	
15·0	,, ,,	
22·0	,, ,,	During a very high wind.
24·0	,, ,,	During a very high wind.
6) 100·8		
16·8		

Excluding the two extremes, taken during an exceptionally high wind, we have a mean of 13·7. The average of the two means gives :—

13·7	
16·8	
2) 30·5	
15·2	

Or an average velocity of 15 feet per second, which very nearly agrees with results obtained by previous observers.

The diameters of the north and south smelter-stacks were 8 and 7 feet respectively, inside measurements.

The quantity of lead found on aspirating the flue-gases through asbestos and cotton wool, and dissolving in pure nitric acid, was as follows :—

Grains of lead per cubic foot in the lead-fume—

North smelter		3·5
Do		2·0
Do		3·5
South smelter		3·2
Do		1·0
Do		3·0
	Mean = 2·7	16·2

These observations were made at the base of the smelter stacks on the Proprietary Mine, and may be reasonably assumed to be twice as much as would reach the top, since it was found that lead compounds were being continually condensed, falling down the stack in a fine powder. I consider that one grain per cubic foot would be a fair average, as the quantity varies with the degree of draught in the flues, and with the kind of ores used. The finer the ore the more difficult would be the blast in passing up through the furnaces.

Taking the velocity at 15; the amount of lead escaping at the top of the chimney as 1 grain in a cubic foot, then the amount of lead from the two sets of smelters on the Proprietary Mine would be as follows :—

South Smelters.		*North Smelters.*	
Log 0·7854	1·89509	Log 0·7854	1·89509
,, D. = 7 x 7	1·69020	,, D = 8 x 8	1·80618
,, V. = 15	1·17609	,, V = 15	1·17609
,, 60 x 60	3·55630	,, 60 x 60	3·55630
,, 24	1·38021	,, 24	1·38021
,, 7	0·84510	,, 7	0·84510
	8·54299		8·65897
,, grains per ton	7·19535	,, grains per ton	7·19535
,, tons per week	1·34764 = 22	,, tons per week	1·46362 = 29

Accordingly, the total lead in the fumes from the two nests of blast furnaces on the Proprietary Mine is :—

North smelters	29 tons per week.
South ,,	22 ,,
Total	51 ,,

The quantity of flue-dust collected weekly (average for the half year ending 2nd June, 1892), amounted to 93½ tons; assuming as a fair average that the flue-dust contains 30 per cent. of lead, then the quantity of lead collected per week in flue-dust = 28 tons, so that Guyard's conclusion for lead-smelting with open chimneys is nearly realised in practice, especially as I am of opinion that the results here given are more probably underestimated rather than exaggerated. The lead in the flue-dust collected amounts to an average of 28 tons weekly, and the lead found in the smoke at the lowest estimate is 51 tons per week.

In addition, there is the lead fume from the smelter floors each time the furnaces are tapped, and at every discharge of the slag-pots, besides that coming from the lead-wells.

These fumes escape into the air, and are diffused over the town—falling upon the roofs of houses, and finding their way into water-tanks and, above all, covering the ground, and any scanty herbage that may be found. This is amply confirmed by many analyses of the soil taken from different parts of the town, all of which contained lead from traces up to as high as 4·8 per cent. in the surface soil from Crystal-street in a line with Block Fourteen.

Total quantity of lead in the fumes passing over the township :—

Name of Mine.	No. of Blast Furnaces.	Tons of lead escaping per week.
British	2	8
Block Fourteen	4	28
Proprietary	15	51
Central	5	15
South	2	7
From slag-pots and tapping floors	28	1
	Total	110 tons.

* "Mining Industry of Leadville, Colorado, U.S., A." (section 12).

A sample of water furnished by Dr. Emilius Thompson contained as much as 5½ grains of lead per gallon.

The question raised by one member of the Board that the lead may have been originally present in the soil before the mines were worked, caused me to have a hole dug some 5 feet into the soil inside a dam at the corner of Wolfram and Iodide Streets, and ·23 per cent. of lead was found. But as this may have been brought there by water, another hole was dug in the ground off Chloride-street, with the result that no lead was found. Having heard that an ironstone lode occurred at Corona, having a remarkable resemblance to the Broken Hill lode, I visited the spot, situated about 60 miles from Broken Hill. Four samples of the soil were analysed, but no lead was found in them, while there was lead in some of the minerals found in the neighbourhood.

Soils and waters from three dams were examined from points situated about 2 miles south of Broken Hill, and no lead was discovered, from which it follows that the lead is present in the soil, having been deposited by the lead fume from the mine stacks. Soil, water, vegetation, all prove the presence of lead. This being so, there can be no difficulty in accounting for the inevitable attacks of "leading" in dogs, and animals that take their food from off the ground.

Meteorological conditions.

For a general description of the conditions of life at Broken Hill see Appendix B, page 101.

Mr. Whysall's observations*:—Rainfall, about 8 inches annually, and droughts frequent; winds, S. and S.W.

During the summer months the heat is very trying, the temperature found in my bed-room on three days in the week ending 4th February, 1893, was observed to be as follows:—

6 a.m.	82 deg. Fah.	3 p.m.	103 deg. Fah.
8 ,,	85 ,,	6·15 p.m.	100 ,,
10 ,,	88 ,,	8 p.m.	95 ,,
Noon	90 ,,	10 ,,	90 ,,
2 p.m.	100 ,,	11 ,,	90 ,,
2·15 p.m.	101 ,,		

Some of the medical men find they cannot use the clinical thermometer in the hot weather.

In times of drought, when water is scarce, people wash themselves but seldom, and cases have come under my notice where many months passed, during which time some men have not washed more than their hands and faces.

The fine dry red dust must also be mentioned, which penetrates the houses and clothes of the people. The dust is blown about in whirlwinds, and it is no uncommon sight to see these dust-cyclones approaching the town while yet miles distant.

WILLIAM M. HAMLET, F.I.C., F.C.S.,
Government Analyst.

APPENDIX M.

Inspection of Surface Workings, British Blocks, 23rd January, 1893.

The Board visited the feed floor and saw the throats of two smelters; there was a slight escape of lead fumes at both, but rather more escaping from one of the throats than from the other. A considerable amount of dust caused from the fall of slack from the hoist. The flue dust mixed for the charge well moistened. Visited the smelting floor; saw two furnaces in operation; noticed that no provision was made for the ventilation of the back of the room. Saw a considerable amount of flue dust stacked; very imperfectly wetted. Flue doors open into smelting-shed. Not room enough on the smelter floor, between the flue and the back of the smelters. The flue dust at the back of one of the smelters was perfectly dry. Noticed heaps consisting of ore flux and flue dust all mixed up together. Doors into the flue placed rather high.

Upon questioning one of the workmen on the smelter floor, the Chairman elicited the following information from him:—"They obtain their drinking water from the condenser; sometimes it is very good, at other times it has an oily disagreeable taste, but nothing to complain of. They are not always served with condensed water, but sometimes with dam water, which is always very good."

There were two water-bags in the smelter-shed; they had rough canvas covers, which were insufficient. The dippers were hung up on the bag and not covered. Discovered a large heap of flue dust at the base of the stack about seventy loads; this dust was dry.

Inspection of Surface Working, Block 14.

The smelter-shed contains three smelters, the shed facing easterly; the angle between feed floor and flue closed; the flue doors as usual opening on to smelter floor.

The Chairman observed a good deal of dust raised in carefully handling the flue dust so as to wet it.

There was no great accumulation of flue dust. The water-bags were open and the dippers lay about on the bullion, or were hooked on copper wire attached to the bags. The water supplied to the bags came from the condensers, and it was said to be not always cold. Stevens Creek water is already laid to the British and to the South Mine, and there is no difficulty now about laying it to all the mines on the line.*

The Board visited the latrine on the edge of the slag dump. It contained three stalls, and was practically a cesspit. A large accumulation of matter in it, and very offensive smell. Arrangements not proper, and should be altered.

The length of the flue from the first furnace to the base of the stack is 125 feet, the height of the stack is about 130 feet, and the total height from the last smelter about 185 feet.

The feed floor was a little more open than others; there was an opening at the ridge, partly closed up by sacks, which was said to be on account of the sun streaming in. The water bags on feed floor were also open. Saw a slight escape on feed floor from the throats of the furnaces. Hose suitably fixed to sprinkle down the contents of the bins.

Inspection of Surface Workings of the Central Mine.

Feed Floor.—The mine is closed down at the present time. The smelting-shed is built against the side of a hill, as usual. It contains three 80-ton furnaces, one 100-ton furnace, and one matte furnace. The bins have a tramway running over them. The shed is open at the ridge, the opening covered to keep out the wet. The floor is rough, not doubled, and open at the joints. All the water-bags on this floor are enclosed, with canvas spouts at the bottom.

Tapping Floor opens south-easterly. The roof is closed at the back over the flue. The flue doors are placed, as usual, opening into the smelting-shed. Water-bags on tapping floor the same as on feed floor. The smelting-shed about 200 feet in length; the stack about 100 feet in height. No accumulated flue dust on the tapping floor. The changing-room is between the store and the engine boiler-house, near the main shaft; partly iron and partly brick, with engine-house forming one of the sides. Form running round three sides. Of the floor, one half is planked and the other half natural surface. Battens along the wall, with nails in them to hang clothes upon. Dimensions of changing-room, 23 feet x 16 feet.

Notes in Changing-room at the South Mine.

The changing-house is 22 feet by 12 feet, rubble; roof, iron; boarded floor; form all round. Batten round the walls, with nails to hang clothes upon. The washing-trough, which had been nailed down during the strike, has not been put in order again by the men since returning to work. But on one form a kerosene tin, with water in it, and soap beside it, also two towels upon pegs, and a certain number of clothes hanging up. This changing-room is in use. Two, or perhaps three, suits hung at one end, and appeared to have been changed the same day.

APPENDIX N.

* *Vide* page 113.

APPENDIX N.

7, Coffee Palace Buildings, Broken Hill, New South Wales, 23rd September, 1892.

Dear Dr. Thompson,

Enclosed is my corrected evidence. I should be glad to have the accompanying additional evidence or recommendations inserted, if possible, as I feel certain of the necessity of making *compulsory* arrangements for the medical attendance or superintendence of the miners, as the majority neglect measures of precaution, and are too frequently almost destitute when lead-poisoning overtakes them.

Resumé of preventive measures suggested.

1. That dressing-rooms and lavatories be provided for underground workers.
2. That warm baths with sulphurated potash be provided for the men by the companies.
3. That men be forbidden to eat their meals underground or in places where there is much lead dust.
4. That means be provided for laying the dust in rich lead mines.
5. That in underground workings, where there is much dust, an interval of time sufficient to admit of its being laid be allowed between two shifts.
6. That fines be inflicted for inattention or neglect of precautionary measures officially enjoined, the monetary outcome to accrue to a Sick Fund or the local hospital.
7. That wherever practicable, a change of occupation or residence be facilitated in cases of poisoning.
8. That a pamphlet containing the rules for the prevention, &c., of the complaint be given to every new hand.
9. That in silver-lead mines a moderate but sufficient sum be deducted from wages, such as 6d. a week in the cases in unmarried workers and 1s. in those married, the whole, minus 1d., to accrue to the medical residents of the township of proportion to the number of patients attended by each; every patient being at liberty to select his own doctor and to change him at pleasure at the end of any quarter.
10. That in silver-lead mines or districts there be compulsorily deducted 1d. per week from each Medical Fund payment for hospital purposes; every accumulated pound of such payments to secure the usual rights of hospital treatment and residence and votes at elections of medical and other officers.
11. That in the case of silver-lead mines, a copy of the measures adopted for the prevention of lead-poisoning and the arrangements in connection with provision for medical attendance and hospital treatment, whether at the cost of the companies or of the men, accompany each application to the Mines Department for renewals of licenses.

Faithfully yours,

Chairman, Lead Board. T. R. BELGRAVE, M.D.

APPENDIX O.

CORRESPONDENCE concerning obstruction offered by the Managers of Block 14 and of the British Mine to the Board's visits of inspection.

I.

Sir, Broken Hill, 23 January, 1893.

I have the honor to make report as follows, and to request advice how to proceed in this matter. It is necessary to premise that this inquiry mainly touches the Proprietary, Block 14, and British Mines (though not exclusively), and that the evidence thus far taken shows that the two latter are probably the places where most cases of poisoning occur, and that Block 14 supplies more of such cases in proportion to the workmen employed than any other.

Extract from proceedings of Board, first visit, page 4 of Report:—"At 2 o'clock on the 21st June, 1892, the Board (after having requested permission in writing) paid a visit to Block 14 Silver-mining Company's Mine. The Manager (Mr. Z. Lane) was not in his office, and the Chairman of the Board was informed by the officer in charge (Mr. Rodda) that Mr. Lane had gone rifle shooting, and had left instructions that no one was to be allowed to go down the mine in his absence."

Subsequently the following letters were addressed to the Manager of Block 14. He had not then categorically refused to allow inspection of the mine, nor to give evidence:—

"Dear Sir, Office of the Lead Poisoning Board, Council Chambers, Broken Hill, 27 June, 1892.

"I am instructed by the Chairman of the Lead Poisoning Board to request you to be good enough to attend at the Town Hall, on Wednesday, 29th instant, at 2 o'clock p.m., for the purpose of giving evidence before the Board on the subject of lead poisoning in the mines of the Barrier Ranges District. I am also to ask that you will bring with you the statement showing the number of men employed in the various departments of your mine, which in a former letter I asked you to be good enough to supply for the information of the Board.

"I have, &c.,
"A. VIALOUX,
"Secretary."

"Dear Sir, Office of the Lead Poisoning Board, 30 June, 1892.

"I am instructed to request that you will be good enough to be present at a meeting of the Lead Poisoning Board, to be held on Monday, the 4th proximo, at 11 o'clock a.m., to give evidence on the subject of lead poisoning in the mines of the Barrier Ranges District.

"I have, &c.,
"A. VIALOUX,
"Secretary."

"Z. Lane, Esq., Manager, Block 14 Mine, Broken Hill.

In answer to the first of these letters, Mr. Lane replied that he would be "engaged in Court all day"; to the second no answer was received; and he did not give evidence as requested.

In view of these occurrences, before leaving Sydney on the second visit, I asked that I might be furnished with formal authority for every member of this Board to visit all mines in the Albert Mining District, and on the 19th January I received authorities accordingly.

In the meantime, having no reason to expect any other opposition, I had, on the 14th January, caused the following letter to be addressed to the Manager of the British Mine:—

"Sir, Lead Poisoning Inquiry Board, Broken Hill, 14 January, 1893.

"I am directed by the Chairman of the Lead Board, to inform you that the Board with the exception of Mr. Howell, intend paying the British Mine a visit on Monday next, at 10 a.m., when they will make an inspection in connection with the above inquiry.

I have, &c.,
"W. J. LITTLE,
"Secretary."

"Cecil Morgan, Esq., Manager, British Broken Hill Mine.

And the following answer was received to it on the same date:—

"Sir, The British Broken Hill Proprietary Co. (Limited), Broken Hill, 14 January, 1893.

"You will be good enough to inform Mr. Chairman that, with the exception of a Mr. J. Thomas, a man recently removed from the Bench by the Government, and who is, I understand, a member of your Board, I shall be glad to welcome the other members.

"I wish to state absolutely that Mr. J. Thomas *shall not* go down the British Mine under any consideration whatever.

"I have, &c.,
"CECIL C. MORGAN,
"General Manager."

"W. J. Little, Secretary, Lead Board.

In

In consequence, on the 20th January, I directed the following letter to be sent to the Managers of Block 14 and of the British :—

"Lead Poisoning Inquiry Board, Broken Hill, 20 January, 1893.

"Sir,

"I am directed to inform you that the members of the Board of Inquiry into lead poisoning at Broken Hill, will visit your mine on Monday morning, the 23rd instant, at or about 11 o'clock, to visit such parts of the mine as they or any of them may wish to see.

"I am to add for your information that they are duly authorised in this behalf by the Honourable the Minister for Mines, under clause 9 of schedule 10 of the Mineral Leases Regulations, made under the Mining Act of 1874.

"I am, &c.,

"W. J. LITTLE,

"Secretary."

"Cecil Morgan, Esq., Manager the British, Broken Hill.

[Also sent to Z. Lane, Esq., Manager, Block 14].

On the 23rd the following reply was received from the Manager of the British Mine :—

"The British Broken Hill Proprietary Co. (Ld.), Broken Hill, 21 January, 1893.

Sir,

"I have to inform you again that if the members of your Commission include Mr. Josiah Thomas I shall not allow them to go underground in the British Mine.

"I wish you to take this for a final answer, and another thing you may as well understand, that the other members shall only go down my mine when it suits my convenience, and the request must be made in a very different tone than of your two last letters.

"I am, &c.,

"CECIL C. MORGAN,

"General Manager."

"W. J. Little, Esq., Secretary Lead Poisoning Inquiry Board, Broken Hill.

On the same day the Board proceeded, as appointed, to Block 14, and found the Manager in his office. I formally announced the object of the visit, and mentioned the authority under which the Board was acting. The following shorthand note shows what happened thereafter :—

"The Board at 11 o'clock proceeded to Block 14, and interviewed the manager, Mr. Lane. He refused to allow Mr. Thomas to enter his mine, but was quite willing to allow the remainder of the Board to make an inspection ; thereupon, the Chairman produced the authority issued to Mr. Josiah Thomas, and Mr. Lane read it through. He, however, still refused, stating that he would have to place himself in communication with the Directors, also with the Minister for Mines and the Colonial Secretary. He would have to receive the consent of the Directors before he could allow Mr. Thomas down his mine, and he would communicate with the Minister, as he had evidently only heard one side of the case, and he would lay the other side before the Minister. He would tell him that Mr. Thomas did not want to go down his mine for any good purpose, as, already, he had made most damaging statements with regard to the mine."

The Board then retired.

The following is a transcription of the shorthand notes of the visit paid by the Board to the British Mine, immediately after having left the Manager's office at Block 14 :—

"The Board proceeded to the British Mine, and inquired for the Manager in his office, but he was absent. A clerk was desired to tell him that the Board were on the mine, whither they then went."

"The Chairman required the braceman (Mr. Hallett) at the main shaft to send them down the mine, but he stated that he had been freshly instructed not 10 minutes before the Board's arrival (but in the usual terms, and without verbal reference to them) not to allow any person to descend the mine without a written order from the Manager."

"The authority issued to the members by the Minister was shown to Hallett, but he still declined to allow the Board to descend the mine.

"At the same time the Board saw the Under-ground Manager (Mr. Retallick), who also refused to allow the Board to descend without written order from the Manager. The Chairman produced the authorities to the Underground Manager and explained what they were."

I take leave to repeat that apart from every other consideration it is essential to this inquiry that the Board should have opportunity of further inspecting the British Mine, and of inspecting Block 14 which they have not yet seen at all.

I have, &c.,

To the Under Secretary for Mines and Agriculture, Sydney. J. ASHBURTON THOMPSON,
Chairman.

II.

Lead Poisoning Inquiry Board, Broken Hill, 31 January, 1893.

Sir,

I have the honor to communicate the following in continuation of my letter of the 23rd instant on the same subject.

On the 26th January the following letter was received from Colonel Morgan :—

Broken Hill, 26 January, 1893.

"Dear Sir,

"My directors have granted permission to your Commission visiting the British Mine in a body, but will not allow members going singly to inspect or collect evidence.

"I can only assure you again that any information I can give Mr. Hamlet or yourself I will give with the greatest possible pleasure.

"Your Commission has, therefore, permission to visit the British Mine as a body at any time convenient to it.

"Yours, &c.,

"CECIL C. MORGAN,

"General Manager, the British Mine."

"The Chairman, Lead Commission, Broken Hill.

On the 27th instant, I received the following telegraphic message from you :—

"Colonel Morgan, General Manager, the British Blocks, has wired to the effect that Chairman and members of Lead Poisoning Board occupied the time of mine manager, foreman, and himself a whole morning underground already, and that the whole mine workings are delayed by these visits, and also that orders have been given to let the Commission down as a body, on presentation of authority. I am to request you to see that the work is not unnecessarily delayed.

"HARRIE WOOD,

"Under Secretary for Mines."

27th January, 1893.

I pointed out to you in reply, that the allegation that the whole work of the mine was interrupted by such visits of the Board was absurd *à priori*, and as regarded the particular visit referred to was without foundation in fact.

On the same date the following letter was received from Mr. Lane, Manager of Block 14 :—

Broken Hill, 27 January, 1893.

"Dear Sir,

"Having fully explained the position to the Minister, and with his sanction and approval, I now withdraw my opposition offered to Mr. J. Thomas going down the mine, but must state for your information that I am to be held blameless in case of any accident, owing to the exceptional circumstances and to the strong and bitter feeling existing amongst a section of the men against Mr. Josiah Thomas.

"I am, &c.,

"Z. LANE,

"Manager, Block 14 Mine."

"To the Chairman, Lead Board.

I should be glad to be informed in what way Mr. Lane has, as he says, "explained the position," and whether the information with which his letter concludes has in reality the "sanction and approval" of the Minister. In the meantime I venture to point out that on receiving this communication it was thought by other members of the Board and by myself to convey a covert threat of personal violence ; but, as the sequel shows, we were mistaken, and in all probability it merely meant that while ostensibly withdrawing his opposition to Mr. Thomas' descent he was privately prepared to continue it by collusion with his own servants.

I thought it well, for reasons into which I need not enter, to accept this letter at its face value, but also by way of precaution, to request the Inspector of Mines to accompany us. Accordingly we went this morning to the office on the mine ; we did not find the manager there ; we saw a gentleman who I believe was the accountant, and I asked him whether on going below, I should find a guide who would conduct us over the workings. He replied that he knew nothing

whatever

whatever about it. We then went over the surface workings, and at last approached the main shaft. I desired the braceman to send us down, and explained who we were, and that Mr. Lane had informed us that he no longer opposed our descent. The braceman replied that he had had no instructions at all, and that he could not send us down without a written order; and this statement appeared to us to be made in the ordinary course of business.

While we were talking with the braceman, however, the driver of the winding engine went out of his way to call him to the window of the engine-house, and when he returned he told us that the engine-driver had said that "*unless* Thomas had *permission in writing* from the *manager* he was not going to send him down the shaft," and he also called out to the men to run their trucks into the cage and to get on with their work.

After consultation with other members of the Board I decided that we had again been illegally obstructed in our endeavour to act on the authority vested in us, and, consequently, we withdrew.

I venture to repeat my opinion that Mr. Lane's opposition is in reality to the Board and not only to Mr. Thomas; that he stands entirely alone among managers in that opposition—Colonel Morgan's action probably not having originated with himself; that the course taken by him is subject of ridicule among the other managers; and that there is not, either among the men employed on Block 14 or elsewhere the kind of opposition to Mr. Thomas which Mr. Lane hints at, nor, as far as I can ascertain, any opposition at all.

I have, &c.,
J. ASHBURTON THOMPSON,
Chairman.

The Under Secretary for Mines and Agriculture.

III.

Sir, Lead Poisoning Inquiry Board, Broken Hill, 7 February, 1893.

In continuation of my letter of the 31st January, I have the honour to write as follows:—On the 2nd instant I received the following telegram from you:—

"Mr. Lane wires that he does not concur in action of men; on the contrary that he notified the Board that all opposition has been withdrawn, but that on Tuesday, when the Board visited the mine in Lane's absence, he not having been notified, after being shown over the surface you demanded to go below, but the engine-driver refused to lower Mr. Thomas down, and he cannot discharge driver and have a strike; he is powerless as regards engine-drivers, but Board can, if they choose, enter mine, and see every part by means of tunnels and ladders, independent of drivers.

"HARRIE WOOD,
"Under Secretary for Mines, 2/2/93."

And on the same date I made the following reply:—

"Mr. Lane's telegram, transmitted by you is a misrepresentation from beginning to end; do not be deceived. I have not the slightest hesitation in speaking thus bluntly. Wait receipt of my letter to-morrow. Do you know whether Lane's directors have any idea of what is going on?

"J. ASHBURTON THOMPSON,
"Chairman, Lead Board, 2/2/93."

On the 4th instant I received the following telegram from you:—

"The following wire was sent to Mr. Lane and directors, Block 14 Company:—'Absolutely necessary that all obstruction to the Lead Poisoning Board visiting your mine in terms of authority, should be at once withdrawn, or unpleasant consequences may result. Kindly arrange with Chairman at once.'

"HARRIE WOOD,
"Under Secretary for Mines, 4/2/93."

On Monday, the 6th instant, I had the following letter from Mr. Lane:—

"To Dr. A. Thompson, Chairman, Lead Board,—

"Dear Sir, "Block 14 Mine, Broken Hill, 4 February, 1893.

"I am again writing you to say that I have no desire to prevent the Board from inspecting the mine, and would like to see you personally on the subject, if possible, for it must be plain to you that such public utterances as Mr. Thomas saw fit to make on Thursday night, are not only cowardly, but still further complicate matters.

"Awaiting the favour of your reply, if you can make an appointment, either at your hotel or elsewhere.

"I am, &c.,
"Z. LANE."

The public utterances of Mr. Thomas referred to in the above letter are contained in the following sentence from a speech in favour of a candidate for election to the Town Council:—

"It was not every man who was in the happy position of the engine-drivers at Block 14, of being able to dictate to the manager."—*Barrier Miner*, 3 February, 1893.

No others have been published or made.

To this letter I caused the following reply to be sent:—

"Sir, "Lead Poisoning Inquiry Board, Broken Hill, Town Hall, 6 February, 1893.

"I am directed to acknowledge receipt this morning of your letter dated the 4th instant, and to say in reply that, as the sole question at present is whether you will or will not fulfil your conditions of lease, it seems to the Chairman that there is nothing to be gained from a personal interview.

"I am to add that by a telegram received to-day from Sydney, the Board learn that all obstruction to their visiting Block 14 has been withdrawn, and to ask you whether this is correct, and whether you will undertake that the Board shall not be further obstructed if they present themselves for the purpose of visiting the underground workings of your mine.

"I have, &c.,
"W. J. LITTLE,
"Secretary to Board."

"Z. Lane, Esq., Manager, Block 14 Silver-mine, Broken Hill."

On the same date I received the following message from you:—

"*Re* Block 14 Mine, all obstruction has now been withdrawn, and the mine is open for inspection by Board, and a message has been received from acting secretary of company in Melbourne, stating manager has been instructed to have all obstacles removed.

"HARRIE WOOD,
"Under Secretary for Mines, 7/2/93."

At the same time you transmitted this copy of a message sent to you by Mr. Lane:—

"The following is a copy of a wire just received from Mr. Lane:—'In accordance with your wire of third instant, I immediately wrote Chairman, Lead Board, asking him make appointment to arrange *re* inspection. He declined to do so. There is no obstruction whatever offered. Any statements made to the contrary are untrue, as I am anxious to carry out your wishes.'

"HARRIE WOOD,
"Under Secretary for Mines, 7/2/93."

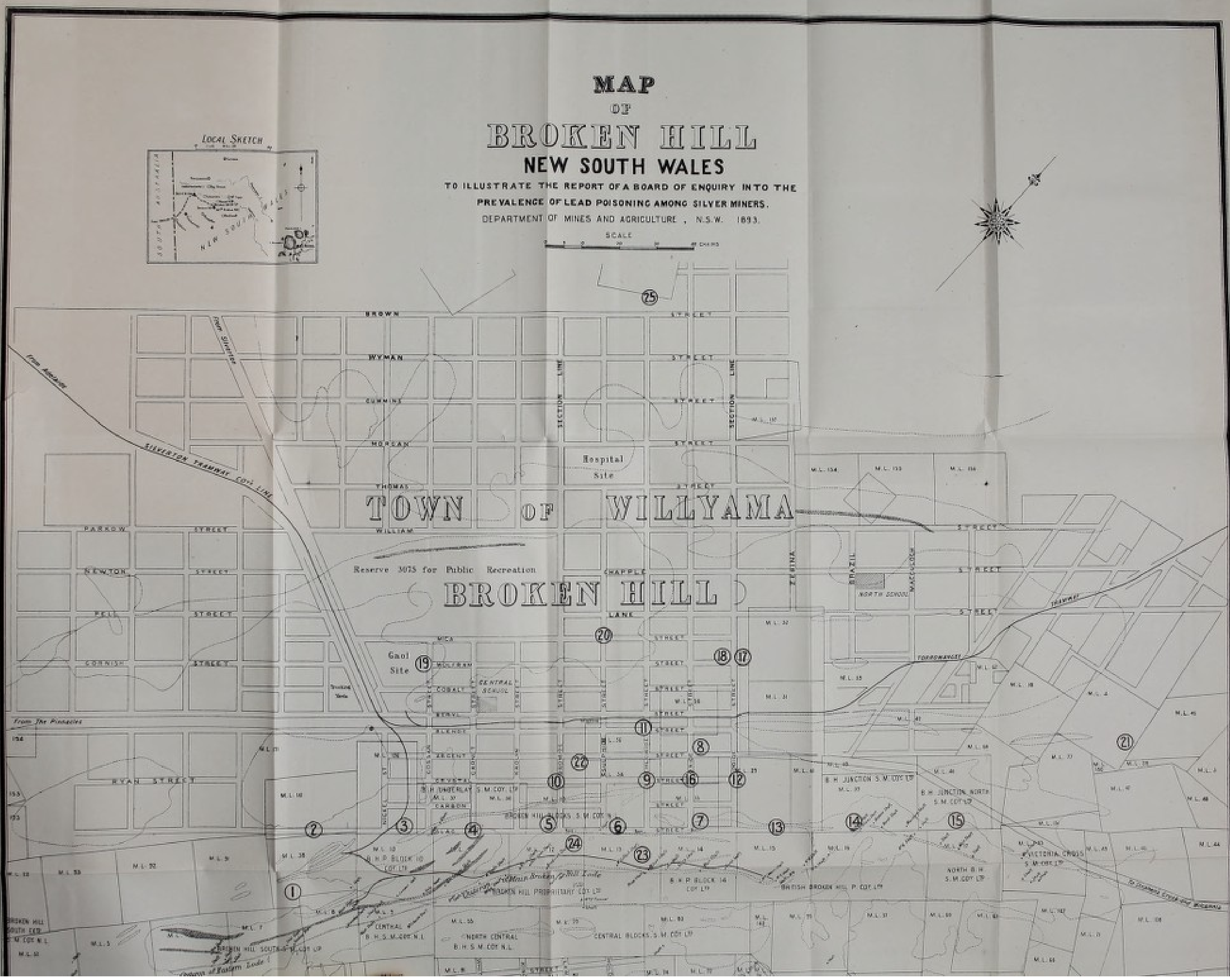
In the course of the afternoon, therefore, some of the members of the Board, including Mr. Josiah Thomas, and accompanied by the Mining Inspector, went to Block 14, saw Mr. Lane, and were by him taken to the main shaft and sent below. We inspected the mine, and then proceeded to the British Blocks. There we found that Colonel Morgan had instructed the braceman and the underground manager that we were to be sent below upon making request. We went below.

I have, &c.,
J. ASHBURTON THOMPSON,
Chairman.

The Under Secretary for Mines and Agriculture.

[One Map.]

Sydney: Charles Potter, Government Printer.—1893.


MAP
OF
BROKEN HILL
NEW SOUTH WALES
TO ILLUSTRATE THE REPORT OF A BOARD OF ENQUIRY INTO THE
PREVALENCE OF LEAD POISONING AMONG SILVER MINERS.
DEPARTMENT OF MINES AND AGRICULTURE, N.S.W. 1893.
SCALE
CHAINS
LOCAL SKETCH
SOUTH AUSTRALIA
NEW SOUTH WALES
TOWN OF WILLYAMA
BROKEN HILL
Reserve 3075 for Public Recreation
Hospital Site
Gaol Site
CENTRAL SCHOOL
NORTH SCHOOL
BROWN
WYMAN
CUMMINS
MORGAN
THOMAS
WILLIAM
STREET
SECTION LINE
PARKOW
NEWTON
PELL
CORNISH
RYAN STREET
CHAPPLE
LANE
MICA
MOLYBDAN
COBALT
BERYL
BLENDE
ARGENT
CRYSTAL
CARBON
ARGENT
SILVERTON TRAMWAY COY'S LINE
From Adelaide
From Silverton
From The Pinnacles
ZEBINA
BRAZIL
TRAMWAY
B.H. JUNCTION S.M. COY. LTD
B.H. JUNCTION NORTH S.M. COY. LTD
B.H. UNDERLAY S.M. COY. LTD
BROKEN HILL BLOCKS S.M. COY
B.H.P. BLOCK 10 COY LTD
B.H.P. BLOCK 14 COY LTD
BROKEN HILL PROPRIETARY COY LTD
BRITISH BROKEN HILL P. COY LTD
NORTH B.H. S.M. COY LTD
VICTORIA CROSS S.M. COY LTD
CENTRAL B.H.S.M. COY N.L.
NORTH CENTRAL B.H.S.M. COY N.L.
CENTRAL BLOCKS S.M. COY LTD
BROKEN HILL SOUTH S.M. COY LTD
BROKEN HILL SOUTH EXTD S.M. COY N.L.
Main Broken Hill Lode
Outcrop of Eastern Lode
M.L. 154
M.L. 155
M.L. 156
M.L. 32
M.L. 33
M.L. 31
M.L. 41
M.L. 10
M.L. 15
M.L. 16
M.L. 9
M.L. 38
M.L. 7
M.L. 5
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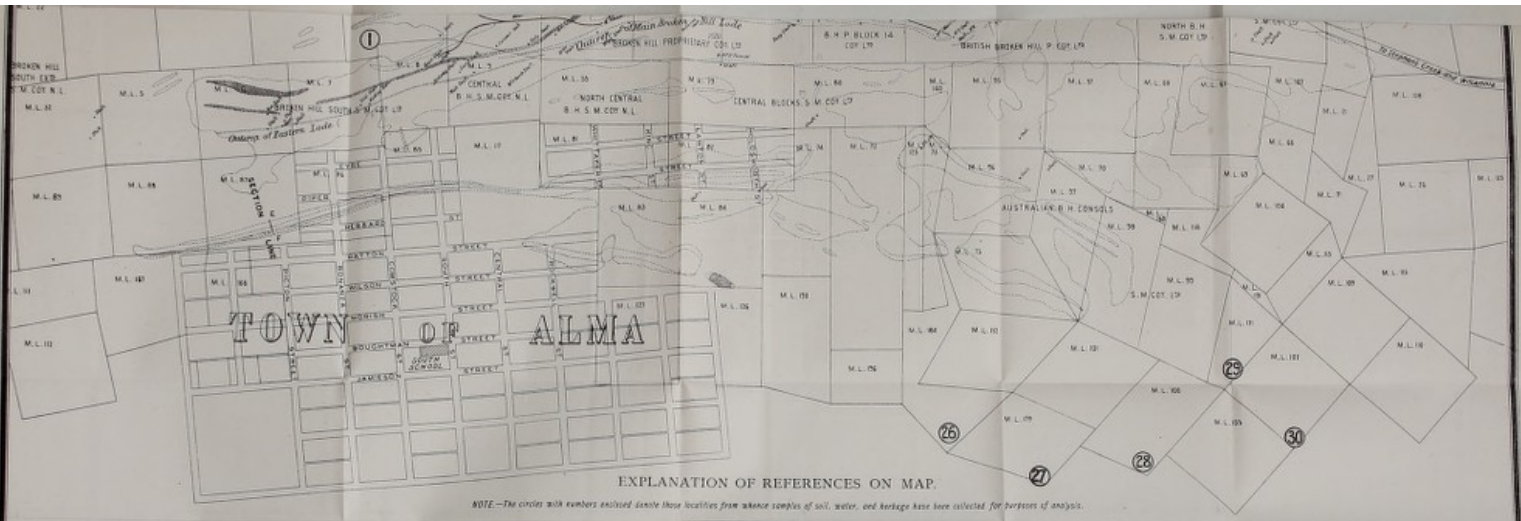

EXPLANATION OF REFERENCES ON MAP.

NOTE.—The circles with numbers enclosed beside those localities from whence samples of soil, water, and herbage have been collected for purposes of analysis.

1 Lead found in the soil in the direction of the prevailing winds.
2 Lead found in the soil about half-a-mile from the South Mine.
3 Lead found in the soil quarter-of-a-mile from Central Mine.
4, 5, 6 Lead found in the soil opposite Proprietary Mine in N.W. direction.
7 Lead found in the soil close to boundary of Block 14.
8 Lead found in the soil, corner of Oxide and Argent Streets [also in the air and in water-tanks, together with traces of arsenic caught from the lead fumes].
9 Lead in the soil near the Post Office.
10 Lead in the soil, corner of Crystal and Bromide Streets.
11 Lead in soil and road sweepings, corner of Bromide and Chloride Streets.
12 Lead in soil and road sweepings in Iodide-street.
13, 14, 15 Lead in soil and road sweepings in Slag-street.
16 Lead in soil and road sweepings in Crystal-street, 23 chains N.W. of Block 14.
17 Lead in waterhole in Iodide-street, quarter-of-a-mile off Block 14.
18 Lead in surface soil, Iodide and Wolfram Streets.
19 Lead in surface soil, corner of Gossan and Wolfram Streets.
20 Lead in surface soil, corner of Mica and Sulphide Streets.
21 Lead found in some stunted grass, 1 mile distant from the British furnaces, in a northerly direction.
22 Lead found in a water-tank in Argent-street.
23 Position of the North Smelters, Proprietary Mine.
24 Position of the South Smelters, Proprietary Mine.
25 Point, distant 2 miles from the Mines, where no lead was found.
26 to 30 Various points, to the south of the Mines, where no lead was found. [29 and 30 were samples from alongside waterholes.]

Sig 92

PHOTO-LITHOGRAPHED AT THE GOVT. PRINTING OFFICE, SYDNEY, NEW SOUTH WALES.