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Brisbane,
8th February, 1956.

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We have the honour to transmit to you herewith our report touching certain matters appertaining to the. State Coal Mine, Collinsville, in accordance with the directions contained in the Commission issued to us on 2nd December, 1954.

We also transmit a copy of the transcript of the evidence of the several witnesses who appeared before us during the course of our inquiry, together with the exhibits which were tendered.

Yours faithfully,

JOS. A. SHEEHY, Justice of the Supreme Court,
Chairman.

S. FLOWERS, Member.

W. SCOTT, Member.

J. F. POWER, Secretary.

The Honourable V. C. GAIR, M.L.A.,
Premier and Chief Secretary of Queensland,
Brisbane.

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APPOINTMENT OF COMMISSION.

Chief Secretary's Office,
Brisbane, 2nd December, 1954.

LIFTS Excellency the Governor has been pleased to direct the publication, for general information, of the following 1 I Commission.

JOHN E. DUGGAN.

ELIZABETH THE SECOND, by the Grace of God, of the United Kingdom, Australia, and Her other Realms and Territories, Queen, Head of the Commonwealth, Defender of the Faith.

To our Trusty and Well-beloved

The Honourable JOSEPH ALOYSIUS SHEEHY, Puisne Judge of the Supreme Court of Queensland ;

SEPTIMUS FLOWERS, Esquire, District Mining Engineeer, Newcastle, of the Joint Coal Board of New South Wales ; and

WALTER SCOTT, Esquire, Governing Director, W. D. Scott & Co. Pty Ltd., Management Consultants throughout Australia and New Zealand.

Greeting

WHEREAS it is expedient in the public interest that full and careful inquiry be made into :-

I. The disaster of the 13th October, 1954, in Tunnel No. 1 of the State Coal Mine, Collinsville, and the causes and circumstances of and relating to that disaster, and, in particular, whether there was any omission to take reasonable precautions to avoid that disaster in the course of mining operations in the said Tunnel No. 1, and whether the conduct of the owner, the management or any employee was a contributing cause of the said disaster.

II. The mechanisation of the said mine, the circumstances of and relating to that mechanisation, the working of that mine under such mechanisation, and whether mechanised mining should be discontinued in that mine.

III. Whether, regard being had for the safety, health and protection of the miners, the use of the said mine should be discontinued.

IV. Whether, regard being had to the public interest, the use of the said mine should be discontinued.

V. Any other matter or thing appertaining to the aforesaid matters which to you shall seem meet and proper in the public Interest.

Now, THEREFORE, KNow YE, THAT WE, reposing especial trust in your zeal, knowledge, learning, industry, discretion, and ability, do by these presents, by and with the advice of Our Executive Council of Our State of Queensland, constitute and appoint you, the said The Honourable JOSEPH ALOYSUIS SHEEHY, SEPTIMUS FLOWERS, Esquire, and WALTER SCOTT, Esquire, to be Our Commissioners for the purpose of inquiring into the matters hereinbefore mentioned : AND WE do hereby require and enjoin you to make diligent inquiry into the matters aforesaid, and for the purpose to exercise all the powers conferred upon a Commission by " *The Commissions of Inquiry Acts,* 1950 *to* 1954," or any Act or Acts in substitution therefor or in amendment thereof : AND WE do further command and enjoin you to summon before you and to examine all such persons as may appear to you able to inform you concerning the premises, and to cause to be taken down in shorthand and reduced into writing the evidence of the several witnesses that may appear before you, and such evidence, together with a full and faithful report touching the matters aforesaid, to transmit to the Honourable the Premier and Chief Secretary of Our said State : AND WE do hereby appoint you, the said The Honourable JOSEPH ALOYSIUS SHEEHY, to be Chairman of this Our said Commission.

IN TESTIMONY WHEREOF, We have caused the Public Seal of Our said State to be hereunto affixed.

Witness Our Trusty and Well-beloved Sir JOHN DUDLEY LAVARACK, Lieutenant-General on the Retired List of the Australian Military Forces, Knight Commander of the Royal Victorian Order, Knight Commander of Our Most Excellent Order of the British Empire, Companion of Our Most Honourable Order of the Bath, Companion of Our Most Distinguished Order of Saint Michael and Saint George, Companion of Our Distinguished Service Order, Governor of Our State of Queensland and its Dependencies, in the Commonwealth of Australia, at Government House, Brisbane, this second day of December, in the year of Our Lord One thousand nine hundred and fifty-four and in the third year of Our Reign.

JOHN LAVARACK.

By His Excellency's Command.

JOHN E. DUGGAN.

L.S.

Chief Secretary's Office,
Brisbane, 3rd December, 1954.

HIS Excellency the Governor, with the advice of the Executive Council, has been pleased to approve that

JOSEPH FRANCIS POWER, Associate to His Honour, Mr. Justice Sheehy,

be appointed Secretary to the Royal Commission appointed to enquire into certain matters appertaining to the State Coal Mine, Collinsville.

JOHN E. DUGGAN.

Chief Secretary's Office,
Brisbane, 3rd December, 1954.

HIS Excellency the Governor, with the advice of the Executive Council, has been pleased to approve that

WILLIAM EDMOND RYAN, Barrister-at-Law, Senior Assistant Crown Solicitor, Solicitor-General's Office, Brisbane, also " The Master of Titles,"

be appointed Counsel to assist the Royal Commission appointed to enquire into certain matters appertaining to the State Coal Mine, Collinsville.

JOHN E. DUGGAN.

Chief Secretary's Office,
Brisbane, 24th March, 1955.

HIS Excellency the Governor, with the advice of the Executive Council, has been pleased to approve that

ROY JAMES HUMPHRIES, Premier and Chief Secretary's Department, Brisbane,

be appointed on and from the 16th March, 1955, and during the absence on Sick Leave of Joseph Francis Power, to perform the duties of Secretary, Royal Commission appointed to enquire into certain matters appertaining to the State Coal Mine,

V. C. GAIR.

1956

QUEENSLAND

ROYAL COMMISSION APPOINTED TO INQUIRE INTO CERTAIN MATTERS APPERTAINING TO THE STATE COAL MINE, COLLINSVILLE.

REPORT

To His Excellency SIR JOHN DUDLEY LAVARACK, Lieutenant-General on the Retired List of the Australian Military Forces, Knight Commander of the Most Distinguished Order of Saint Michael and Saint George, Knight Commander of the Royal Victorian Order, Knight Commander of the Most Excellent Order of the British Empire, Companion of the Most Honourable Order of the Bath, Companion of the Distinguished Service Order, Governor of the State of Queensland and its Dependencies, in the Commonwealth of Australia.

MAY IT PLEASE YOUR EXCELLENCY,—

INTRODUCTION.

On 2nd December, 1954, we received Your Excellency's Commission to inquire into and report upon certain matters appertaining to the State Coal Mine, Collinsville, in accordance with the terms of reference contained therein.

The first meeting of the Commission was held in Brisbane on 7th December, 1954, following appropriate advertisement in the press and by radio, for the purpose of arranging for the representation of various persons or bodies who might be interested, and to fix times and places of sittings.

At the hearing, Mr. W. E. Ryan, Solicitor-General of Queensland, appeared to assist the Commission ; Mr. D. Casey appeared by leave of the Commission to represent the Owner of the Collinsville State Coal Mine, the Government of Queensland ; Mr. T. D. McCawley, Q.C., appeared by leave to represent Mr. A. Lightfoot, former General Manager, State Coal Mines, Queensland ; Mr. R. F. Cormack appeared by leave to represent Mr. A. Winstanley, Manager, Collinsville State Coal Mine ; Mr. W. E. Lawrie appeared by leave to represent the Queensland Coal Owners' Association ; Mr. J. M. Barry appeared by leave to represent the Australian Colliery Staff, Queensland Branch ; Mr. F. W. Paterson appeared by leave to represent the Queensland Colliery Employees' Union, the Collinsville Branch of the Amalgamated Engineering Union, and the next-of-kin of the seven deceased miners, namely, Mrs. Ivy Ruff, Mrs. Joyce Shrubsole, Mrs. Jean Parkinson, Mrs. Josephine Miller, Mrs. Isobel Peterson, Mrs. Angelina Walker, and Mr. John Logan ; and Mr. W. Parkinson, assisted by Mr. J. B. Barrett, appeared by leave to represent the Australian Coal and Shale Employees' Federation.

Two applications by Mr. J. Henderson for permission to appear on behalf of the Communist Party of Australia were refused. The first application was made at the commencement of the sittings of the Commission and the second on the fortieth day of the sittings during the examination of Mr. A. Lightfoot by Mr. McCawley.

Since it was not practicable, owing to accommodation difficulties, to sit in Collinsville, the Commission heard the evidence of some witnesses resident in or near Collinsville, at Bowen, and at the conclusion of such evidence adjourned to Brisbane where the evidence of other witnesses was heard. A total of 79 sitting days was taken in hearing the evidence, 13 days in Bowen and 66 days in Brisbane. Eight days were occupied in hearing addresses.

In all, 32 witnesses were examined before the Commission and 191 exhibits were tendered. A full list containing the names and descriptions of the witnesses will be found in Appendix "A", while Appendix "B" contains a list of the exhibits tendered.

The mine was inspected by all three Commissioners on two occasions, the surface installations on 17th December, 1954, and the scene of the disaster underground on 15th January, 1955.

In addition, Mr. Flowers made an inspection of various workings in both tunnels on two further occasions, viz. on 15th and 16th June, 1955.

The terms of reference were extraordinarily wide, involving inquiry not only into all aspects of the disaster but also into the history of mechanization of the mine, the success or otherwise of the mine under mechanization, and as to whether mechanization should be discontinued or not. Further, we were required to investigate the future of the mine from_ the angle of the safety, health and protection of the miners, and also from the economic angle as to whether the mine should be discontinued in the public interest.

The fifth term confirmed our view that our inquiry was to be of the widest nature in so far as the the first four terms were concerned.

In accordance, therefore, with what we believed to be a charge on us to go fully into any and every angle of the terms of reference, we determined to hear all evidence which might be in any way relevant, although possibly some of it, in the ultimate result, might turn out to be of little or no weight.

We confidently say that we rejected nothing which might have had any bearing on our task, and that full opportunity was given to all interested to raise anything which they wished, even though only remotely connected with the terms.

It was a full and complete inquiry and at the conclusion of the open hearings there were required, careful consideration of literally scores of factors, and a re-reading and study of some 5,000 pages of evidence and a great number of exhibits, some of which contained hundreds of pages of material.

We regret the time taken and that it is over twelve months since we first began our task, but we may fairly plead that the magnitude of the duty demanded such care and time.

We have divided the Report into sections corresponding with the terms.

At the outset, we set out the terms of reference, our conclusions and findings and a summary of the salient features of the Report.

TERMS OF REFERENCE
AND
FINDINGS AND CONCLUSIONS.

TERM I.

The disaster of the 13th October, 1954, in Tunnel No. 1 of the State Coal Mine, Collinsville, and the causes and circumstances of and relating to that disaster, and, in particular, whether there was any omission to take reasonable precautions to avoid that disaster in the course of mining operations in the said Tunnel No. 1, and whether the conduct of the owner, the management or any employee was a contributing cause of the said disaster.

FINDINGS.

WE FIND :

(1) The causes of the disaster of the 13th October, 1954, in Tunnel No. 1 of the State Coal Mine, Collinsville, are :—

(a) That the disaster was caused by an outburst of gas from, or in the immediate vicinity of, the face of the workings at the Dip in the main heading of the mechanized section No. 3 West No. 1 Tunnel ;

(b) That such gas was almost pure Carbon Dioxide, CO,, probably about 98 per cent ;

(c) That such other gases as may have been present in the outburst, i.e., Methane, CH, ; Sulphuretted Hydrogen, 11$_2$S ; Sulphur Dioxide, SO_2 ; or Carbon Monoxide, CO, were in so minute a proportion as not to warrant any finding that they or any of them were in any way a material contributing factor to the lethal quality of the outburst gas, containing as it did CO, in such proportion as to almost, if not entirely, exclude Oxygen ;

(d) That such outburst gas was released at such pressure and in such volume as to cause the disaster ;

(e) That the outburst occurred at about 5.50 p.m. on the evening of 13th October, 1954 ;

(f) That such gas was held at such pressure by absorption or adsorption in or to the coal in such place, sufficiently near to, or connected with the Dip workings, as to have been ready to erupt or break out, when the pressure overcame whatever resistance may have been theretofore offering ;

(g) That the gas was in great volume when released ; probably of the order of 500,000 cu. ft. ;

(h) That the gas was so held by reason of some fault, roll, sill, dyke, igneous intrusion, or other disturbance of the seam, i.e., the Bowen Seam, causing such a fracture, grinding and pulverization of the coal as to allow the gas to be so imprisoned in the disturbed, broken and fine coal ;

(i) That the nature of the disturbance as revealed by the Report of Mr. Cribb, Government Geologist, dated 14th October, 1955, and plans dated 30th September, 1955, showing the results of test borings, was an igneous intrusion, coupled with a down throw fault causing a displacement of the seam of approximately 15 ft., with considerable disruption at the break ;

(j) That the nature and quality of the coal in the Bowen Seam is such that, even in its undisturbed state, it holds or contains CO_2, which is given off more freely when the coal is broken or disturbed.

(2) The cause of death of the seven men :

Alex Parkinson,
Peter Miller,
Henry Peterson,
James Reid Logan,
Arthur Shrubsole,
Frederick Ernest Walker and
Herbert Ruff,

13 —

Asphyxiation due to the inhalation of an irrespirable atmosphere containing such a high proportion of Carbon Dioxide as to exclude the Oxygen necessary to maintain human life ;

(3) There was no omission to take reasonable precautions to avoid that disaster in the course of mining operations in the said Tunnel No. 1 ;

(4) The conduct of the Owner, the Management or any employee was not a contributing cause of the said disaster.

TERM **II** A.

The mechanization of the said mine . .

CONCLUSIONS.

Our conclusions in connection with the general aspects of mechanization are :-

(1) The final plan for mechanization was the result of some five years' close thinking on the subject ;

(2) The actions of the Ministers for Mines throughout were wise and correct. Each allowed the various authorities to examine the different schemes and when there was a deadlock, the current Minister for Mines presided at conferences to try to settle the issue ;

(3) The recommendations brought to Cabinet by the Minister for Mines were the result of lengthy and careful thought and discussions ;

(4) We are of the opinion that the Minister for Mines was wise in arranging for the appoint. ment of a General Manager who would have a greater knowledge of the day to day working of a mechanized mine and of the type of equipment likely to be used than was already available ;

(5) The procedure for the calling of tenders was entirely correct and all care appears to have been taken ;

(6) As far as all aspects covered by Section II A. are concerned, therefore, there are no grounds for criticism against the Government, any Minister for Mines, the Department of Mines, or any officers who played any part in the procedures and decisions to mechanize the mine.

TERM **II B.**

. . the circumstances of and relating to that mechanization . .

CONCLUSIONS.

Our conclusions regarding the circumstances of and relating to that mechanization are :-

(1) The financial results of the mine were, according to profit and loss figures, unsatisfactory. The main reasons for this were :-

(a) Constantly falling production ;

(b) Lags in price adjustments ;

(c) Too many surface labourers ;

(d) A somewhat higher than average figure of lost manshifts.

(This is not a complete list and specifically leaves out any question of a poor work effort on the part of the miners as this factor is fully considered in a later reference.)

(2) Of these, the constantly falling production was the most serious because there seemed to be no end to it. The logical method of attacking the trouble was by mechanizing the mine.

(3) In relation to the effect on Government finance, mechanization would be expensive, but, if it reduced or eliminated the drain on Consolidated Revenue, it was quite justified.

(4) Whilst the standard of efficiency of the mine might appear to be satisfactory on a comparative basis, there appeared to be strong reasons for the conclusion that, under the natural conditions operating at the mine, it should have been immensely better.

(5) The economic position in North Queensland was such as to make it logical, most desirable and even essential that, so far from production falling, it should be substantially increased, and mechanization was consequently the best and proper course to adopt.

(6) We therefore confirm that all of the evidence supports the Minister for Mines in the reasons he gave for proceeding with mechanization.

(7) Furthermore, as the result of a thorough study of these reasons, it is in our view beyond doubt that the Government's action in proceeding with mechanization was the correct one at the time and showed a realistic appraisal of current conditions. This conclusion is, in our view, completely valid despite anything which subsequently happened under mechanization.

TERM II C.

the working of that mine under such mechanization . . .

CONCLUSIONS.

Our conclusions are :-

(1) In the years ended 30th June, 1954, and 30th June, 1955, mechanized mining was carried on for approximately seven months in the former and three and a half months in the latter. Work in the remainder of each period (subject to an intervening period of non-prodUction after the disaster) was carried on under contract mining conditions.

(2) For those financial years, the losses were £160,270 and £196,244 respectively.

(3) Apart from the amounts made available by the Government for mechanization, grants from Consolidated Revenue were made of £150,000 to cover losses in the 1953-54 period and £180,000 for the 1954-55 year.

(4) Easily the most important cause of the losses was completely unsatisfactory production. The figures were very considerably less than had been anticipated and barely exceeded the production previously gained under contract mining.

(5) The four causes of totally unsatisfactory production were, in order of importance :-

Physical conditions—particularly excessive grades and (to a much lesser degree) bad roof conditions ;

Faults and shortcomings in machines and equipment ;

The unco-operative attitude of the Union and the employees and the resultant poor production effort ;

Shortcomings in Management, particularly lack of flexibility and initiative in managerial planning and thinking.

(6) Bad grades were the most important factor of all because of the adverse effects of such grades on all production agencies. They exercised a profound influence on the performance of the machines and on the attitudes and work results of the men and also not only imposed great strain on Management, but necessitated leadership qualities of high calibre.

(7) It is not considered, however, that the totally unsatisfactory production under mechanization in any way invalidated the conclusions previously arrived at—that the Government's decision to mechanize the mine was the correct decision and that it took all the reasonable and prudent steps that could have been expected of it to give mechanization every chance of success.

TERM II D.

. . and whether mechanized mining should be discontinued in that mine.

CONCLUSIONS.

Our conclusions are :—

(1) Any approach to the question of whether mechanized mining should be discontinued can logically commence with acceptance of the validity of the original thinking in favour of mechanization and acknowledgment that the installation is a first class piece of work.

(2) The biggest single advance towards successful operation under mechanization would come from an easing of the grades and this would be helped and supplemented by a strengthening of the equipment. This still leaves plenty of scope for a great improvement in attitude and work effort on the part of the Union and the employees and the display of greater initiative and more dynamic leadership on the part of Management.

(3) Having these matters particularly in mind, three schemes have been outlined in the belief that each offers opportunity for higher production and profitable operation of the mine. The first requires virtually no capital expenditure, should give 900 tons per day and at that figure an acceptable profit. The second scheme, envisaging a combination of No. 1 and No. 2 Tunnels, should mean considerable easing of the grades and should give a daily production of 1,125 tons with enhanced profits. The second and third schemes would embrace the use of shuttle cars and would secure production of 1,125 and possibly 1,350 tons per day. The profits at such a production figure would be very considerable and make a valuable contribution to the liquidation of past losses but would mean a progressive capital expenditure over a two year period of up to £150,000.

(4) Any future working of the mine should embrace the adoption of a panel system of working, to allow of efficient sealing off in the event of spontaneous combustion.

(5) Continuance of mechanized mining should include proper face preparation, a sound scheme of planned and preventive maintenance, and an enlightened approach to adequate training at all levels.

(6) Consistent with the foregoing, the mine should continue as a mechanized unit. We believe it is capable of and should produce acceptable profits which in time should help to recoup the losses of the last few years.

TERM In.

Whether, regard being had for the safety, health and protection of the miners, the use of the said mine should be discontinued.

CONCLUSIONS.

(1) In relation to the general aspect of ventilation, no evidence was put before us to support the belief that the safety, health and protection of the employees are likely to be imperilled or endangered in the future working of the mine.

(2) Nevertheless we believe that the second intake should be completed at the point in 3 West as shown on Annexure No. 35.

(3) As it is almost certain that continuous emission of CO, will result in accumulations of Black Damp in the working places in the Bowen Seam, we recommend vigilant inspection and all the ventilation reasonably possible.

(4) We do not believe that coal dust is a menace at the mine and we see no reason why it should constitute one in the future. Nevertheless it is necessary of course to see that the Coal Mining Act is adhered to and complied with and the ordinary precautions taken after shot firing with stone dusting carried out when required.

(5) In relation to simultaneous shot firing, we believe that detonators should be grouped as to resistance and only those of the same resistance used in the same operation. In these circumstances, simultaneous shot firing could be continued.

(6) Where we have recommended grunching in place of coal cutting, delay action detonators should be used.

In the Report we have recommended the use of milli-second delay shooting in certain places and this may require amendment to the Queensland Coal Mining Act, Clause 69, Schedule 2. We recommend that such amendment be made.

(7) We recommend that Shot-firers should be the holders of at least a Deputy's certificate.

(8) We are of the opinion that a rescue station should be set up in the district under the Act, to serve the State Mine and Bowen Consolidated Mine, such station to be equipped with the necessary apparatus. The trainees should be properly trained, including training underground.

(9) Consideration should also be given to the organisation of a fire-fighting group among surface employees to deal with all surface fires and underground employees for trouble underground.

(10) The Chief Inspector of Coal Mines in Queensland should keep himself well advised on investigations being made by the Geological Department of the University of Sydney in relation to the problem of CO, outbursts.

(11) We recommend that in all main development places in addition to places known to be approaching a proved fault, dyke, or sill, that grunching with milli-second delay detonators should be resorted to, with no employees allowed within the area which would be affected in the event of an outburst, and the person engaged in the operation of shot firing to be no closer than 300 ft. on the intake side when the shots are fired.

(12) We are of the opinion that inducer shot firing, as suggested, will provide maximum safety for employees by inducing outbursts when employees are absent from any area likely to be affected in the event of an outburst.

(13) We further recommend that as much of the shooting of all places, as is reasonably practicable, should be done at a time when the least number of employees are in the mine and that as many shots as possible should be fired at the one time whether by inducer or simultaneous shot firing.

GENERAL FINDING.

Regard being had for the safety, health and protection of the miners, the use of the mine should not be discontinued, either from the angle of unsafe practice, usage, custom or condition, or from the angle of the mine being inherently unsafe by reason of the likelihood of an outburst of CO, or any other cause.

TERM IV.

Whether, regard being had to the public interest, the use of the said mine should be discontinued.

CONCLUSIONS.

Our conclusions are :—

(1) The Collinsville State Mine has in the past made an important contribution to the development of North Queensland.

(2) The coal demands of North Queensland were in the region of 450,000 tons for the calendar year of 1955 and an increase of 5 per cent. per annum on this figure is expected for the future.

(3) This would ensure the acceptance of all the coal which the State Mine could produce were it not for plans by the Bowen Consolidated to expand open-cut output to a figure which, with its underground mine, would virtually ensure meeting all demands for the next four or five years which would be the open-cut life. The introduction of a new mechanized underground mine of like output would replace the open-cut at the end of that time. This would mean that North Queensland consumers would become independent of the State Mine supplies.

(4) There are, however, serious disabilities in the scheme—as, for example, one Company would virtually obtain a monopoly for the supply of all North Queensland coal with all the weaknesses and problems that such a monopoly might bring.

(5) The closing of the State Mine would almost certainly mean great hardship upon the employees, many of whom may well lose their assets by being forced to look elsewhere for work. There may be a further indirect result wherein it may become difficult to entice labour to Collins. ville for future requirements.

(6) As a result of a careful assessment of the arguments for and against discontinuance, we believe the mine should, in the public interest, be continued.

(7) On balance, we believe that sale of the mine as a going concern at an acceptable price or leasing at an acceptable rent are impracticable at this stage and would create many problems.

(8) We believe that the Government should give consideration to the future organisation of the mine, preferably turning it into a Company with the Government holding all the shares and appointing a Board of Directors which would give expert assistance to Management.

(9) Finally, if profitable operation of the mine is not reached for the year ended 30th June, 1958, we believe the question of the future of the mine should be examined afresh.

TERM V.

Any other matter or thing appertaining to the aforesaid matters which to you shall seem meet and proper in the public interest.

CONCLUSIONS.

1. We believe that the Overmen should at least have the qualifications of a Deputy and their status, duties and qualifications require clarification.

2. The Overmen should at all times while on duty carry an oil safety lamp and an electric safety lamp.

3. Consideration should be given as to whether it would be wise to submit the Deputies to a written examination.

4. Full support should be given to any project which has as its objective the building of an all-weather road between Bowen and Collinsville.

SUMMARY OF REPORT.

The terms of reference in the Commission were so wide that of necessity our Report is very lengthy.

We have thought it desirable to reduce into this short summary the salient points.

TERM I.

> " The disaster of the 13th October, 1954, in Tunnel No. 1 of the State Coal Mine, Collinsville, and the causes and circumstances of and relating to that disaster and, in particular, whether there was any omission to take reasonable precautions to avoid that disaster in the course of mining operations in the said Tunnel No. 1, and whether the conduct of the Owner, the Management or any employee was a contributing cause of the said disaster."

During the whole of its working life the Bowen Seam of the State Coal Mine at Collinsville has been giving off CO, (Carbon Dioxide). Such gas, when given off, has become a constituent of Black Damp which has been prevalent in the mine during its working life.

In lower workings, i.e., dips, in both tunnels, where water has accumulated, bubbling through the water has been prevalent.

floor. It is now clear that this bubbling has been caused by CO, coming through the water on the

The tendency of the seam to create Black Damp was known to all concerned, as was also the bubbling in the water all over the mine in the lower workings.

With one exception, the witnesses stated that the outburst was never anticipated, foreseen or expected.

It was unprecedented in Queensland Coal Mines and apart from two outbursts in the Metropolitan Colliery, Helensburg, New South Wales, in 1897 and 1925, respectively, there had been no prior outburst in Australia.

Such outbursts are rare except in certain parts of Europe.

One witness, James Alexander Nisbet, an employee in the mine, and secretary of the local branch of the Queensland Colliery Employees' Union, stated that he himself felt that everything was not as it should be, and further stated that-

> " A person on the field about two or three weeks before the disaster, with knowledge of outbursts elsewhere, seeing what was taking place at the Dip, may have got an idea. '

We think that this is hindsight on his part.

Government Inspectors (including the Chief Inspector), Miners' Inspectors, Union Check Inspectors, Manager, Under Manager, Overmen, Deputies and the miners themselves, many of them of long experience and properly safety conscious, had no such anticipation or expectation.

It would appear that the possibility, let alone the likelihood of such a happening, was never even discussed or mentioned.

We believe that the emanation of CO, and the bubbling were looked upon as peculiarities of the mine and that they were in no way regarded as a portent of trouble to come.

During the fortnight or three weeks prior to 13th October, 1954, the date of the disaster, the bubbling, according to some witnesses, had increased.

On the early morning of 8th October there was a heavy accumulation of Black Damp at the scene and on 12th October the fault in the seam was met.

The heavy discharge of CO, causing an accumulation of Black Damp on 8th October, and the increased bubbling, did not give any cause for alarm.

It was well known that CO, and other gases are frequently found at faults or other disturb. ances of coal seams.

The cause of the disaster was an outburst of gas, practically pure CO,, probably about 98 per cent.

The gas had been held imprisoned in comminuted coal and when it broke out, it did so in great volume, probably of the order of some 500,000 cu. ft.

The coal had been comminuted or pulverized by a disturbance of the seam caused by an igneous intrusion, coupled with a fault, leading to a displacement of the seam of about 15 ft. and causing much disruption at the break.

The pulverized coal provided a very receptive medium for holding the gas.

The coal inherently contains CO, and the greater the comminution of the coal, the more CO, is released.

We are unable to say if the CO, originated in the vicinity of the Dip workings, where such workings met the fault, or if it migrated there from elsewhere, but there is no doubt that a large quantity was held in the fatal spot, under a high pressure of possibly about 250 lb. per square inch.

We cannot say what broke the final barrier holding the gas in *situ.*

Some witnesses say they heard a shot fired immediately prior to the outburst but taking all the evidence we incline to the view that the ordinary working of the mine progressively weakened that barrier to a point when, without the intervention of any sudden new agency such as the firing of a shot, the pressure of the pent-up gas overcame the resistance of the barrier and so the gas broke out.

On its release, it dislodged some 400 to 600 tons of coal and it travelled at high but lessening speed up the return airway and up against the air current in the intake airway, forcing the air back and filling completely some of the lower chambers of the mine.

It drove out, for some distance, the ordinary air containing Oxygen and the deceased men were unable to reach an aspirable atmosphere. They died from lack of Oxygen—asphyxiation.

The outburst occurred at about 5.50 p.m. on the 13th October.

Three of the deceased, Alex Parkinson, Henry Peterson, and James Reid Logan were working in the immediate vicinity of the face of the Dip and in all probability received some short warning. They were able to travel some distance from the face before being overcome. None of them were injured in any way by the erupted coal, some of which was blown perhaps about 70 ft.

There is no reliable evidence as to where Peter Miller, Deputy, was when he first realised the danger.

The other three men, Frederick Ernest Walker, Arthur Shrubsole, and Herbert Ruff were working in or in the vicinity of level B.10 They were on the return airway side.

The gas forced its way against the intake air as far as A.9 on the intake side and on the return side it went at least as far as B.6 and probably further, and was so strong at B.8 as to overcome an employee working there, James Alfred Baker.

As far as the evidence shows, there was no other gas in the mine which imperilled the miners, proper precautions being taken.

We are satisfied that more than the required statutory precautions had been taken by the safety officers—the deputies—as to testing for Black Damp (and indeed Methane) before the disaster.

We do not think that the outburst should have been reasonably anticipated by the Owner, Management, or any employee.

The Dip headings had been driven further in relation to the ventiliation heading than is usually done but in our view, the circumstances operating were such as render such a course of action proper mining practice.

There was no negligence on the Management's part in so driving the heading and in any event had the alternative course been pursued, i.e., of keeping the ventilation heading up with the Dip heading, we do not think any of the men would have escaped.

It was alleged that the safety equipment was inadequate or defective.

Some of it was in order. We have no doubt whatever that had it been 100 per cent. perfect on the surface, it would not have been of any use in saving life.

We cannot see that it can be reasonably kept anywhere else than on the surface.

We have found—

CAUSES OF DISASTER.

(a) That the disaster was caused by an outburst of gas from, or in the immediate vicinity of, the face of the workings at the " Dip " in the main heading of the mechanized section No. 3 West No. 1 Tunnel ;

(b) That such gas was almost pure Carbon Dioxide, CO,, probably about 98 per cent. ;

(c) That such other gases as may have been present in the outburst, i.e., Methane, CH, ; Sulphuretted Hydrogen, H,S ; Sulphur Dioxide, SO, • or Carbon Monoxide, CO, were in so minute a proportion as not to warrant any finding that they or any of them were in any way a material contributing factor to the lethal quality of the outburst gas containing as it did CO, in such proportion as to almost, if not entirely exclude Oxygen ;

(d) That such outburst gas was released at such pressure and in such volume as to cause the disaster ;

(e) That the outburst occurred at about 5.50 p.m. on the evening of 13th October, 1954 ;

(1) That such gas was held at such pressure by absorption or adsorption in or to the coal in such place, sufficiently near to, or connected with the Dip workings, as to have been ready to erupt or break out, when the pressure overcame whatever resistance may have been theretofore offering ;

(g) That the gas was in great volume when released probably of the order of 500,000 cu. ft. ;

(h) That the gas was so held by reason of some fault, roll, sill, dyke, igneous intrusion, or other disturbance of the seam, i.e., the Bowen Seam, causing such a fracture, grinding and pulverization of the coal, as to allow the gas to be so imprisoned in the disturbed broken and fine coal ;

(i) That the nature of the disturbance, as revealed by the Report of Mr. Cribb, Government Geologist, dated 14th October, 1955, and plans dated 30th September, 1955, showing the results of test borings, was an igneous intrusion, coupled with a down throw fault causing a displacement of the seam approximately 15 ft., with considerable disruption at the break ;

(j) That the nature and quality of the coal in the Bowen Seam is such that, even in its undisturbed state, it holds or contains 00_2, which is given off more freely when the coal is broken or disturbed.

CAUSE OF DEATH.

We find that the cause of death of the seven men

Alex Parkinson
Peter Miller
Henry Peterson
James Reid Logan
Arthur Shrubsole
Frederick Ernest Walker and
Herbert Ruff

was—

Asphyxiation due to the inhalation of an irrespirable atmosphere containing such a high proportion of Carbon Dioxide as to exclude the Oxygen necessary to maintain human life.

NEGLIGENCE.

We find there was no omission to take reasonable precautions to avoid the disaster in the course of mining operations in Tunnel No. 1.

nib, CONDUCT OF THE OWNER, MANAGEMENT AND EMPLOYEES.

We find that the conduct of the Owner, the Management or any employee was not a contributing cause of the disaster.

TERM II A.

The mechanization of the said mine . . .

A great deal of the historical and geological information regarding the Bowen River Coal-field is to be found in a Department of Mines' Manual (1929) entitled " The Geology of the Bowen River Coalfield." The earliest reference is back in 1866 and some 19 years later the first bore was sunk by the Government. It was not until 1915, however, that serious thought was given to the development of the area and this was to be made possible by the construction of a railway between Bowen and the coalfield which was sanctioned by Parliament late in 1915.

Initial operations commenced in March 1919 when the main tunnel of the Bowen Seam was driven to a distance of 300 ft. from the surface. Careful tests of bulk samples showed the coal to make good metallurgical coke and an experimental coke oven was therefore erected and brickworks established.

The Bowen Coalfield Railway was opened for traffic in August, 1922 and this really marked the commencement of coal production on an acceptable scale. The year 1923 saw the output lifted to 400 tons per day.

The Collinsville Coal measures have been mapped at intervals over a distance of about 48 miles and they comprise six seams which have an average thickness of 48 ft. 9 ins. These coal measures have been extensively intruded by igneous rocks and whilst there is little surface evidence of their presence, all seams have in places been destroyed or detrimentally affected over portions of the field by irregularly-shaped sills.

Nevertheless the area is a good one subject to this one major disability. The coal has been tested in various gasworks and submitted to other technical analyses. As far as gas coal is concerned, its figure is about 8,500 cu. ft. of gas per ton and its return of coke is about 70 per cent, It has been classified as first-class steaming coal and coking coal and second-class gas coal, The first thoughts on mechanization came from Mr. Thomas Platt, at that time Supervisor of State Coal Mines, and other officials associated with the mine in the early 1940's. In 1945, however, some official suggestions were made by the Hon. Mr. Justice C. W. Davidson who, associated with owners' and miners' representatives, made an investigation into and reported generally on the coal industry in Australia.

Soon after this report was received, Mr. A. Winstanley was appointed Manager of the mine (1946).

In August, 1947, Mr. Winstanley recommended a form of mechanization to the Supervisor of the State Coal Mines and this recommendation was passed on to the Secretary for Mines in September, 1947. It suggested the provision of £100,000 for mechanization of the No. 1 Tunnel but no action was taken to implement the scheme.

This may have been because about that time Powell Duffryn Technical Services Ltd. of England was commissioned by the Queensland Government to report on the coal industry of Queensland. The official Report from this organisation was not presented until 1949 but, in the meantime, one of the senior executives, Mr. D. G. Hemmant, on 31st July, 1948, wrote a memorandum giving a suggested immediate programme for the State Mine, indicating that the maximum proportion of the future output, consistent with market requirements, should come from the upper seams, working them in descending order, solid work being followed up by pillar extraction after as short an interval as possible. He also suggested the purchase of two scraper loaders from New South Wales so that the No. 3 West level in No. 1 Tunnel could be pushed on with all possible speed.

Nothing was done in this connection and the official report by Powell Duffryn Technical Services Ltd. proposed that new workings should be developed in the area then being worked in the Bowen Seam at the No. 1 Tunnel in the colliery. It further suggested that new workings should be commenced in the Garrick Seam and that the seams should be working in descending order so as to avoid damage to the unworked seams.

It further indicated that if the seams persisted over the area chosen for future development, as set out in their report, in a similar way to what was proved by existing bores, the total reserves of coal in the area would be approximately 20.76 million tons.

In 1950 Mr. A. Crowley, the Engineer of the Queensland Coal Board, and Mr. K. D. Woolley, the Mining Engineer of Powell Duffryn Technical Services Ltd., issued a further report in which they looked at certain aspects of mechanization but particularly recommended the immediate introduction of power borers. They felt that such introduction would mean an immediate increase of about 400 tons of coal per week. This recommendation was accepted by the Department of Mines and power borers were completely installed by the 24th March, 1952.

About the same time as the Crowley and Woolley Report was received, Mr. Winstanley gave a further report to the Supervisor of the State Coal Mines as the result of visits paid to mechanized mines in New South Wales. He recommended the use of trackless mining type of equipment with large units and cable reel type shuttle cars and belt conveyors. Again this was for the proposed mechanization of No. 1 Tunnel but there was also provision for two complete units to cover the No. 2 Tunnel.

It was quite apparent that there was a great deal of different thinking about the ways and means to mechanize the State Mine although everyone seemed to be in agreement that mechanization was most desirable.

Numbers of conferences were held between representatives of the Department of Mines and, of course, the mine management as well as with members of the Queensland Coal Board and executives from Powell Duffryn Technical Services Ltd.

Arising out of these, Mr. Winstanley submitted a third scheme which was for the complete mechanization of the No. 2 Tunnel. He supported heavy duty type mining equipment with surface and underground installations and conveyor transportation as well as all other necessary aids. He felt that his scheme would secure from about 900 to 1,050 tons per day and he gave estimates of the working costs. On his statement, this programme would have meant a substantial profit, but the Supervisor of the State Mines thought that his estimates were much too optimistic and he increased the various expenses considerably over Mr. Winstanley's estimates.

It looked as if most of the people somewhat agreed with Mr. Winstanley's scheme but almost immediately afterwards, Mr. Crowley of the Queensland Coal Board, in conjunction with Powell Duffryn Technical Services Ltd., submitted another scheme for partial mechanization of No. 2 Tunnel, somewhat in opposition to that by Mr. Winstanley.

The discussion went on for another month or two and finally it was decided to hold a conference with all interested parties attending to see whether the differences between the two latest schemes could be ironed out.

In the main, there was at the outset agreement on some twenty items whilst with a further six, a qualified agreement was reached. Only in three or four areas was there a final disagreement.

Of these two schemes, the Powell Duffryn scheme provided for an average output of 820 tons per day with the total cost of £337,242. The scheme prepared by the mine management and the Coal Board which estimated an output of 900 to 1,050 tons per day, was expected to cost £471,750.

It was finally decided to describe the two schemes to the Minister for Mines (which was done), but the Department of Mines recommended the scheme prepared by Mr. Winstanley and the mine management generally.

On the 12th March, 1951, some six months after the conference with the Minister for Mines, the matter came before Cabinet, the two schemes again being placed before it. The submission to Cabinet gave all the relevant particulars, but again the Department of Mines favoured the scheme by the mine management and suggested approval of a scheme of mechanization which would probably cost £500,000.

Cabinet accepted the recommendation, approved the immediate expenditure of £7,770 for development underground and gave instructions regarding calling of tenders for the various machines.

Apparently the idea had at that time been formulated of appointing a General Manager for State Coal Mines who had had satisfactory experience in mechanized mining. Because of this, further steps to implement Cabinet's decision were held up pending the appointment.

Mr. A. Lightfoot was appointed as General Manager and actually commenced duties on the 1st October, 1951. He was notified of his appointment, however, on the 19th July, 1951, and immediately afterwards, he was given all the papers in connection with the proposed mechanization and his opinion was sought in relation to every aspect. He examined these, suggested certain alterations and the amended lists were finally forwarded to the State Stores Board for the calling of tenders.

As soon as he began active duties on the 1st October, 1951, Mr. Lightfoot went straight to the mine and either at that time decided, or confirmed an earlier thought, that the No. 1 Tunnel should be mechanized and not the No. 2 Tunnel. This necessitated certain consequential alterations in the tenders but these were largely directed towards ensuring that the machines to be ordered would stand up to more difficult grades and conditions than the original tenders had provided. This would be consequent upon the change from No. 2 Tunnel to No. 1 Tunnel.

On the 13th December, 1951, a statement was prepared by Mr. Lightfoot as General Manager and Mr. Clark, Under Secretary, Department of Mines, for submission to the Minister for Mines, submitting the mechanization proposals and recommending acceptance of certain of the equipment tenders. The memorandum indicated that during installation, normal production would continue in No. 2 Tunnel and after installation, the surface labour could be continued in employment in No. 2 Tunnel in hand-winning coal on day-wage conditions.

It was originally estimated that an appropriation of £500,000 would have been necessary, but because of a general percentage reduction in loan funds, it was recognised that only £420,000 would be available for the then current financial year for mechanization purposes.

The equipment ordered comprised three coal-cutting machines complete with boring machines mounted thereon, six coal-loading machines, one main trunk belt conveyor system, two subsidiary conveyors, 15 small chain conveyors, necessary cables, transformers and gate-end boxes, together with one shuttle car. Provision was also made for some expenditure for spare parts, a new pit top, and the provision of a 200-ton storage bin. The indicated total approved at that time was £420,000. These proposals, supported and recommended by the Minister for Mines, were submitted to Cabinet on the 20th December, 1951, and Cabinet's approval obtained. It was known at the time that the £420,000 would not be sufficient, and subsequent approvals were obtained for a further £100,000.

Contract mining in the No. 1 Tunnel ceased at the end of 1952 and the installation of the mechanization equipment commenced in January, 1953. Some of the plant did not become available until September, 1953, but nevertheless the installation was sufficiently complete by the beginning of November, 1953, to allow mechanized mining to commence on the 7th November of that year.

The almost unanimous opinion was that the installation was a very good one and had been pushed through in reasonably good time. The work was done efficiently and as far as installation went, everything pointed to success.

Our conclusions in connection with the general aspects of mechanization are :-

1. The final plan for mechanization was the result of some five years, close thinking on the subject.

2. The actions of the Ministers for Mines throughout were wise and correct. Each allowed the various authorities to examine the different schemes and when there was a deadlock, the current Minister for Mines presided at conferences to try to settle the issue.

3. The recommendations brought to Cabinet by the Minister for Mines were the result of lengthy and careful thought and discussions.

4. We are of the opinion that the Minister for Mines was wise in arranging for the appointment of a General Manager who would have a greater knowledge of the day to day working of a mechanized mine and of the type of equipment likely to be used than was already available.

5. The procedure for the calling of tenders was entirely correct and all care appears to have been taken.

6. As far as all aspects covered by Section II A. are concerned, therefore, there are no grounds for criticism against the Government, any Minister for Mines, the Department of Mines, or any officers who played any part in the procedures and decisions to mechanize the mine.

TERM II B.

. . . The Circumstances of and relating to that Mechanization . . .

A number of reasons were responsible for the recommendation to Cabinet in favour of mechanization and influenced Cabinet in its decision to approve.

In the first place, the financial results for some ten years or so prior to the decision had not been very satisfactory and from 1944 onwards, a succession of losses had been made. These losses necessitated grants from Consolidated Revenue and it was obviously desirable to avoid these in the future, if possible. Furthermore, the production from the State Coal Mine has not been satisfactory and year by year had shown a marked decrease due to a lessening number of contract miners. This promoted a serious state of affairs and it appeared that the only way to reverse the process and increase production was by mechanizing the mine.

This situation became much more serious because, as against falling production at the Collinsville State Coal Mine, the needs by North Queensland for coal were growing sharply. Any attempt to provide North Queensland consumers with coal from other areas was both expensive and promoted hardship on the railways. It became imperative, therefore, that coal production from the State Mine be lifted considerably. Mechanization gave a promise of doing so.

It was felt that mechanization was in conformity with modern thinking and would practically eliminate much of the arduous labour of hand-mining methods.

These then were the reasons for mechanization, and we felt it advisable that we should examine these reasons to assess their validity. This necessitated, amongst other things, a study of the Profit and Loss Accounts of the mine from 1940-41 to 1952-53. The first three and the last of these years were profitable years. All the rest showed losses and in 1944-45, the loss reached a figure of almost £40,000 for the year.

This obviously had some effect upon the indebtedness by the mine and in the year 1951, £70,000 was given as a grant from Consolidated Revenue to cope with some of the mine losses, and the following year a further £25,000 was given. These and other factors (such as the provision of plant) meant that from a figure of £49,753 in 1941, the indebtedness rose to £286,132 in 1952. In 1953 it went to £724,086 but this included some of the capital expenditure on mechanization.

Any analysis of the position readily disclosed that the major reason for losses was the virtually constantly falling production of coal. In 1941, 197,000 tons were produced but this mounted rapidly in 1943 and by this latter year, the peak figure of just over 300,000 tons production was reached. This was no doubt helped by the transfer of contract miners from southern fields, a plan which originated in a desire to help coal production needed in a wartime economy.

From 1943 onwards, however, production started to fall and in 1944, it was 251,000 tons and in 1945, 241,000 tons. The year 1946 saw a big decrease—the total tonnage produced was only 172,000 tons. It hovered within reach of this figure until 1949 but in 1950, it dropped 60,000 tons in the one year, reaching a figure of only 126,000 tons. The following year, 1951, was virtually the all-time low of 116,000. Next year there was a slight increase to the figure of 152,000, though this was obviously far below the pre-1949 period and only one-half of the 1943 figure.

The secret of the low production was in the number of contract miners, which commenced at 144 in 1941, jumped in two years to 197, but then following the pattern of production, dropped to 168 in 1944, 157 in 1945, and 131 in 1946. It stayed at about that figure until 1949. The year 1950 saw a sudden drop to 91 and a further drop the next year to 70, with a gradual rise over two years until 82 was reached in 1953.

The number of contract miners is so much a part of the pattern of production that one need look little further for reasons for the sustained fall in production over a period of years. It is worth noting, however, that the production figures depended upon another factor, i.e., production per Contract Miner. In 1941, 1,516 tons per Contract Miner were produced and whilst production in the next year fell fairly seriously, the figures for the years 1943, 1944, and 1945 were all in the 1,500's. Then came a period up until 1950 when four out of five years showed only between 1,300 and 1,400 tons whilst 1949 produced 1,493 tons.

At the beginning of 1951, power borers and other aids began to make their presence felt and the production per Contract Miner jumped to 1,662 tons, which figure was held in 1952 and substantially increased to the record of 1,853 tons in 1953.

During these years, and particularly since 1948, expenses were increasing and so that losses would not get out of hand, price increases had to be granted to the mine. This was in conformity with the pattern elsewhere, because rising costs were general throughout the coalmining industry.

Usually the price of the State Mine coal was kept somewhere close to that of the neighbouring mine, Bowen Consolidated. Up to the 8th January, 1951, it did lag somewhat but on that date, the price paid for the coal from each of the two mines was fixed at the same figure. The State Mine was, however, granting a discount of five per cent. on all sales of coal to the Railway Department.

The comparison with the Bowen Consolidated Mine is an important one because through the course of evidence, it was indicated that the results of the State Mine suffered considerably as against those of Bowen Consolidated, and this was indicated as supporting the viewpoint that the State Mine employees were much less co-operative than those of Bowen Consolidated. An analysis was therefore made of the results of the two mines and it does not appear, taking into account some of the disabilities suffered by the State Mine, that there was much difference in the results achieved. A full analysis of the reasons behind this statement is given in the report.

Because of the importance of the price of coal, an analysis was also made of the method of pricing by the Queensland Coal Board because this was largely adopted by the Department of Mines which controlled the prices for the State Mine.

As the result of an examination of the position, the conclusions reached were that the Profit and Loss results of the State Mine did not necessarily give any real indication of the Profit and Loss position of the mine. All that could be said would be that on the prices charged, the results were as shown. Indeed, in our view, the pricing method adopted over the years was such as to result in the State Coal Mine somewhat subsidising the Railways and the Bowen Coke Works, and probably North Queensland Coal Consumers. The probability is that if the State Mine had secured the prices and conditions received by Bowen Consolidated and if the State Coal Mine had not granted subsidies to the Railways and the Bowen Coke Works, profits would have been earned over the whole period. Furthermore, the comparative results as against those of Bowen Consolidated do not appear in any really unfavourable light

This may not, however, be a sufficient gauge of the efficiency of the mine. Whilst under the circumstances nominated, a profit may have been secured, it still would not prove that the actual profits of the State Mine should not have been very much greater even than those that would have resulted. As an alternative, there is nothing to show that profits should not have been earned even under the circumstances which largely contributed to the unprofitable showing.

Several factors seem to suggest that profits should in any case have resulted. The output per manshift in relation to underground employees bore favourable comparison with any other mines in Queensland but apparently largely because of an undue surplus of surface labour, this advantage gained in output at the coal face was completely lost in overall manshift output. The favourable position at the coal face, therefore, was turned into an unfavourable overall figure. There is little doubt that the results from an overall production viewpoint should have been very much better and had they been so, profitable trading would have resulted, despite price and discount factors.

The mine has apparently been characterized for many years by a surplus of surface labour and this grew worse as the contract miners decreased year by year. The figures in this regard are striking and show conclusively that not sufficient attention was given to this factor by mine management.

In relation to manshifts lost for various reasons, whilst the figures show that the State Mine compared unfavourably with Bowen Consolidated, its record was not out of line with those of other Queensland mines and no real exception could be taken along these lines.

Reference is made in the Report to the fact that any shortage of production by the State Coal Mine had to be made up by bringing coal in the main from Blair Athol and Callide Mines and apart from the very much greater cost involved, this promoted great strain on the Railways in the handling of the traffic. To the extent that the State Coal Mine produced coal which could be used in North Queensland, it made a major contribution to its development. To the extent that its production fell short of North Queensland requirements, it indirectly placed a greater burden on the North Queensland consumers and the Railways.

Our conclusions regarding the circumstances of and relating to that mechanization are :-

1. The financial results of the mine were, according to Profit and Loss figures, unsatisfactory. The main reasons for this were :—

   (a) Constantly falling production.

   (b) Lags in price adjustments.

   (c) Too many surface labourers.

   (d) A somewhat higher than average figure of lost manshifts.

   (This is not a complete list and specifically leaves out any question of a poor work effort on the part of the miners as this factor is fully considered in a later reference.)

2. Of these, the constantly falling production was the most serious because there seemed to be no end to it. The logical method of attacking the trouble was by mechanizing the mine.

3. In relation to the effect on Government finance, mechanization would be expensive but if it reduced or eliminated the drain on Consolidated Revenue, it was quite justified.

4. Whilst the standard of efficiency of the mine might appear to be satisfactory on a comparative basis, there appeared to be strong reasons for the conclusion that, under the natural conditions operating at the mine, it should have been immensely better.

5. The economic position in North Queensland was such as to make it logical, most desirable and even essential that, so far from production falling, it should be substantially increased, and mechanization was consequently the best and proper course to adopt.

6. We therefore confirm that all of the evidence supports the Minister for Mines in the reasons he gave for proceeding with mechanization.

7. Furthermore, as the result of a thorough study of these reasons, it is in our view beyond doubt that the Government's action in proceeding with mechanization was the correct one at the time and showed a realistic appraisal of current conditions. This conclusion is, in our view, completely valid despite anything which subsequently happened under mechanization.

TERM II C.

. . . the working of that mine under such mechanization . .

The four promised changes under mechanization were :-

(a) The expectation of better financial results.

(b) The discontinuance of grants from Consolidated Revenue to cover losses.

(c) The increase of production to cater for a larger proportion of North Queensland coal requirements.

(d) The elimination of " practically all arduous labour."

Of these, only the last was achieved. Mechanization did undoubtedly reduce the severity and proportion of laborious jobs. In the other three categories, matters went from bad to worse.

In relation to financial results, the year ended 30th June, 1954, produced a loss of £160,270 and the year 1954-55 a further loss of £196,244.

These far exceeded any other adverse results ever previously experienced. Furthermore, because of these losses, grants from Consolidated Revenue of much greater amounts than ever before became essential—£150,000 in 1954 and £180,000 in 1955.

In the matter of coal requirements by Northern Queensland, far from helping, the position under mechanization became much worse than ever before and production of 124,154 tons in 1953-54 (which was practically on a par with the lowest total under hand-mining methods) became even worse in 1954-55, when a mere 88,406 tons resulted.

It must, however, be understood that in neither of these two years did a full 12 months' mechanized mining occur. As indicated, production under mechanization commenced on 7th November, 1953, and proceeded until 13th October, 1954, upon which latter date the disaster occurred. The disaster disrupted the whole of the working of the mine as to production, and in fact there was no production at all for some weeks, after which hand mining was again introduced. Actually, in the 1953-54 year there were some seven months or so of mechanized mining and in 1954-55 a week or two more than three months. It is quite evident, therefore, that the production figures in each of the two years were the result of coal won under both mechanized and hand-mining conditions.

Nevertheless, production, whilst mechanization was in operation, was extremely unsatisfactory and considerably below even the most pessimistic levels. It had been anticipated that up to 1,500 tons per day would be achieved, whereas actually in the mechanized period, little more than 500 tons were produced. Whilst the period from 1st July, 1954, to 13th October, 1954, showed an improvement over the earlier period, the production still reached a figure of only 600 tons daily.

An analysis of such factors as labour turnover and manshifts lost for various reasons (particularly industrial disputes), does not suggest that the reason for this low production was to be found in these causes, and it became necessary to analyse a number of other factors in order to arrive at what actually were the real causes of the low production.

In this connection, the conclusion was reached that the completely unsatisfactory production under mechanization was due, in this order, to :—

(a) Physical conditions,

(b) Machines and equipment,

(c) The attitude of the Union and the employees, and

(d) Shortcomings in management.

The difficulties encountered as the result of physical conditions were due to roof conditions and excessively bad grades. Almost at the outset of mechanization, a roof fall caused a restriction in working plans which interfered with production and caused other disabilities and adverse results, all of which continued long after the roof condition was cleared up. This roof fall came from a defined area of bad roof condition running through a portion of the mine and adversely affecting, at some point, certain levels on both the "A" and "B" sides.

The troubles experienced because of roof conditions, however, were not nearly as important in their effect as the problems engendered by excessively steep grades. Whereas an average grade of 1 in 6 had been specified in the original tenders and it was made a condition of purchase that the machines were to operate on grades of 1 in 4.8, it was found in production that where the grade got steeper than 1 in 6, it became more progressively difficult to deal with and as the grades even reached 1 in 3.6 in places (one witness stated 1 in 3), all kinds of difficulties which would not have been experienced in grades of 1 in 6 and better arose and very seriously interfered with production, which dropped accordingly.

We classify the excessive grades as being the major and most important cause of low production because the adverse effects of the grades spread in all directions. They placed great strain upon the machines and equipment, disclosed some weaknesses in them and created stresses. The result was breakdowns and production bottlenecks.

There was ample evidence to show that the grades experienced were representative of the worst possible conditions, and either better or worse grades would have been easier to cope with.

They placed much greater strain upon the employees handling the equipment and trying to overcome the natural disabilities of the grades. They made it much more difficult for a man to do an acceptable job and caused conditions which upset morale and made it difficult to distinguish between carelessness and lack of ability or training.

The difficulties in grades also promoted great strains on management. Apart from uncovering any weaknesses in management, there was a much greater degree of uncertainty in decision and in order to cope with the difficulties, it really required a higher degree of management ability than was available.

It is believed that production would almost certainly have increased with any improvement of the grades, but unless and until some improvement eventuated in the grades, profitable production under mechanization was and would be extremely doubtful.

In relation to the second cause of low production—the machines and equipment—there is little doubt that the main belt installation was a first-class piece of work, and generally speaking, the cutters behaved quite satisfactorily. Trouble was, however, experienced with both the loaders and the chain conveyors. In the case of the loaders, they did not appear to be able to cope satisfactorily with grades more severe than 1 in 6, and even though the machines bought were to deal with grades of 1 in 4.8, there was at least one weakness in design which made it extremely doubtful whether the loaders could cope with such grades. The major disability with the loader was the overhanging gear boxes which gave very little and unsatisfactory clearance and were responsible for much of the bogging and jamming of the loaders as well as for troubles associated with oiling and hydraulic systems.

The experience with the chain conveyors was even more unsatisfactory than with the loaders. Whilst it was nominally said that they would cater for production requirements up to a specific tonnage for a distance of up to 450 ft., experience showed that their performance was quite unsatisfactory at distances any greater than 300 ft. There were also certain disabilities and weaknesses inherent in the design of the conveyors which in themselves promoted numerous stoppages which, in turn, of course, reduced production.

Mr. Lightfoot indicated that the major cause of low production was very much more the attitude of the men than the performance of the machines. The letter which he wrote to the suppliers of the equipment and which was supported by a letter from the Under-Secretary for Mines in the same category showed beyond any doubt that he and the Department of Mines generally were completely dissatisfied with the performance at least of the loaders and the chain conveyors. Nor was the reply from a representative of the suppliers satisfactory in its answers to the criticisms levelled against the equipment.

Breakdowns, whilst sometimes the fault of the men, were often due to conditions of machines. Partly because of the weakness of the machines, partly because of excessive grades and difficult conditions, bottlenecks developed in the loading. At times tandem, doubling, and shuttle loading had to be used and the limitations of the chain conveyors restricted the loading rate to a marked degree.

We have already indicated that the difficulties in grades accentuated the problems with the machines and it is quite possible that if grades had never become worse than 1 in 6, and chain conveyors had not been asked to carry coal for more than 300 ft., an important percentage of the stoppages and troubles may have disappeared. As it was, however, it was apparently quite uncommon to have all the equipment operating satisfactorily at the same time.

A great deal of evidence was given regarding the behaviour of the Union and the employees and the contribution made by these factors to the unsatisfactory production.

The ex-General Manager, Mr. Lightfoot, was by far the main accuser of both the Union and the employees in this connection. The attitude of the Union and the work effort of the men were, in his opinion, easily the greatest contributing causes of unsatisfactory production.

He indicated that the Queensland Colliery Employees' Union in particular had always had an excessive hold over the employees of the mine, had always insisted upon the operation of dargs and had adopted various means of restricting the work effort of the miners. He maintained that these restrictive practices were carried over from contract mining into mechanization even though the Union had explicitly agreed that they would not be thus carried over. (The Union and the employees, however, gave evidence strongly denying that there was any hidden darg under mechanization). Seniority levels and rigid control over overtime and Saturday work all hampered production and prevented the management from pursuing its plans to improve production.

Mr. Lightfoot, in particular, felt that part of the troubles so far as the Union was concerned, was that it was subjected to Communist influence and this influence was made manifest in a number of ways, but particularly in the obstacles placed by the Union in the way of filling the contract for the supply of coal to Korea. This contract was ultimately cancelled, and Mr. Lightfoot maintained that this was the result of pressure by Communists within the Union and of control over the Union, resulting in such low production as to make it impossible to comply with the delivery terms of the contract.

It was indicated that Union control, Communist influence, and the antagonism of the employees all made themselves manifest in a great deal of loafing, a continual lack of effort and a great deal of disinterest in the job to be done. Mr. Lightfoot maintained that it was difficult to get the employees to work specified hours and that as the result of carelessness, excessive spillage, and other factors, problems arose which need never have arisen if the morale had been satisfactory and the attitude of the employees not dominated by interests whose major purpose was to keep production low. The low morale and other adverse aspects resulted in a greater degree of indiscipline and insubordination, and these were not conditions under which production would flourish. Indeed, their effects were felt in all work segments of the mine, in installation, boring and shot-firing, timbering, cutting and loading.

Mr. Lightfoot went on to make the more serious allegations of sabotage and stealing. He gave some examples of sabotage. One was a detonator found on the return end of one of the main trunk belts, another was a large lump of coal found jammed between the return belt and the carrying structures, causing rapid wear, and again, there was some damage done particularly to a gate-end box, which action in Mr. Lightfoot's view, ranked as sabotage because it was a deliberate action. A fourth suggestion of sabotage was the continued mysterious stopping of the main belt conveyor.

We were unable to agree with Mr. Lightfoot's contentions in this regard as, in our view, the instances he gave were the result of carelessness, were accidental, or were the deliberate action of some individual or individuals, but were not a premeditated group attempt at sabotage.

The examples in relation to stealing were detailed and a prosecution was effected in one case. In the main, we consider that the stealing was greater than usual and more than would normally be found even in mines where stealing does occur. We think, however, it was probably worse in Collinsville perhaps than anywhere else and certainly more than in most other mines.

No other person approached Mr. Lightfoot either in the extent of his accusations against the men or in their vehemence. There was, however, sufficient evidence to indicate that the Union, through its influence on the men as well as the men themselves, did little to help production and indeed the men were careless and lazy. The evidence of the happenings on the very night of the disaster, prior to the outburst, indicates a poor work effort.

The fourth aspect which must share in the blame for low production was management. Whereas various management people, but most particularly Mr. Lightfoot, blamed the men for many of the troubles which culminated in low production, the men in the main felt that the major cause was the shortcomings of management itself.

In the first place, there seemed to be a fairly strong conviction that the wrong tunnel had been mechanized. It will be remembered that Mr. Lightfoot was in favour of, and proceeded to mechanize the No. 1 Tunnel, whereas the major opinion before that had been in favour of mechanizing No. 2. There were arguments in favour of each. The railway line, pit top equipment, workshop, screening arrangements, power house, and office buildings were all situated at the top of No. 1 Tunnel and as such represented a saving of 8th mile in transport of coal and employees working No. 1 Tunnel as against No. 2.

On the other hand, there was no good second intake in the No. 1 Tunnel to allow of efficient transport of men and materials and even the proposed second intake was by a tortuous route. Use of the conveyor belt road in No. 1 Tunnel therefore resulted in excessive dust. Furthermore, the grades appeared to be steeper in No. 1 than would have been experienced in No. 2 Tunnel and this alone would have been a most important consideration. It is interesting to note that the equipment originally anticipated for the No. 2 Tunnel was to be capable of negotiating grades of 1 in 6, but when finally ordered for No. 1 Tunnel was to operate in grades of 1 in 4-8. Furthermore, the grades were established in the No. 2 Tunnel from existing working places and bore holes and thus had a degree of certainty which grades in No. 1 Tunnel did not have. Again the length of life for proved working was greater in No. 2 than in No. 1 Tunnel.

Mr. Lightfoot's viewpoint in favour of mechanizing No. 1 Tunnel was supported somewhat by an independent witness in Mr. Fallins, though the latter did not really inspect No. 2 Tunnel. We believe, however, the majority opinion would have been in favour of mechanizing No. 2 Tunnel and the weight of evidence supports this choice. Nevertheless, we feel it could best be summarised by saying that it was a case where experts differed, and whilst we believe that results would have been better from No. 2 Tunnel, we are not prepared to criticise Mr. Lightfoot in his choice of No. 1 Tunnel.

There is little doubt that the difficulty of conditions taxed Management's ability to the full. It was somewhat surprising to us to find that even though results were so very unsatisfactory, there was not more flexibility of thinking on Management's part and more ingenuity in trying to find ways and means of overcoming the difficulties being experienced. A suggestion was made by one of the representatives of the company supplying the equipment for the use of angular pillars as a method of working, the opinion being expressed that this would have made flitting problems easier, would have lessened the grades and would have eliminated some of the time taken up by tandem loading. Any method which could even partially have accomplished these aims would have represented a major step forward and doubtless would have resulted in considerable extra production. No action appears to have followed the suggestion and we were surprised that it was turned down virtually out of hand when what had been tried for some time was still proving so completely unsatisfactory.

The men themselves thought that this inflexibility of thinking on the part of Management made itself evident in the lack of a systematic approach to the work. There seemed to be no rhythm attempted in the cycle of work and practices, and time and energy seemed to be expended without any real attempt being made to systematize the operations.

One of the conditions which contributed to some of the faults which developed was that the employees seemed to have been inadequately trained. They were given a minimum amount of training at the pit top before the machines were taken underground, but in all the circumstances this seemed completely inadequate. We believe that some of the conditions for which the men were blamed were really the result of never having been trained satisfactorily. This training was required at all levels. Extra training of the men would, we feel, have manifested itself in better results. The Overmen, too, should have had many more opportunities for training and many of their actions showed the lack of it. The Overmen in the main had had no previous experience of and no opportunity to learn their new duties in a mechanized mine, and they were feeling their way very often as much as the men.

In the case of top management, too, whilst Mr. Lightfoot had had excellent experience in mechanized mining, others would have benefited from seeing what was being done in this regard in other fields and would thus have been able to add materially and authoritatively in thinking, in planning, and in operating.

We believe it was management's responsibility to place greater emphasis upon training and this certainly would have helped to secure greater production. In like category was the lack of maintenance. Whilst Mr. Lightfoot in particular blamed the men for not carrying out the maintenance programmes, no real evidence was given that the maintenance programmes were actually ever properly planned. Furthermore, responsibility for maintenance was certainly never clearly determined, and we came to the conclusion that whilst the men did not carry out their maintenance duties in the way that may be desired, Management never clearly laid down responsibilities, and if only by inertia, largely acquiesced in the haphazard way in which maintenance work was conducted. For this we believe that Management must take the blame.

Whilst all of the foregoing matters had an adverse and possibly serious adverse effect upon production, it may be felt that the final cause for criticism of management—the number of surplus employees—would not come within this category. It is necessary to remember, however, that the working of the No. 2 Tunnel under day-wage conditions was one of the conditions included in the original mechanization proposal which was adopted by Cabinet. The working of the No. 2 Tunnel under these conditions operated only until February, 1954, at which time production ceased. The original idea was that the surplus employees, becoming available as the result of mechanization, would be used in the No. 2 Tunnel under hand-mining methods. Instead they were allowed to remain largely at the surface of the No. 1 Tunnel and thus added considerably to expenses without making any real contribution to production. That there were surplus employees both under contract mining, and under mechanized, seemed at all times to be recognised by Management and it was almost inexplicable that no steps were taken to remedy the position. We feel that alert and high calibre management would have dealt with this position promptly and efficiently.

We assume that the reason why hand-mining was not persisted with in the No. 2 Tunnel was the shortage of power but this factor should have been known at the time the provision was inserted in the submission to Cabinet. Apart from the fact that the terms of that provision were not therefore carried out, there was a loss of production of coal which could have been secured from hand-mining methods from the No. 2 Tunnel and which could have made some contribution to the position and some reduction in the loss sustained by the mine.

To recapitulate, therefore, we are of the opinion that the biggest single factor causing low production was the grades and the conditions experienced in the No. 1 Tunnel. These not only provided difficulties in themselves but increased and aggravated difficulties with the machines and the man and lowered the effectiveness of management. Had the grades improved considerably, we feel sure that much better results would have been secured ; whilst they continue as they are, they will remain a threat to satisfactory production. The loaders and chain conveyors did not operate satisfactorily though their performance was worsened by the difficult grades and conditions. Certain features and design caused breakdowns and stoppages which may not have occurred under better conditions but which under the difficult conditions experienced had serious adverse effect upon production.

The attitudes of the Union and the men left much to be desired. They showed little sense of responsibility or concern for the low production, gave inadequate co-operation and, in many ways, made even more difficult an already difficult management job. If the mine is to be continued, a much more constructive and co-operative attitude from the Union and the men will be essential.

Management had very difficult conditions to contend with and some of the steps it took could well be praised. In our opinion, however, it did not appear to be of that calibre necessary to deal with the severe difficulties (including the human problems) which ensued. It fell down somewhat because of its inflexibility in thinking, its practice at all times of explaining everything in terms of bad attitudes and practices on the part of the men (which was not justified) and its custon of looking everywhere else but in its own practices for causes of the difficulties. These things were most in evidence in the case of Mr. Lightfoot because, of course, the major responsibility for direction and decision lay with him

We believe that all of these four factors must be kept closely in mind in any decision as to whether and if the mine should be continued as a mechanized unit.

Our conclusions therefore are :-

1. In the years ended 30th June, 1954, and 30th June, 1955, mechanized mining was carried on for approximately seven months in the former and three and a half months in the latter. Work in the remainder of each period (subject to an intervening period of non-production after the disaster) was carried on under contract mining conditions.

2. For those financial years, the losses were £160,270 and £196,244 respectively.

3. Apart from the amounts made available by the Government for mechanization, grants from Consolidated Revenue were made of £150,000 to cover losses in the 1953-54 period and £180,000 for the 1954-55 year.

4. Easily the most important cause of the losses was completely unsatisfactory production. The figures were very considerably less than had been anticipated and barely exceeded the production previously gained under contract mining.

5. The four causes of totally unsatisfactory production were, in order of importance :-

Physical conditions—particularly excessive grades and (to a much lesser degree) bad roof conditions.

Faults and shortcomings in Machines and Equipment.

The unco-operative attitude of the Union and the employees and the resultant poor production effort.

Shortcomings in Management, particularly lack of flexibility and initiative in managerial planning and thinking.

6. Bad grades were the most important factor of all because of the adverse effects of such grades on all production agencies. They exercised a profound influence on the performance of the machines and on the attitudes and work results of the men and also not only imposed great strain on Management, but necessitated leadership qualities of high calibre.

7. It is not considered, however, that the totally unsatisfactory production under mechanization in any way invalidated the conclusions previously arrived at—that the Government's decision to mechanize the mine was the correct decision and that it took all the reasonable and prudent steps that could have been expected of it to give mechanization every chance of success.

TERM II D.

. . . and whether mechanized mining should be discontinued in that mine . . .

In deciding whether mechanized mining should be discontinued it is necessary to remember that there were strong and logical reasons advanced for mechanization in the first instance and mechanization should therefore only be discontinued if :—

(a) The original thinking was wrong,

(b) The reasons advanced in favour of maehanization in the first instance were wrong,

(a) Newer conditions taking the emphasis away from mechanization had arisen,

(d) The expectations and anticipations of higher production at lower cost were erroneously based, or

(a) If it became evident as the result of mechanization that mechanized mining was not the way out of the problems.

Nothing transpired in relation to the quality of the product which would cause any new thinking about mechanization. In the case of conditions in the mine however, a different situation had arisen. There was a strong case for believing that the results of the gas outburst projected into the future should not be taken as a reason for discontinuing mechanization. (The justification for this appears in Term III.). Furthermore, the roof conditions did not in themselves indicate a serious and continuing position. The grades, however, had begun to show only a very minor improvement and as so many of the production problems arose from this factor, it would appear futile to think in terms of any future plans for the mine without trying to overcome or lessen the adverse effects of the severe grades that had operated in the past.

In relation to the machines, the belt conveyor and the cutters had been satisfactory, the loaders had given trouble and the chain conveyors were quite unsatisfactory. Nevertheless some or all of these aspects could have been improved somewhat if extra managerial attention was given to improving the supervision, increasing the training, endeavouring to eliminate bottlenecks, improving maintenance, strengthening morale, and establishing proper workshops. In the final analysis, however, the ability of the machines to do a better job could well depend upon an improvement in the grades.

There would be room for considerable improvement on the part of the men both in work effort and attitudes and a great step forward under mechanization would take place if some means could be found to ensure that the work effort of the men was commensurate with what could reasonably be expected from them. It is likely that the experience over the last year or so may have made the men realise that over-production was really no threat to their own jobs, that mechanization had eased their work considerably and that mines which continued to make important losses are always in danger of being closed altogether and their jobs suspended and security affected accordingly. It is hoped that these factors will promote a very definite improvement in the attitude of the men and in the results they achieve.

An improvement in Management is also looked for, if only because a higher calibre of Management is necessary to meet more complex and different problems. Greater attention to the organisation of the work, to training particularly at operator and Overmen levels, to preventative and routine maintenance, combined with much more flexibility in thinking, much more initiative and much more determination to succeed in spite of difficulties and not to succumb to them will have to be and could reasonably be asked of Management. We are not unimpressed with the ability of some of the people associated with the mine, and therefore we believe that a much better work effort could be made by them than has operated in the past.

It is necessary to traverse these matters because without improvement in some or all of them, success in the future would continue to be extremely hazardous no matter what working plan was envisaged.

In relation to the future of the mine, Mr. Lightfoot suggested on 26th August, 19M, prior to his termination of employment that a reversion to part hand mining should be contemplated. Mr. Mollohan and Mr. Fallins also made certain suggestions, though these were designed to help in the case of individual shortcomings and difficulties rather than being a complete plan.

The Union suggested that hand mining should be reverted to in No. 2 Tunnel, but that in addition concentration should be made on the Dip Section in the mechanized mine so that a panel system could be developed and bords worked on a rotational system.

We have given a great deal of thought to the future of the mine and in order to base our conclusion on the best possible evidence, arranged for an extra bore hole to be completed. We suggest three alternatives, though the third is really a development of the second. The first involves a further capital expenditure of £1,700, which is partly required for an overhaul of all the present equipment. The scheme envisages the installation of subsidiary belt conveyors in the A.8 and B.8 levels and chain conveyors elsewhere on the "A" and " B " sides as shown on plan. (Annexure No. 38.)

The plan to drive down the main dip grading over the fault would be continued, and the main belt would be extended to cover this progress. Grunehing is recommended in main developmental working and when approaching a known fault. We also recommend the preparation of a new section on the " B " side and coal cutting on the afternoon shift, with shot-firing on the night shift.

This programme should give a production of say 900 tons per day and should make the mine a profitable venture.

The second scheme (Annexure No. 39) envisages a combination of the No. 1 and No. 2 Tunnels. Production in the No. 1 Tunnel would be as described in the first scheme, but in addition three new dips would be driven south-west of the fault. The main belt heading would be continued in No. 3 West by means of a graded drive down to the Bowen Seam on the south-west side of the fault. Two other places for ventilation would be necessary and from these entries three headings would be driven towards the south-west. Five headings could be driven to join with the No. 4 East level of No. 2 Tunnel so that not only would the two tunnels be connected, but several working sections could be developed.

Several major advantages would follow such a scheme. The great advantage in this scheme would be that the grades would be considerably eased, and as a consequence shuttle cars could be purchased to replace the chain conveyors, and this action in itself should help to speed up prcduction greatly.

A full description of the way in which this scheme could be implemented and the methods to be adopted appears in the Report.

Its cost however would amount to £34,700 but it would result in 1,125 tons per day, and provided this figure was reached as it should be the result would be a handsome profit.

The third scheme (Annexure No. 40) allows greater extraction from bords on the level and could be more applicable to heavier grades. Three headings could be driven to the rise and the bords broken away at right angles to develop a panel, the coal being fed to a conveyor belt in the middle heading. The coal could thus be won either advancing or retreating. Either shuttle cars or the present chain conveyors could be utilised. The third scheme using shuttle cars would require even more capital expenditure and the total would probably amount to £150,000. The figure of 1,125 tons per day should however easily be reached and indeed 1,350 tons per day should be obtained. Even if only 1,125 tons was won however the result would still be most profitable.

There is little doubt that the mine was intended to produce 1,500 tons per day under mechanization, and therefore if it was felt that the 550 tons which was actually realised would now be lifted to 900 tons, there would have to be some reason for this thinking.

Actually each of the schemes is based upon the assumption that the grades will ease and though this was the original thought in 1953 when mechanization commenced, there is much sounder ground for the contention now than there was then, because of the new bore hole which was completed at the request of the Commission.

In essence therefore as far as scheme No. 1 is concerned, it simply means that there is conjecture that the grades will ease and this in turn will mean easing all other adverse conditions thus enabling 900 tons per day to be produced. The virtue of the scheme lies in the fact that it requires only £1,700 by way of expenditure.

The second scheme follows on scheme No. 1, but in addition envisages joining No. 1 and No. 2 Tunnels and thus these grades can fairly accurately be worked out and would be much more favourable than others experienced in the No. 1 Tunnel. The expected increase of 900 tons to 1,125 tons is a very acceptable increase both in relation to the extra coal available and also in the increased profit. The adverse feature is in the amount of capital expenditure. It is however spread over a period of two years. We believe that these schemes would give an excellent chance of fulfilling the original aims of mechanization and of accomplishing these jobs. We believe too, that all the evidence points in favour of continuing the mine as a mechanized unit. As part of such a scheme we think that managerial consideration should be given to a number of other factors such as experimenting with various drilling patterns which should result in better preparation of the coal for loading, placing the responsibility for proper shot-firing on the Overmen and experimenting with the position of the horizontal cut in the seam and with simultaneous and/or milli-second delay shot-firing.

In addition it will be essential that considerable attention be paid to planned and preventive maintenance so that the machines will have every opportunity to produce at their best and the risk of break-downs and bottle-necks will be kept at a minimum.

There should also be full recognition of the benefits to be obtained from training and the adoption of methods designed to give Operatives and Overmen the maximum help from such measures.

With any of the plans as described, with a lifting of the determination of Management to make the mine a success and with more flexibility and initiative in its thinking, with more help and co-operation and a better will to work on the part of the men, we can find no reason why the mine should not be continued as a mechanized unit, nor why it should continue to make losses.

Our conclusions therefore are :—

1. Any approach to the question of whether mechanized mining should be discontinued can logically commence with acceptance of the validity of the original thinking in favour of mechanization and acknowledgment that the installation is a first-class piece of work.

2. The biggest single advance towards successful operation under mechanization would come from an easing of the grades and this would be helped and supplemented by a strengthening of the equipment. This still leaves plenty of scope for a great improvement in attitude and work effort on the part of the Union and the employees and the display of greater initiative and more dynamic leadership on the part of Management.

3. Having these matters particularly in mind, three schemes have been outlined in the belief that each offers opportunity for higher production and profitable operation of the mine. The first requires virtually no capital expenditure, should give 900 tons per day and at that figure an acceptable profit. The second scheme envisaging a combination of No. 1 and No. 2 Tunnels should mean considerable easing of the grades and should give a daily production of 1,125 tons

with enhanced profits. The second and third schemes would embrace the use of shuttle cars and would secure production of 1,125 and possibly 1,350 tons per day. The profits at such a production figure would be very considerable and make a valuable contribution to the liquidation of past losses but would mean a progressive capital expenditure over a two-year period of up to £150,000.

4. Any future working of the mine should embrace the adoption of a panel system of working, to allow of efficient sealing off in the event of spontaneous combustion.

5. Continuance of mechanized mining should include proper face preparation, a sound scheme of planned and preventive maintenance, and an enlightened approach to adequate training at all levels.

6. Consistent with the foregoing, the mine should continue as a mechanized unit. We believe it is capable of and should produce acceptable profits which in time should help to recoup the losses of the last few years.

TERM Di.

Whether, regard being had for the Safety, Health, and Protection of the miners, the use of the said Mine should be discontinued.

By far the most important factor for consideration in this matter is the likelihood of future outbursts of CO, in the mine.

We are satisfied that the deeper the workings go, the greater the likelihood of another outburst of this gas.

We believe that the seam is of such a nature as to inherently contain a high concentration of CO,.

When the seam is disturbed or broken and the coal is fragmented, we see no reason why the circumstances which were present at the time of the disaster should not be repeated elsewhere.

The sudden release of a volume of CO, which had been imprisoned under pressure in fragmented coal was the cause of the disaster, and if that gas had *originated* at the scene, then the same circumstances, which caused the build up there may well, under similar conditions, have caused a build up of a lethal concentration elsewhere, or if the CO, had migrated there, by way of water or as a gas, from some other place, by way of cracks or fissures, then CO, may well have migrated in a similar manner to other places where similar conditions exist as those which existed at the Dip.

We have carefully balanced the danger of another potential outburst with the economic value of the mine and we have reached the conclusion that the hazard is outweighed by all the other factors.

We feel confident that, if precautions are taken as we suggest, although other outbursts cannot be prevented, disastrous effects may be minimised or eliminated.

Apparently it was considered up to comparatively recently in the history of coal mining disasters, that boring ahead was the answer to likely outbursts, but the latest opinions on the subject all indicate that such boring ahead is of no advantage at all, except to discover any disturbance in the seam being worked which might be a breeding ground for gas under pressure.

Boring ahead will not allow the bleeding off of the gas in such quantity as to materially affect the pressure.

We think that the solution to the problem is in inducer shot-firing, coupled with other methods of working.

The method of working which we propose is that in all main development places and when proceeding towards a known fault, dyke or sill the bulk of the blasting be done when the least number of employees are in the mine, i.e., on the afternoon or night shift ; that as great a number of shots as is practicable should be fired at the one time ; that during shot-firing operations all employees should be withdrawn to a safe area ; and that the shot-firer in charge of the operation should fire from a distance (and under cover) of not less than 100 yds. from the face which he is so blasting.

What our recommendation really amounts to is this ; that in all main development places and when proceeding towards a known fault, dyke or sill as much disturbance to the coal face as is reasonably practicable, should be caused at the one time, so as to break any barrier which may be holding back gas under pressure, and that such inducer shot-firing should be done at a time and under conditions when the least number of employees are in the mine.

We do not advocate boring ahead, for the reason that we believe that, when working in virgin country or when approaching a known fault, dyke or sill, there should be an assumption made that there will be trouble ahead.

This means that we by-pass the intermediate step of advance boring or, in other words, we assume that advance boring has proved dangerous country.

We further recommend that, in all main developmental places or when proceeding towards a known fault, dyke or sill, the cutting machine should not be used but advance should be made by gruneching using Milli-Second Detonators. We bear in mind that the disaster in the Metropolitan Coal Mine at Helensburg, New South Wales, in 1954 occurred when a cutting machine was being used in the vicinity of a small fault.

In workings other than main development places and places known to be approaching a proved fault, dyke or sill, normal production methods (cutting, boring, shooting and loading) as in the past should continue, but we recommend that in simultaneous shot-firing all detonators used in the one operation should be of the same resistance.

Now that we know that the Collinsville Mine may be subject at any time to an outburst of CO,, we further recommend that vigilance in respect of Black Damp should be exercised at all times. We do not intend this recommendation to be read as implying any negligence in this regard in the past.

It was discovered after the outburst that almost pure CO, was emanating from the floor at the scene of the disaster and that almost pure CO, is coming from the floor in No. 4 West Dip and from the floor of No. 2 Tunnel.

Any indication of this nature in future must be carefully watched and chemical analyses should be made frequently and at all times when unusual accumulations of Black Damp occur.

It must be remembered that it is CO, which emanates from the coal and the Black Damp does not occur until the CO, is diluted in the atmosphere into which it is emitted, so that if Black Damp is traced back CO, will be found as the basis.

We feel that, if the precautions which we have outlined, both in this term of the Commission and also in Part D of Term II, are taken, nothing further can reasonably be done. We think such precautions are all that are reasonably necessary.

Apart from the likelihood of outbursts of CO_2, there is always the menace of emanations and accumulations of Black Damp.

These conditions are a hazard, altogether apart from the question of an outburst of gas under pressure.

We are satisfied that adequate precautions against this have been taken in the past and that the Deputies—the safety men—more than carried out their statutory duties in the way of testing and examination. We also believe that the Overmen, whenever any such danger existed, took good care of the safety of the miners themselves by ordering them out of such places and preventing entry by the erection of " No Road " signs.

However, on this point, the matter of ventilation is of the utmost consideration and we feel that the ventilation should be the maximum possible at working faces by means of ensuring by way of effective and efficient intakes that plenty of clean fresh air enters the working places and is not dissipated or tainted by weak or defective bratticing or doors, or by any tortuous passage through long intakes, or by passing through old workings where impurities may enter into its stream.

Although we feel it unnecessary, in view of what they have done in the past, we also counsel the safety men to be extra cautious and careful and persevering in their testing for the gas.

Apart for the likelihood of outbursts of CO_2, there is always the possibility of trouble arising from Methane, CH_4.

It is a non-gassy mine, but it can never be assumed that Methane, CH_4 will not be found in any coal mine. The Management therefore should always be vigilant.

We also recommend that the method of work should be so altered as to provide for panel working, whereby parts of the mine can be sealed off, leaving the remainder of the mine unaffected should spontaneous combustion occur in any part of the workings.

With regard to both gases, and the danger which might arise from either of them, we recommend that the method of egress be kept clear and any difficulty in the passage of such be eliminated. In fact, the management may well investigate what from a practical viewpoint is the best and quickest method of egress from actual workings and put that way into good order for use in case of trouble arising.

We further recommend that the Rescue Station be brought under the Act and that the equipment and rescue training be put on a sound footing.

We suggest also, that fire-fighting squads be organised both on the surface and underground to deal with any fires which may occur.

The only other factor regarding the safety of the mine arises from a consideration as to usages and practices and conditions which may be dangerous, e.g., inadequate ventilation ; bad roof ; unsafe methods of shot-firing ; and others to which we have referred in detail in the Report.

It is sufficient to say that these are matters of a temporary nature only, or in the nature of a hazard which is inherent in coal mining, or, in some cases, conditions which are remediable.

In all such cases, if any danger or hazard does exist, such danger or hazard can be removed by taking the appropriate steps which the position calls for.

Conclusions:—

(1) In relation to the general aspect of ventilation, no evidence was put before us to support the belief that the safety, health and protection of the employees are likely to be imperilled or endangered in the future working of the mine.

(2) Nevertheless we believe that the second intake should be completed at the point in 3 West as shown on Annexure No. 35.

(3) As it is almost certain that continuous emission of CO, will result in accumulations of Black Damp in the working places in the Bowen Seam, we recommend vigilant inspection and all the ventilation reasonably possible.

(4) We do not believe that coal dust is a menace at the mine and we see no reason why it should constitute one in the future. Nevertheless it is necessary of course to see that the Coal Mining Act is adhered to and complied with and the ordinary precautions taken after shot firing with stone dusting carried out when required.

(5) In relation to simultaneous shot firing, we believe that detonators should be grouped as to resistance and only those of the same resistance used in the same operation. In these circumstances, simultaneous shot firing could be continued.

(6) Where we have recommended grunching in place of coal cutting, delay action detonators should be used. In the Report we have recommended the use of milli-second delay shooting in certain places and this may require amendment to the Queensland Coal Mining Act, Clause 69, Schedule 2. We recommend that such amendment be made.

(7) We recommend that shot-firers should be the holders of at least a Deputy's certificate.

(8) We are of the opinion that a rescue station should be set up in the district under the Act, to serve the State Mine and Bowen Consolidated Mine, such station to be equipped with the necessary apparatus. The trainees should be properly trained, including training underground.

(9) Consideration should also be given to the organisation of a fire-fighting group among surface employees to deal with all surface fires and underground employees for trouble underground.

(10) The Chief Inspector of Coal Mines in Queensland should keep himself well advised on investigations being made by the Geological Department of the University of Sydney in relation to the problem of CO, outbursts.

(11) We recommend that in all main development places in addition to places known to be approaching a proved fault, dyke, or sill, that grunching with milli-second delay detonators should be resorted to, with no employees allowed within the area which would be affected in the event of an outburst, and the person engaged in the operation of shot firing to be no closer than 300 ft. on the intake side when the shots are fired.

(12) We are of the opinion that inducer shot firing, as suggested, will provide maximum safety for employees by inducing outbursts when employees are absent from any area likely to be affected in the event of an outburst.

(13) We further recommend that as much of the shooting of all places, as is reasonably practicable, should be done at a time when the least number of employees are in the mine and that as many shots as possible should be fired at the one time whether by inducer or simultaneous shot-firing.

GENERAL FINDING.

Regard being had for the safety, health and protection of the miners, the use of the mine should not be discontinued, either from the angle of unsafe practice, usage, custom or condition, or from the angle of the mine being inherently unsafe by reason of the likelihood of an outburst of CO_2 or any other cause.

TERM IV.

Whether regard being had to the public interest, the use of the said mine should be discontinued.

There is little doubt that in the past the State Coal Mine has helped to develop the coal resources of the State, has materially assisted in the development of North Queensland industries by making coal available at reasonable prices, has obviated extra strain on the Railways by minimising the haulage of coal, has saved the State and/or the North Queensland consumers large sums of money by making coal available close to the point of usage, and has given employment to anywhere between 200 and 400 men over a long period of years. It has thus contributed in substantial fashion to public interests in the past.

A close examination of the expected supply and demand position of coal requirements in North Queensland for the next five years or so, indicates beyond doubt that the demand is likely to continue to exceed the supply, even if the production of the State Mine is advanced to figures originally envisaged.

Under conditions as they operated until quite recently, maximum production by the State Mine was an absolute essential for the welfare and benefit of North Queensland. Recently however the coal production of the open-cut mine of Bowen Consolidated and the expected production of the present and a projected new underground mine belonging to the same company have introduced new factors into the position and have made a reassessment necessary. The production of the open-cut mine can be and is in process of being expanded to produce at the rate of 6,000 tons per week and the Bowen underground has also increased production.

It is likely therefore that if these plans of Bowen Consolidated materialised it would produce 300,000 tons per year from the open-cut, 100,000 tons from the underground, and with 50,000 tons from Mount Mulligan and other fields, the total available would be 450,000 which is approximately in line with the North Queensland estimated requirements for the future. As the open-cut is only likely to continue for four to five years, however, further arrangements would contemplate a new underground mine which would replace the open-cut production as the latter diminished. If this scheme was proceeded with therefore it would appear that, including the State Mine, there would, on present information, be a potential source of an adequate supply of northern division coal for North Queensland consumers for some four years ahead and with the advent of a new underground mine this position could continue.

Under these circumstances, the closure of the State Mine need not detrimentally affect the position of North Queensland coal supplies as would have happened up till this time. Once this matter is satisfactorily disposed of the closure of the State Mine would have certain advantages. It would finally obviate any future losses once any capital losses in disposing of the mine had been absorbed, and it would relieve the Government of any further special liability.

There would also be the further fact that the extra production from Bowen Consolidated would mean that the original purpose of the State Mine—to serve the North Queensland area with coal—would be accomplished, and indeed the open-cut coal could result in additional economic advantage to the North Queensland consumers. A private company (Bowen Consolidated), would be encouraged to spend large sums in the area and it may even be possible for the State Government to make a reasonably favourable arrangement with Bowen Consolidated whereby many of the State assets would be purchased by that Company.

There are however some serious objections to discontinuance of the mine. In the first place, North Queensland consumers would be dependent for their supplies virtually upon one company and it is felt that there is some serious disadvantage from the public interest standpoint in such a position. If the Bowen Consolidated programme was cancelled, postponed, cut down or not realised, North Queensland consumers would be exceedingly short of coal and the means whereby the State Mine could assist may have largely been destroyed.

Secondly it appears beyond doubt that the closure of the State Mine would impose severe hardships upon many employees, particularly those who own and have to vacate their houses in the Collinsville area, because they may have little chance of selling their assets for any reasonable sum. If they were forced to try and obtain employment in the Coal Mining Industry at a time when other mines were dispensing with the services of some of their employees, hardship may ensue. There seems therefore little doubt that from an employee aspect a strong case could be prepared for continuing the mine.

Thirdly, it is extremely doubtful whether any kind of reasonable arrangement could be made to dispose of the assets of the mine and large capital losses may result. Because of an on-site basis, Bowen Consolidated would have a very great advantage over any other likely purchaser in the nomination of any price for any or all the assets.

Some of the disabilities may be obviated and the advantages retained if the mine could be satisfactorily sold as a going concern or if some favourable arrangement could be made to lease the mine. Both of these courses however promote great difficulty and it is very doubtful whether any satisfactory arrangements could be made. Indeed it looks probable that the only arrangements possible would be those which, in the case of a sale, would result in large capital loss and in the case of a lease, may result in some kind of subsidy or unsatisfactory lease terms being necessary.

In the final analysis therefore it appears that the wisest course would be to continue the operations of the mine provided that there was some reasonable belief that future operating losses could be avoided. We believe that the plans outlined in the Report to accomplish this are sound and with reasonable co-operation by the men and a satisfactory standard of Management should be attained. Indeed we can see no reason why the mine cannot operate as a profitable unit to the extent of planning in the future to make some contribution to recouping the losses of the past. In order to do this however every advantage must be taken to strengthen Management so it will be well equipped to cope with any of the difficulties of the future.

We have some doubts as to whether the existing mine organisation with its dependence upon the Department of Mines is a satisfactory one, and we feel that there are better forms of control than those existing at present. We think the Government therefore should retain Ownership of the mine but should give consideration to turning the venture into a private company whose shares are held by the Government. This would clear the way for the appointment of a Board of Directors of at least one, possibly two technical men preferably well-versed in mechanized mining, one financial man, one businessman with general all-round management experience and one representative of either the Mines Department or the Treasury. This Board should be given the maximum degree of control consistent with the fact that they would be using public funds and that they must of course at all times be completely subject to the Minister for Mines. The Company should then be asked to operate within certain budgets and certain financial limits but subject to these factors the responsibility for the successful operation of the mine should be placed upon the Board and it should be given as much power and freedom of action as is consistent with the foregoing.

Even if a company status be not approved, we feel that it is at least strongly advisable that an Advisory Board be appointed and that it be of such a nature that its duties, functions and responsibilities be as close to the suggested Board of Directors as would be practicable.

Whilst we recognize that possibly a large amount for capital expenditure (in addition to that already found by the Government) would be necessary and there would still be some risk of future losses accruing (with a certain substantial loss for the year 1955-56) there is, we believe, every possibility of profitable trading after 1955-56, and we believe it would be in the public interest that the Government should continue the operation of the mine. If however losses did continue for a further period of two years (that is into 1957-58), the whole matter of continuance should then be reconsidered.

Some less important matters have been included in Term V. In the matter of Overmen we suggest that their duties and qualifi cations should be clarified and that they should at least have the qualifications of a Deputy. In addition we think it desirable that at all times when on duty, they should carry both an oil and an electric safety lamp.

In the case of Deputies we believe it to be undesirable that they should belong to the same Union as the miners. Furthermore there is much to be said for a pass in a written examination to be necessary for appointment as a Deputy.

Finally we feel that morale in Collinsville would benefit greatly from an all-weather road. We know that this is within the province of the Local Authority, but we feel it should be referred to by us because of the benefits likely to accrue to the mine.

TERM IV.

CONCLUSIONS.

1. The Collinsville State Mine has in the past made an important contribution to the development of North Queensland.

2. The coal demands of North Queensland were in the region of 450,000 tons for the calendar year of 1955 and an increase of 5 per cent. per annum on this figure is expected for the future.

3. This would ensure the acceptance of all the coal which the State Mine could produce were it not for plans by the Bowen Consolidated to expand open-cut output to a figure which, with its underground mine, would virtually ensure meeting all demands for the next four or five years which would be the open-cut life. The introduction of a new mechanized underground mine of like output would replace the open-cut at the end of that time. This would mean that North Queensland consumers would become independent of the State Mine supplies.

4. There are, however, serious disabilities in the scheme, as for example, one company would virtually obtain a monopoly for the supply of all North Queensland coal with all the weaknesses and problems that such a monopoly might bring.

5. The closing of the State Mine would almost certainly mean great hardship upon the employees, many of whom may well lose their assets by being forced to look elsewhere for work. There may be a further indirect result wherein it may become difficult to entice labour to Collinsville for future requirements.

6. As a result of a careful assessment of the arguments for and against discontinuance, we believe the mine should, in the public interest, be continued.

7. On balance, we believe that sale of the mine as a going concern at an acceptable price or leasing at an acceptable rent are impracticable at this stage and would create many problems.

8. We believe that the Government should give consideration to the future organisation of the mine, preferably turning it into a Company with the Government holding all the shares and appointing a Board of Directors which would give expert assistance to Management.

9. Finally, if profitable operation of the mine is not reached for the year ended 30th June, 1958, we believe the question of the future of the mine should be examined afresh.

TERM V.

CONCLUSIONS.

1. We believe that the Overmen should at least have the qualifications of a Deputy and their status, duties and qualifications require clarification.

2. The Overmen should at all times while on duty carry an oil safety lamp and an electric safety lamp.

3. Consideration should be given as to whether it would be wise to submit the Deputies to a written examination.

4. Full support should be given to any project which has as its objective the building of an all-weather road between Bowen and Collinsville.

REPORT

TERM I.

The disaster of the 13th October, 1954, in Tunnel No. 1 of the State Coal Mine, Collinsville, and the causes and circumstances of and relating to that disaster, and, in particular, whether there was any omission to take reasonable precautions to avoid that disaster in the course of mining operations in the said Tunnel No. 1, and whether the conduct of the Owner, the Management, or any employee was a contributing cause of the said disaster.

Term I.

A. The disaster of 13th October, 1954, in Tunnel No. 1 of the State Coal Mine, Collinsville ;

B. And the causes ;

C. And circumstances of, and relating to, that disaster ;

D. And, in particular, whether there was any omission to take reasonable precautions to avoid that disaster in the course of mining operations in the said Tunnel No. 1 ;

E. And whether the conduct of the Owner, the Management, or any employee, was a contributing cause of the said disaster.

It will be observed that different aspects of the disaster are within the scope of our Inquiry. Such aspects are sufficiently demarcated in the setting out of the term as above, and we propose to deal with them in that order.

Different aspects of Term I.

A. Meaning of the word " Disaster."

B. Causes of the Disaster—

Various gases in, or suggested to be in, the Mine :

Carbon Dioxide, CO,
Black Damp
Methane, CH,
Sulphuretted Hydrogen, H_2S
Sulphur Dioxide, SO_2
Carbon Monoxide, CO

Cause of Death.

C. Circumstances of and relating to the Disaster.

Definitions.

Evidence of witnesses relating to Disaster.

Foundations for our Findings.

Evidence of Victor Reginald Cundith, Senior Analyst.

Results of clearing operations and testing up to date, including the examinations made by Mr. Cribb, Government Geologist—and our own observations.

D. Whether there was any omission to take reasonable precautions to avoid the disaster, in the course of mining operations in Tunnel No. 1—

Noxious gases :

Methane, CH,
Carbon Monoxide, CO
Sulphuretted Hydrogen, H_2S, and
Sulphur Dioxide, SO_2
Black Damp, and Carbon Dioxide, CO,.

Deputies' Reports.

Witnesses' evidence.

Possibility of escape if companion headings kept up.

Finding.

E. Whether the conduct of the Owner, the Management or any employee was a contributing cause of the disaster.

Finding.

Summary of Findings.

TERM I A.

THE DISASTER OF 13th OCTOBER, 1954 IN TUNNEL No. 1 OF THE STATE COAL MINE, COLLINSVILLE.

We treat the word " disaster " as meaning and including—

(1) The actual happening on the evening of 13th October, 1954 ; and

(2) Its consequences, namely—

The death of seven men, Alex Parkinson, Peter Miller, Henry (Pike) Peterson, James Reid Logan, Arthur Shrubsole, Frederick Ernest (Mick) Walker, and Herbert (Bert) Ruff ; the temporary disablement of others, including Arthur Conrad Munro and James Alfred Baker ; and the resultant damage to the mine workings and production.

TERM I B.

THE CAUSES OF THE DISASTER.

(1) We are satisfied, and so find—

(a) That the disaster was caused by an outburst of gas from, or in the immediate vicinity of, the face of the workings at the Dip in the Main Heading of the Mechanized Section No. 3 West No. 1 Tunnel ;

(b) That such gas was almost pure Carbon Dioxide CO„ probably about 98 per cent. ;

(c) That such other gases as may have been present in the outburst, i.e., Methane, CH, ; Sulphuretted Hydrogen, H_2S ; Sulphur Dioxide, SO, ; or Carbon Monoxide, CO, were in so minute a proportion as not to warrant any finding that they or any of them were in any way a material contributing factor to the lethal quality of the outburst gas, containing as it did CO, in such proportion as to almost, if not entirely, exclude oxygen ;

(d) That such outburst gas was released at such pressure and in such volume as to cause the disaster ;

(e) That the outburst occurred at about 5.50 p.m. on the evening of 13th October, 1954 ;

(1) That such gas was held at such pressure by absorption or adsorption in or to the coal in such place, sufficiently near to, or connected with the Dip workings, as to have been ready to erupt or break out, when the pressure overcame whatever resistance may have been theretofore offering ;

(g) That the gas was in great volume when released, probably of the order of 500,000 cu. ft. ;

(h) That the gas was so held by reason of some fault, roll, sill, dyke, igneous intrusion, or other disturbance of the Seam, i.e., the Bowen Seam, causing such a fracture, grinding, and pulverization of the coal, as to allow the gas to be so imprisoned in the disturbed, broken and fine coal ;

(i) That the nature of the disturbance as revealed by the Report of Mr. Cribb, Government Geologist, dated 14th October, 1955, and plans dated 30th September, 1955, showing the results of test borings, was an igneous intrusion, coupled with a down throw fault causing a displacement of the Seam of approximately 15 ft., with considerable disruption at the break ;

Copies of such Report and plans are annexed. (Exhibit 178.) Annexures Nos. 1, 2 *(a)*, 2 (b) and 2 (c). **Annexures Nos. 1, 2 (a), 2 (b) and 2 (e).**

That the nature and quality of the coal in the Bowen Seam is such that, even in its undisturbed state, it holds or contains 00_2, which is given off more freely when the coal is broken or disturbed.

(2) It is probable that, where seams outcrop as these of the Bowen field do, some of the CO_2 inherent in the coal escapes through the outcrop, but that a depth is reached eventually, when the gas cannot escape through the outcrop, and therefore remains in the coal giving rise to a possibility, if not a likelihood, that when the coal has been disturbed and fragmented at such depth by some terrestrial movement, a volume of CO_2 under pressure may be imprisoned therein.

(This outburst occurred at a depth of 610 ft. from the surface.)

(3) We are unable to say with any degree of assurance what caused the barrier opposing resistance to the imprisoned gas to break.

Although some witnesses stated that they heard a shot, or something like a shot, fired, the evidence appears conclusive that no shot was fired immediately prior to the disaster.

According to the evidence of William Buchanan, only one hole had been ready for firing.

During the clearing-out operations on 24th March, 1955, when some coal had been loaded, out from the right-hand side of the Dip face, the shot hole which had been bored and charged prior to the disaster was revealed standing with its charge still in the hole. A power-borer head was also seen lying to the right of the hole, covered over.

On 31st March, 1955, a power-borer drill was seen standing up at the face, and a power-borer head and a length of cable were recovered from the Dip face near the right-hand rib.

On 2nd April, 1955, a tamping stick was recovered in two pieces, from alongside the right leg of the last set of timber erected before the disaster.

On 4th April, 1955, a drill was seen standing at the Dip face, and on 13th April, 1955, two power-borer drills and a pick were discovered at the Dip face.

Apart from this seemingly conclusive evidence, the cutting machine had been left close up to where the men had been working, and was buried by the erupted coal.

No exploder battery was found in A.13, a position in which it would most likely have been, had it been used to fire the shot. We realise that a single shot might well have been fired from an attachment to the shot-firer's head light battery.

Buchanan's evidence is that when he left the scene about six minutes before the outbreak, Peterson, the shot-firer, had expressed his intention to fire the single shot ; that the one hole had been bored three feet from the right-hand rib and about three inches over the water ; that it had been charged and stemmed and that Peterson was then actually handling the cables which would make the connection between the detonator and the battery. His evidence goes no further in this connection.

The face had been cut and shot on the afternoon shift of Monday, 11th October, i.e., 4 p.m. to 12 midnight.

The coal so shot had been loaded out on the day shift-8 a.m. to 4 p.m.—of Tuesday, 12th October, revealing faulty, soft coal on the right-hand side of the Dip in the face and floor. Holes nine feet deep had been bored into this faulty coal in the face and floor, the whole depth of each being in coal.

The Dip had been timbered on the afternoon shift-4 p.m. to midnight—of 12th October.

On the day shift of 13th October, an attempt had been made to cut the face. The blade had gone in on the right side into the faulty coal to a depth of about 8 ft. and had cut an arc of about 4 ft. on that side and about 18 in. from the floor, when the machine became disabled on the soft floor.

The next operation was on the fatal evening, when the one hole already mentioned was bored, stemmed and charged.

An attempt was then made to bore another one about 21 to 3 ft. from the first and about the same height, i.e., 3 in. over the water on the floor. The borer then gave trouble, apparently electrical.

Buchanan is unable to say how deep were the holes, but it is likely that the first was to a depth of about 7 ft. 6 ins. and the second one about half that depth or a little more.

After Buchanan left we do not know what any of the deceased men did at the face.

We have pointed out what work had been done on the face and on the floor from the 11th onwards, as far as we can discover from the evidence.

We incline to the view that the workings had progressively lessened the resistance to a stage when without the sudden intervention of any particular new agency such as the firing of a shot, the force of the imprisoned gas exceeded the opposing force and so the gas broke out.

VARIOUS GASES.

(4) The evidence suggests the presence of *Carbon Dioxide, Methane, Sulphuretted Hydrogen* and *Sulphur Dioxide* in the outburst gas, and *Carbon Monoxide* has also been mentioned as a gas present in the mine. We therefore think it desirable to refer to the qualities of these various gases and also Black Damp and their effect on human life.

(a) Carbon Dioxide, CO_2, is a chemical entity, 27 per cent. Carbon and 73 per cent. Oxygen by weight. The Oxygen is not free. The specifiic gravity is 1.53 so that if pure or present in sufficient quantity with other gases in any combination, e.g. Black Damp, it or such will, like water, sink to the lowest level available. It is a colourless gas but has a slight pungent smell. It has a slight acid " soda water " taste. It is not combustible nor explosive. It is an extinguishing gas and will, if in sufficient quantity in the atmosphere, extinguish a safety lamp. It is formed by the oxidation or combustion of coal, timber, or other matter, or by the breathing of animals or men. *It is given off by coal in certain coal mines.*

The effect on human life is twofold-

(i.) Its operation when present in an aspirable atmosphere, i.e., when sufficient Oxygen is present to maintain life ; and

(ii.) Its operation when present under such circumstances as result in the absence of Oxygen in sufficient quantity to maintain life.

Apart from the effect of its presence in relation to Oxygen in any given atmosphere, it has a narcotic effect when present as a percentage of 10 or over.

In therapy a proportion of 10 per cent. CO, and 90 per cent. Oxygen is used.

In a document presented by the Medical Division of the Joint Coal Board, New South Wales, and prepared in collaboration with the Division of Industrial Hygiene and the Departments of Mines and Public Health, New South Wales, it is stated-

> " Up to 10 per cent. CO, in the air causes increased respiration. Higher tends to act as a narcotic, if the Oxygen content is normal. Usually, however, Oxygen content is lowered considerably and death may result from suffocation."

In a text book prepared by the Department of Public Mines, New South Wales, 1948, it is stated, *inter alia,* that CO, forms .03 per cent. of the atmosphere ; that it causes a pricking sensation in the nose ; that when the percentage in the air reaches three to four, man experiences a slight difficulty in breathing, but with an increasing percentage in the air, breathing becomes noticeably deeper and more frequent ; at 6 per cent. there is marked panting, with increased frequency of the pulse ; at 10 per cent. there is violent panting, flushing of face, throbbing of arteries, and headache ; beyond 10 per cent. it begins to have a narcotic effect, and at 11 per cent. unconsciousness may occur but a man soon recovers when given Oxygen or fresh air to breathe ; 50 per cent. will soon cause death. Small quantities of it cause the safety lamp to burn dimly.

In Queensland, under Clause 2 (4) of Schedule 2 of " *The Coal Mining Acts,* 1925 *to* 1952," provision is made that-

> " A place shall not be deemed to be in a fit state for working or passing therein if the air contains either less than 19 per cent. of Oxygen or more than 11 per cent. of CO,."

We present the following table showing the effect on man of absence and presence of various percentages of CO, in combination with other gases :—

	Percentage.		
	Oxygen.	Nitrogen.	CO,.
Precarious to life (No 002 present)	10	90	Nil
Precarious to life (CO, replacing Oxygen)	16	79	5
Precarious to life (CO, replacing Oxygen and Nitrogen). .	19	71	10
Fatal to life (No CO, present)	5	95	Nil
Fatal to life (CO, replacing Oxygen)	13	79	8
Fatal to life (CO_2 replacing Oxygen and Nitrogen)	17.8	67.2	15

(b) Black Damp is not a chemical entity like the other gases but is mainly CO, and Nitrogen with Methane sometimes present also. The composition is variable, being on an average 87 per cent. Nitrogen and 13 per cent. 00$_2$, but it may be pure Nitrogen or contain over 30 per cent. of CO,. It has no colour, but has a slight smell and taste due to the CO, present. It is non-poisonous if Carbon Monoxide is absent. *However, by diluting the air it may decrease the amount of Oxygen available for respiration.* It is incombustible and non-explosive. Small amounts cause safety lamps to burn dimly and larger amounts will extinguish them. It will not cause symptoms of poisoning or asphyxiation when mixed with sufficient air to enable a lamp to burn. It is found usually on the floor or lower part of mine workings, due to the presence of CO,.

(c) Methane, CH_4. 75 per cent. Carbon and 25 per cent. Hydrogen by weight with specific gravity of .55. It has no taste, colour nor smell. It is non-poisonous, but does not support life. It burns rapidly, causing a blue flame in the safety lamp. It is given off by some coal and is the main constituent of Fire Damp, or natural gas. It will rise to the roof. It is explosive when mixed with sufficient air to support combustion. The lowest limit of its inflammability is 5 per cent. by volume and it may be detected on the safety lamp if present in a 11 per cent. proportion.

(d) Sulphuretted Hydrogen, 11$_2$S (Stink Damp—Rotten Egg gas) is 6 per cent. Hydrogen and 94 per cent. Sulphur by weight, with specific gravity of 1.19. It has no colour, but has a sweetish taste, and a powerful pungent odour resembling that of rotten eggs. It is very poisonous. Atmospheric concentrations of .05 per cent. =one part in 2,000—will cause severe irritation of the eyes and respiratory tract in half an hour, with risk of pneumonia and damage to the lungs which may prove fatal. The maximum allowable for prolonged exposure is .002 per cent., i.e., 20 parts in a million. It may be detected by smell in concentrations as low as three parts in a million. Indeed, the medical witness at the Inquiry, Dr. McEniery, in an experimental test, detected the smell in a concentration of one part in 1,500,000 (11 million). It is combustible, the lowest percentage of inflammability being 41 per cent. Its presence may be due to the heating of the coal or strata.

(e) Sulphur Dioxide, SO_2, 50 per cent. Sulphur and 50 per cent. Oxygen by weight, has a specific gravity of 2-26. It has no colour but has an acid taste and a pungent " burning Sulphur " smell. It is highly poisonous. Atmospheric concentrations of •05 per cent. =one part in 2,000—are dangerous for short exposures. Maximum allowable concentration for prolonged exposures is •001 per cent.=10 parts in a million. It is incombustible and non-explosive, and is usually caused by the heating or burning of coal containing Sulphur.

(f) Carbon Monoxide, CO, 43 per cent. Carbon and 57 per cent. Oxygen by weight, with specific gravity of -97. It is colourless and tasteless, but has a slight odour of garlic. It is highly poisonous. It is combustible and explosive, the lowest limit of inflammability is 121- per cent. It is formed by incomplete combustion of coal, timber or other material. Atmospheric concentrations of .4 per cent=4 parts in 1,000 are fatal in less than an hour. Less than •01 per cent.= one part in 10,000 are considered safe.

(5) Bearing particularly in mind the evidence given by Dr. McEniery and Deputy McPherson, Cecil Dunlop and Aubrey Jaques, and the various analyses made, to which we will later refer, the outburst gas would seem to have consisted of a mixture of about 98 per cent. CO, with CII_4 the highest other constituent, and probably some minute trace of H,S. The Sulphur gas may have arisen from the grinding and heating process in the original disturbance.

(6) We find it convenient to give the reasons for our findings and opinions later in this Report.

CAUSE OF DEATH.

(7) We find that the cause of death of the seven men :

Alex Parkinson,
Peter Miller,
Henry Peterson,
James Reid Logan,
Arthur Shrubsole,
Frederick Ernest Walker, and
Herbert Ruff,

was—

Asphyxiation due to the inhalation of an irrespirable atmosphere containing such a high proportion of Carbon Dioxide as to exclude the oxygen necessary to maintain human life.

TERM 1 C.

CIRCUMSTANCES OF, AND RELATING TO, THE DISASTER.

Definitions.

Various technical words and expressions were used in evidence and are used in this Report.

" *Dip*" is used—

Sometimes to describe the main tunnel in the mechanized section,

Sometimes to describe the actual face and the immediate vicinity of the face of the workings in that tunnel,

Sometimes to refer to the whole of the workings in that section, and

Sometimes to describe any down grade tunnel or down grade workings in the mine in either No. 1 or No. 2 Tunnel.

" *Mechanized Section,*" " *Machine Section,*" and " *No.* 3 *West No. 1 Tunnel* " all refer to the same part of the mine.

" *Black Damp*" is used in miners' parlance for CO, but, as we have seen, these gases are not identical.

" *Inbye*" and " *Outbye*" are expressions used to indicate that a particular place is further from or nearer the surface in relation to some other place.

The words " *Lamp* " and " *Light* " are used to denote the Deputies' oil safety lamp and the miners' head light respectively.

To lend clarity to our Report, we annex :-

Annexure No. 3. A plan of the mine produced to us as required to be kept under section 86 (1) of " *The Coal Mining Acts,* 1925 *to* 1952." (Exhibit 1) *Annexure No. 3.*

Annexure No. 4. A comprehensive plan of the scene of the disaster, showing the various particulars according to the legends therein contained. (Exhibit 2.) *Annexure No. 4.*

Several witnesses gave evidence as to the happenings on 13th October, 1954, immediately before, at the time of, and immediately after the outburst.

Evidence was also given as to the conditions and happenings in the mine at times more remotely distant, both before and after the disaster, such evidence being mainly directed to the presence of " Black Damp," and, as such, seems to us to bear on the circumstances relating to the disaster. This evidence is also material to Term III of the Inquiry.

It is impossible to synchronise the evidence given by some of the witnesses as to what happened immediately prior to the outburst. The discrepancies may be due to lack of memory, faulty gauging of times or, in some cases, may be due to an attempt to conceal or cloak a general inactivity in the working of the mine on this particular evening.

We think the evidence does disclose a very loose system of work, poor both in arrangement and effort. We propose to deal with the evidence of each witness and comment thereon.

THOMAS HENDERSON ALLAN, Overman in charge of the afternoon shift at the time of the disaster.

He has had 36 years' experience in coal mining, 11 years in Scotland, 20 years at Bowen Consolidated Mines Ltd., and 5 years at the State Mine.

He held a Deputy's Certificate, which corresponds to a third-class certificate in New South Wales.

Neither he nor any of the other Overmen, including the senior who at times acts as Under Manager, held a second-class certificate or higher.

Some criticism has been expressed in this connection and we have looked at Sections 59 (1) and 59 (2) and Schedule III, Clauses 8 to 35, of the Act.

We do not feel called upon to interpret these provisions but we do say that some confusion must arise in the State Coal Mine as to the power, duties, responsibilities, and qualifications of an Overman, back shift or otherwise, and *we recommend that the position be clarified.*

Allan was in control underground, neither the Manager nor Under Manager being on duty there.

He commenced work at 3.45 p.m. and took charge at 4 p.m. when the afternoon shift commenced. He had 42 men under him. They were—

Two Deputies—Peter Miller, deceased, and Douglas McPherson ;

Three fitters, two of whom came on shift and one who carried on from the preceding shift ;

Two carpenters ;

One electrician ;

Three drivehead men, at Nos. 2, 3, and 4 driveheads respectively ;

One winch driver ;

Four transport men employed on the rope haulage ;

Eight timber men in two crews of four men each, one gang under T. Whyte, which went to A.8 Level, and the other gang, consisting of Dunlop, Lavercombe, Torkington, and James Alfred Baker, which went to B.8 ;

Three loader men in one crew : Frederick Ernest (Mick) Walker, deceased, Arthur Shrubsole, deceased, and Herbert Ruff, deceased, Ruff was the crew member who attended to the conveyor. This crew went to B.10 ;

(As we understand it, two men operate the loader and one man attends to the delivery of the coal onto the belt or chain conveyor as the case may be, cleaning up spillage.)

Three loader men in another crew, comprising Harry Hansen, D. Staples, and W. Davis (the latter doing a double shift and attending to the conveyor). This crew had originally gone to B.7 but, a fault having developed in the loader therein, they had been sent to A.11 ;

Two shot-firers—Aubrey Jaques, who went to A.7 and Henry Peterson, deceased, who went to the Dip. Peterson was an experienced miner, with due care for safety ;

Four cutter men—Alex Parkinson, deceased, leading cutter man, who went to the Dip (he was an experienced and good miner, with a proper regard for safety), C. Grieves, an experienced miner, who went with Jaques to A.7, James Reid Logan, deceased, an experienced miner, who went to the Dip, and William Buchanan, spare machine man, who also went to the Dip as a learner and to do message work ;

Two horse drivers—J. Thomas and R. Brunker, who were trying to take timber to A.12 at the time of the disaster ;

Two shift men who were assisting the fitters ; and

Two shift men cleaning spillage along the No. 4 trunk conveyor belt.

It will be seen that A. Parkinson, J. R. Logan, and H. Peterson were in the Dip and F. E. Walker, A. Shrubsole, and H. Ruff were in, or in the vicinity of, B.10, and P. Miller, Deputy, might have been anywhere in the section. All seven lost their lives. Others, including Baker and Munro, were affected but recovered.

c. 5.10 p.m. Allan stated that at about 5.10 p.m. he visited the Dip face. He spoke to A. Parkinson and saw J. R. Logan there also. No holes had been bored and no work had been commenced. He took it for granted that the shot-firer H. Peterson and the spare man Buchanan were away drawing their explosives and making things ready for work. Everything was then perfectly normal. There was bubbling on the floor, which bubbling had been there for some time. It was a common occurrence in the Dip in the machine section. It has also been noted in different places in No. 2 tunnel. The bubbling did not apparently give Allan any concern.

(It is important to remember that there was usually some water lying on the floor near the face of the Dip and in fact there was a pump installed to deal with it).

He stated that, on the evening of the disaster, at the tunnel mouth, he gave instructions as to their work to the loader crews, the timber men, cutter men and labourers. He then went down the mine to the Report Room at B.4, where he saw Vince Davis, Deputy of the preceding Shift, who told him things were all right. Allan intended to grunch the Dip and Davis told him that he would find it a bit quieter there, the bubbles were not so high.

Allan said that he left Davis at B.4 and went down into B.7, which he had to load, then to B.8 to see if there was timber there to start the timber crew, then to B.10, which was to be loaded out. He there spoke to Walker and Shrubsole, who were picking down loose coal from the face. Whilst there, Shrubsole continued picking and Walker commenced hosing down the coal.

On going out of B.10, Allan saw Ruff cleaning spillage along the chain conveyor in the main dip heading. (Allan makes no mention of a visit to the crib room at A.9 at about 5 o'clock when some of the men were having a cup of tea or had had a cup of tea, although other evidence is that Allan did make such a visit.)

Allan stated that he went to the Dip after seeing Ruff. He did not see Thomas nor Brunker on the way down. At the Dip he saw Parkinson, who asked, " What will we do ?" Allan told Parkinson to grunch the Dip and Parkinson passed a remark that " It looks as if they had some fun there," referring to the cutter. This machine had been drawn back from the face with the back end leaning towards the left-hand rib, the blade extending across the water towards the centre of the bord. The cutter head was turned over for proposed use as a platform to stand on for the boring of the holes (thus obviating standing in the water). The machine had made a partial cut 3- ft. from the floor. (Morgan says 18 in. from the water.)

The brattice had been carried to about 6 feet from the face.

Experienced shot-firers and miners determine where holes are to be bored. Usually there is one series of five below the cut and two series above.

The full depth of the cut is 8 ft. to about 8 ft. 6 in. and the holes are bored to a depth of 6 in. less than the cut.

Allan stated that the men commenced to leave the surface at 4 p.m., the last man leaving by about ten past four, followed by himself. It takes 25 to 30 minutes to reach the face. Allan said that at 5.50 p.m. Hansen and his crew had started in A.11, having previously gone to B.7 where the loader had failed. Work had started in B.10 by Walker and his crew. Whyte's timber gang had started in A.8 and Dunlop's gang in B.B.

c. 5.50 p.m. *The time of the disaster was about* 5.50 *p.m.* Just prior to that, Allan spoke to Buchanan on the outbye side of the brattice across the main Dip heading just below A.9. At about 5.50 p.m. Allan passed through that brattice with the intention of going back to the Dip to see how the men were getting on with grunching the face. He had already given instructions for that to be done. He also intended to check up the timber in A.12.

When he passed through the brattice and straightened up, he saw a " dirty grey " haze coming up from the direction of the Dip. He was the only person just inbye the brattice at the time

(We think the outburst gas was colourless. The haze as described by the various witnesses " dirty grey," " grey," " ashes," " fog," " bluish or whitish like cigarette smoke," was, we think, caused by the particles of coal and dust blown along by the immense pressure of the gas, as revealed to each individual by his head light. The haze may also have been caused by the expanding CO_2 gas at low temperature meeting the warm mine air.)

Allan started to run towards the Dip face. He suspected an outburst of gas almost immediately. He recalled the Report relating to a pocket of Black Damp found on the dog watch a few days earlier (i.e., Friday, 8th October). He suspected Black Damp. His suspicions were confirmed when his breathing became affected as he got the " first little whiff " while he was running down the Dip towards A.10.

He got as far as A.10 but was unable to use the telephone at the corner of the main heading and A.10 on the lower rib of A.10, because of the gas. As he described it, he was too busy saving himself.

He went through the door in the brattice at the entrance of A.10 and into A.10. The door was closed. There was haze in A.10 but not as thick as it was in the main dip heading. He made for the main air intake coming down from A.9 to A.10, turned right into the cut-through from A.9 to A.10, through the brattice door, into the intake and so up to A.9.

A study of Annexure No. 4 shows the route he took.

At A.9, he found that the haze was " petering out." He turned to the right and went through the door in the brick stopping and so into the area in A.9 near the main heading containing the crib room and fitters' room.

There were other men in that particular area.

He gave instructions to someone to go to the No. 4 Drivehead and telephone the surface and get in touch with the Manager and tell him to stand by the phone until he, Allan, spoke to him, that something had happened in the Dip.

(The belt is in four sections, each driven by a drivehead at the beginning of the particular section. No. 1 extends from the surface to about half-way to the turn-off to No. 3 West Heading ; No. 2 from such position to the turn-off to No. 3 West Heading ; No. 3 from such turn-off to about half-way to B.10 ; and No. 4 from such position to B.10.)

He also gave instructions to Deputy McPherson, who was in the vicinity, to short-circuit the air into the Dip workings by opening all doors on the intake side to give free passage of air into the Dip.

Allan was outbye the brattice across the main heading near the crib room when Harry Hansen, who had been in A.11, came along. Hansen told Allan that there was a big fellow down in the main heading but that he, Hansen, could not move him. Allan went through the brattice below A.9 and down the main heading. He found the man, Frederick Ernest Walker, lying near the end of the belt with his head up the Dip. He could not move him. (The positions in which Walker and the other men were found are shown in Annexure No. 4.)

Allan had to retreat behind the brattice. He called for and secured ropes. Two were tied together and a loop was made at one end. Others paid out the rope from the brattice and Allan went back to Walker, followed by T. Whyte, timber man.

Walker was brought out by means of the rope and handed over to Ron Fordham, a timber man in Whyte's gang and an honorary ambulance bearer, for artificial respiration.

Allan and Whyte again went forward down the Dip with the rope and found Arthur Shrubsole in the position indicated in the plan. By the use of the rope and the efforts of the others at the brattice, he was brought out in a similar fashion.

At that time, the haze was clearing a little but Allan was having difficulty in breathing. Nevertheless, he went in again, this time accompanied by Bernard Fordham, and found Herbert Ruff just where he ordinarily would have been working, i.e., at the junction of the chain conveyor from B.10 and the main heading chain conveyor. He was also brought out by the rope. Allan was then exhausted.

He rested for a couple of minutes, then went through the crib room into the main intake in A.9, thence down the cut-through main intake (also referred to as the companion heading and so etimes as the intersection) into A.10, and along that level to the main dip heading. He used the blephone already mentioned and rang the Manager. The time was then 6.15 p.m. 6.15 p.m.

He told the Manager that there had been an outburst of gas in the Dip from a gas pocket, asked him to come down and asked for instructions.

Ventilation was then re-establishing itself and Allan went from A.10 to A.11 on the intake side, i.e., through the cut-through, accompanied by Deputy McPherson. They tested ahead all the time with the oil safety lamp. They turned into the main Dip on the intake side, i.e., behind the brattice, and found Peter Miller just below A.11. He was taken to A.9 by Allan, McPherson, and Hansen. Artificial respiration was applied and Allan returned to A.11.

The Manager and Senior Overman G. Templeton arrived.

With the object of diffusing the gas in the main return, it was decided to progressively break down the brattice going down the Dip, replacing it as they went along. This was done.

They found Henry Peterson just outside the brattice in the main return in the Dip, below where Miller had been found. There was a detonator pouch in his belt, containing detonators which were subsequently counted on the surface. There were 42 with long leads and two with cut leads.

(Detonators are issued in batches of 50's. Forty-four were found on Peterson and, on the evidence of Buchanan, six had been used as primers. It will appear that four loose detonators were found early in the cleaning operations and one was found at a subsequent time in the charged hole to which reference has been made.)

Allan suggested that the explanation of the cut leads is that, on some occasions when a series of shots are fired, there may be a shortage in the length of lead wires and part of the lead wires of other detonators are used to supply such deficiency.

Allan recovered Peterson by controlling his breathing, stooping over from the intake side and lifting him through the broken brattice. He was taken to A.9.

Before Peterson was found, Allan had telephoned the surface asking for a doctor and further asking that resuscitation gear be sent down.

Shortly after Peterson was taken to A.9, Dr. McEniery of Collinsville arrived.

Ventilation went forward, Allan being assisted by Overman William Templeton and William Owens of Bowen Consolidated Mines Ltd.

there. They got into A.12, using hurdles to direct the flow of air to the floor to dispel the gas lying

The door in the brattice at the entrance of A.12 was found to be blown open, with the body of J. R. Logan keeping it in such position. It was stripped of its brattice. The doors are wooden frames covered by two sheets of brattice, i.e., bagging or hessian.

Logan's body was taken to A.9.

R. Spiers, Manager of Bowen Consolidated Mines Ltd., arrived with a party of men and brought two proto suits from the State Mine Rescue Station. Spiers and Allan donned the suits and explored A.12 and at its actual face found Miller's safety lamp.

(The place where the lamp was found may indicate where Miller was when he realised the danger, but again the place where it was found might be a position in which he placed it as a marker in checking the direction of the level.)

Spiers and Allan then went to the main Dip but retreated to A.11, it having been found that Allan's goggles were not properly adjusted. They were using A.11 as a base.

After adjusting the goggles, they made an exploratory trip round the loader in the main heading near B.11 and also had a look around the loader in B.11. They returned to A.11.

There was a discussion and on the Manager's suggestion it was decided to get a blower fan which had been installed in B.10 and use it to boost the fresh air in the Dip to enable more rapid progress to be made. The power had been cut off and Allan and Spiers in their proto suits went to B.10, cut the cable and started to move the fan towards A.11 when a Deputy and other men arrived, they having found that the gas had been so far diffused by the short-circuiting of the air that their lamps were not extinguished. The blower was rushed across to A.11 and the door of that level closed. The fan was connected up and A.12 was cleared.

They kept working forward with the fan and went into the Dip in the main intake between A.12 and A.13 They found the last man, Alex Parkinson, a few yards down from A.12 on the intake side of the brattice. He was taken out.

Annexure No. 4 indicates the various distances from where the bodies were found to the Dip face as it was approximately at the time of the disaster.

(PARKINSON was found about 120 ft. from the Dip face in the main heading inside the brattice on the intake side right up against the rib, a few feet below the bottom rib of A.12.

LOGAN was found about 145 ft. from the Dip face in the partly open doorway into the intake level A.12.

PETERSON was found about 180 ft. from the Dip face in the main heading outside the brattice in the return airway between A.11 and A.12.

MILLER was found about 185 ft. from the Dip face in the main heading inside the brattice in the intake airway near the rib and just below A.11 and about 110 ft. from his lamp.

RUFF was found about 230 ft. from the Dip face in the main return airway at the junction of the Dip and B.10 chain conveyors.

SHRUBSOLE was found about 240 ft. from the Dip face in the main heading in the return airway and about 160 ft. from the face of B.10 where he would have been working.

WALKER was found about 260 ft. from the Dip face in the main heading in the return airway near the end of the belt and about 170 ft. from the face of B.10 where he would have been working. He was about 20 ft. from the brattice door at the mouth of A.10.

Other important distances are—Horse (Kelly) was about 155 ft. from the Dip face across the disabled loader No. 1 in the main heading in the return airway just below the bottom rib of B.11. Horse (Bill) was found about 180 ft. from the Dip face in the main heading in the return airway just near Peterson.

The brattice across the main heading below A.9 is about 330 ft. from the Dip face.

The brattice partly across the main heading near the bottom rib of B.11 is about 160 ft. from the Dip face.

The distance between centres of levels is approximately 70 ft. and the width of the bords or levels, including the Dip, is approximately 20 ft.)

Allan and Spiers again donned the proto suits and in the main heading in the return airway, approximately half-way or a little less between A.12 and A.13, about 12 yds. down from A.12, Allan being a couple of yards inbye of Spiers, they took samples of air, using the method of emptying bottles of their full content of water, allowing the vacuum thereby created to be filled by the air and then corking them with tight fitting corks.

Spiers took his sample from knee to hip high, i.e., about 2ft. 6 in. from the floor, and Allan shoulder high, i.e., about 5 ft. from the floor.

The time these samples were taken was about five hours after the disaster.

After taking the samples, Allan went a further couple of yards towards the face and saw at about A.13 in the main heading a mass of broken crowns lying across the Dip roadway. Behind them he saw a bank of coal reaching up in an uneven gradient almost to the roof and filling the roadway from rib to rib. The haze was still there.

Inset in Annexure No. 4 indicates the conditions at the Dip face.

On 15th October, Allan, accompanied by Mr. T. Platt, Chief Inspector of Coal Mines, and others, made an inspection of the scene. Platt took a sample of air about 14 ft. past the last standing leg in the main Dip at A.13 on top of the heap of erupted coal and near the roof. A test with a safety lamp on the top of the heap caused the lamp to be extinguished and tests made with two bush birds caused their death.

Allan observed that the crowns were lying on the face of the heap. The legs were leaning back away from the face and in most cases the caps and lagging were missing. The top of the heap was about 2 to 3 ft. from the roof, i.e., from some 12 ft. to 12 ft. 6 in. from the floor. Allan, from the top of the heap, by the aid of his head light, saw ahead, at a distance he estimated to be 45 to 50 ft., what appeared to be broken stones. Allan estimated the weight of the disrupted coal when he saw it to be 420 to 450 tons.

The explosion tore out the brattice up to A.13—a distance of about 70 ft.—and damaged the brattice outbye for about another 15 ft.

Allan's opinion was that a shot had been fired but he formed this impression before the charged hole had been found during the cleaning-up operations and he clearly indicated that he had no proof of a shot having been fired. He is definitely of opinion that the disrupted coal had not been dislodged by a shot but that the force of the pent-up gases escaping carried the coal forward. In Allan's opinion, the men would have retreated around into A.13 for safety if a shot was to be fired.

On 22nd October, the damaged timber having been repaired or tighened or renewed, the work of removal of the outburst coal was commenced.

Allan saw two firing cables actually protruding from the disrupted coal in the Dip proper and leading back towards and into A.13. A quantity of the dislodged coal which was pulverized had gone into A.13.

Allan was subsequently informed that another four detonators were found.

Apart from the four detonators which Allan was informed had been found, a canister of explosives was found during the clearing-up operations after the eruption and Allan was also informed that some primer plugs were found. (A canister, when full, contains 10 lb.—each plug being 8 oz. There may have been some explosive used out of the canister to make these primers). No exploder was found in A.13. Deputy McPherson was in A.11 before Allan.

The outburst was unprecedented in the history of the Bowen coalfield. Prior to the disaster, no complaint had been made to Allan about the ventilation. The coal blown out was all fines. The top of the heap was flattened out, with a small gutter on the right-hand side, i.e., the A. side.

We commend Allan for his efforts on the night of the disaster. Until the Manager and others arrived, he was in charge, and we think he acted prudently and bravely.

Whilst we so commend him, we think it abundantly clear that others also gave of their best in attempted rescue.

The evidence in this respect is confused, but apparently McPherson, Hansen, Whyte (timber man), the Fordhams and Spiers were to the forefront and there were probably others to whose efforts particular attention has not been drawn.

On the other hand, we are not at all satisfied with his evidence about the delegation of the work on this particular night, in respect of where such instructions were given.

His omission to make any reference to a visit to the crib room at A.9 at about 5 p.m., in the light of other evidence which we are disposed to accept, deserves comment.

ROBERT CONRAD MUNRO, aged 22, general labourer, with three years' experience in the State Coal Mine.

He commenced work, he stated, at 4 p.m. and later was cleaning spillage at B.7 drivehead. (In addition to the main driveheads for the belt, 2, 3, and 4 in the main tunnel, there are subsidiary places called driveheads at the mouth of each bord containing a chain conveyor. These operate the chain conveyors in the bords or levels.)

One W. Davis came along and told him that Allan wanted to see him, that Allan was somewhere down the Dip, and for him, Munro, to go down towards the Dip. He had been working for about half an hour.

On the way down the Dip seeking Allan, he saw Ruff at the mouth of B.10 cleaning spillage. That was about 20 minutes before he saw the haze. He did not see the horse drivers nor the horses on the way down.

After receiving the message in the first instance he went into B.7, then down the cut-through to B.8. He does not remember if anybody was working there. (Dunlop's gang were timbering there.) He then went down the cut-through to B.9 and looked towards the face of such level and saw no lights. He then went out to the main dipway and down it to the Dip.

He did not go to the face of the Dip, but called out from a distance of about 30 feet, " Is Tom down there ?" Someone replied, " No, he might be up the A side somewhere." He does not know who were at the face. He heard a whining noise which sounded as if a power borer were working.

On the return trip he went up the main heading, looking in at A.13, and then went through the door of A.12 into A.12. He opened that door to get in, and closed it after him. He did not see anyone in A.12 and cannot remember seeing any light there. He came out to the main tunnel again. He cannot recall any brattice across the main tunnel near the mouth of B.11 and did not notice any horses or drivers between A.12 and A.11.

(If his memory is accurate, Munro must have entered A.11 before the horses and/or drivers got into the main tunnel.)

He then went into A.11. It took him approximately 25 minutes to get to A.11. In A.11 he saw one Bushell, fitter, near the face and stayed talking to him for about 10 minutes. He then intended to go to the crib room at A.9 by way of the main heading. He was making his way down A.11 level when he saw Ray Brunker and J. Thomas, horse drivers, just at about the door of A.11. They were running towards the cut-through leading from All to A.10. They passed him and he saw fog coming towards him. The horse drivers were actually in the haze and were about 10 ft. from him when he first saw them. He did not get as far as the door into the Dip heading. The fog was thick.

From the time he went seeking Allan at approximately 5 p.m. to the time he saw the drivers running was about 40 to 45 minutes.

He followed Brunker and Thomas up the cut-through and then right up to A.6 or A.7. The fog was behind him about half-way up to A.10. He felt a tight pain in his chest as he was going through the door in the cut-through between A.11 and A.10. Bushell followed him and he remained in A.6 or A.7 for some five minutes and then went to the main tunnel. He put the time then at about 5.40, but said that such time may be inaccurate. He looked through the brattice in the main heading below A.9 and then went to the crib room, returned to the brattice door, went through it and down the main dip for about 15 ft., when, as he described it, he felt as if he " got hit suddenly by something." He felt a tight pain in the chest and was gasping for breath. He went back behind the brattice for fresh air and into the crib room, where he saw some other men and told them that there was gas down in the main dip. With others he again went through the brattice.

He is somewhat confused in his recollection, but it would appear that on one occasion when he looked through the brattice or when he walked down the Dip, he saw a light or some lights down the Dip.

Allan was at the scene and Munro assisted in looking for and assembling ropes. He helped in getting Walker out, likewise Shrubsole. He was there when Ruff was brought out and by then he felt ill. Allan told him to go to the No. 4 drivehead to take the men off No. 4 belt. He did so and then commenced to lose consciousness. He was assisted by others and put on the belt and taken to the surface.

He had heard no explosion prior to seeing the haze. He did not smell anything in the haze. It had no effect on his eyes but he felt it in his nose, throat, and lungs. At No. 4 drivehead he felt pains first in his legs, then his arms.

The haze was a light-grey colour and so dense that the visibility by his own light was reduced to about 6 ft. In A.11 the haze was forcing its way up against the intake air.

Munro thinks that if a shot had been fired he was in a position to hear it, but we think that such opinion is doubtful.

Munro's memory for events is poor and the course and time he took in seeking Allan after receiving the message indicates apathy and lack of appreciation of duty.

JOHN EDWARD THOMAS, horse driver, of 3 years' experience at the mine.

On the night of the disaster, he had secured some timber at the supply base at A.6 to take to A.12 with the horse " Bill." He came down the cut-through to A.11 and then to the door of the main dip. Brunker was then in front of him (with the horse " Kelly," and timber) in A.11, just before the main dip is entered.

Brunker told him that he did not think they could get through the main road. There was a loader outside of A.12 and they would have to get it moved.

Thomas had a look at the position of the loader and both drivers and horses went into the main heading, Brunker's horse being in the lead about 19 ft. ahead of Thomas's. The horses were pulling or snigging the timber attached by chains.

(There is a conflict between Thomas and Brunker as to the stage at which the horses were brought into the Dip tunnel. If Thomas is correct, the horses must have been out in the main dip tunnel for some 20 minutes before the disaster, except for the short visit of " Kelly " into A. 12.)

Brunker told Thomas he had been looking for Allan to try to get him to have the machine shifted, that he had seen Peter Miller and that Miller had told him that he, Miller, would come down and shift it. Miller was not there at this time.

Thomas and Brunker then went down the main heading, the time being about 5.30 or 5.35. They went to the face. Thomas saw Buchanan and Peterson. He cannot recall seeing anyone else there, although others could have been there. c. 5.30 p.m.

Peterson was making up a shot. He had a plug of explosive and had just put a detonator in it and was tying the end of the detonator cables or leads around the plug to secure the detonator.

Thomas noticed nothing wrong. He smelt no gas. The ventilation was " just like it always felt." The ventilation there was never strong.

Someone at the Dip said that they had already tried to shift the loader but it had broken down, that they had run it forward a bit but the nose was down on the floor and it kept bogging into the spillage from the conveyor pans and it could not be lifted or moved sideways, so as to enable the machine to be moved down past A.12 to give access to the horse drivers and their timber into A.12.

Thomas and Brunker then came back to the horses and found Peter Miller at the machine, trying to move it. Thomas told Miller that he was wasting his time, that the men at the Dip had already tried to move it but the nose had broken down. Miller agreed and Thomas told him they would try to squeeze past.

Miller left, going in the direction of the Dip face.

They tried to get the first horse past. There were two 14-ft. legs on one chain and other timber on a second chain. The horse got past, but the timber jammed on the machine. Some of the timber was unhooked and the remainder taken into A.12. Brunker came hack and hooked onto the jammed timber and gave a pull.

Thomas then felt a strong breeze coming from the direction of the Dip face. He looked down the Dip. The breeze grew stronger and stronger to a degree which he describes as howling gale." The time was a little before 6, perhaps 5.50. c. 5.50 p.m.

Thomas was standing alongside the machine towards its tail end, about opposite the centre of the mouth of B.11. Brunker was standing near the nose of the machine, about opposite the top rib of A.12.

Thomas saw three or perhaps four lights moving up the Dip at a running speed. They were about outside or a little higher than A.13.

Someone carrying one of the lights was calling out " Run for your life," " Get out for your life."

Just as this was called out, Thomas saw a wall of what appeared to be ashes coming towards him. It was a clear-cut wall. The wind preceded the wall by a second or two.

Thomas does not remember the brattice curtain partly across the roadway where the loader was immobile, but it certainly appears to us that it was there and he was on the outbye side of it. It would have been draped across the loader and may have been held back in some way. (Its purpose was obviously to temporarily ventilate B.11 and nobody was working in B.11 that night.) One horse at least had gone through. It did not impede Thomas's vision down the Dip.

The dust was very thick, so that a person in it could not see where he was going. Brunker came back to Thomas and, although he was right alongside of him, Brunker's light looked like a faint glimmer.

Just as Thomas and Brunker turned to go, they were enveloped in the haze.

Thomas suffered no ill-effects except sore eyes from the dust.

They got to A.11. The door was then open. Thomas had closed it when he brought his horse out from the level. (The pressure of the gas apparently had opened it.) Had it been opened when Thomas was down the Dip, he would have seen it when he returned to his horse ; he was quite close to it.

The haze was so thick that Thomas did not realise he had gone through the doorway and was in A.11 until he got to the cut-through between A.11 and A.10, i.e., A.11 up.

There were several men in A.11 near the doorway of A.11 up, but he recognised only one, Hansen, and that was by his voice. Several men went through into A.11 up. In this place, the air was normal.

Even whilst enveloped in the haze, Thomas did not smell anything.

Thomas ran up to A.6 and there saw Deputy McPherson, to whom he reported that it was blowing a gale down the Dip and one could not see for dust.

McPherson started to run down the Dip. Thomas told him that Peter Miller was already down there.

Thomas subsequently assisted in carrying messages and in the transport of the body of Walker to the surface.

Thomas heard no shot fired at the Dip and no warning of shot firing.

In the circumstances of this night, he would have expected a warning and would have heard such a warning from the Dip face had it been given.

He agrees with others that, in firing the Dip, the men would have done so from inside the brattice in A.13.

RAYMOND SEPTIMUS BRUNKER, horse driver, aged 18 years, with 31 years' experience at the mine.

He arrived with his horse at the supply base at A.6 about 4.30 p.m. on the day of the disaster. He went over to B.7 looking for 18-ft. crowns. There were none on the A. side. He had received instructions from a Deputy at the winch. He went back to A.6 and secured a load of timber, two legs attached to one chain and some four laggings attached to another chain, taking about half an hour to collect his load. He then went towards A.12 by way of the cut-throughs. At A.11 he looked through the door into the main heading and saw the immobile machine opposite B.11. He left his horse and timber in A.11 and went into the main heading to see if the machine
c. 5 p.m. could be moved. He fixes this time at about 5 o'clock. Thomas was not there then.

Brunker saw Parkinson and Logan at the machine. He asked them to shift it. They were trying to so do. He also saw Peterson in the vicinity. Peterson walked past once towards the Dip.

The engine of the machine was running and it was going forward. The machine went forward a bit. They were moving backwards and forwards. There was spillage in front of it. It ran towards the Dip some 15 to 18 ft. They were unsuccessful in getting it out of the way and finally one of them told Brunker to go and get the Overman and tell him that they could not shift it. Brunker went away and Parkinson and Logan left, going, as far as Brunker recollects, towards
c. 5.20 p.m. the Dip face. He did not notice what happened to Peterson. The time was then about 5.20 p.m.

(This evidence puts Parkinson and Logan at the machine outside B.11 from about 5 p.m. to 5.20 p.m. at a time when Allan says he saw them at the Dip face, i.e., about 5.10 p.m., when he gave instructions to grunch.)

Brunker first looked in A.11 and then went into A.10 where he saw Peter Miller. He told Miller he was looking for the Overman, that the machine had stuck. Miller said he would go down and have a look. Miller was then marking the position of a leg in A.10. They stayed talking for a
c. 5.30 p.m. while and then Brunker went back towards A.11. The time was about 5.30.

He went to the machine and examined it to see if there was room to squeeze past it. It could not be shifted. He next heard Thomas coming through and he, Brunker, went back to A.11. Thomas examined the position.

They both walked down to the face. Brunker did not take notice as to who were at the face. He was at some distance from Thomas when Thomas had some conversation with someone at the face. They, Brunker and Thomas, came back to the machine and he, Brunker, saw Peter Miller at it. Miller tried to shift it. It would not move. He was trying to move the nose. He was unsuccessful. Miller then went towards the Dip face and Brunker and Thomas went back to their horses in A.11 and brought them out into the Main Dip. (This is in conflict with the evidence of Thomas.) Brunker tried to get past with his horse snigging the timber on the two chains. His load got stuck on the machine. He uncoupled the load which was stuck and got the remainder into A.12 and returned with his horse. He had to open the door into A.12 and believes he closed it when he left.

c. 5.50 p.m. He got the remainder of his load up to the machine and then about 5.50 he heard an explosion like a shot, which came from the direction of the Dip face. He was bending down.

Brunker is somewhat contradictory about the loudness of the noise which he says he heard. He says on more than one occasion that it was louder than an ordinary shot.

The plan shows he was then approximately 155 ft. from the face.

He did not hear any warning call. There was no machinery working. He thinks he would have heard a warning if called.

(Other evidence, that of Dunlop, indicates that the belt was running and in fact there were two loader crews working, so presumably the chain conveyors A.11 and B.10 were working.)

When he heard the explosion, like a shot, he turned round -Id looked towards the face.

He felt wind and saw haze or ashes. The haze was very thick. He unmed around and called out, " A fall." He heard someone in the haze call out, " Go for your lives'.' and saw one light. The voice came from about A.13.

He turned and ran through the door into A.11. The haze was around them when they started to run. He did not see the door of A.11. He believes he was in front of Thomas but does not think he opened the door.

In A.11 he felt difficulty in breathing. He did not smell anything. There were no other ill-effects. He kept going to A.6. After a little while he went down the main tunnel a short way but was ordered back. Subsequently he assisted in the later operations.

JAMES ALFRED BAKER, Timber Man, with eight years' experience in the Collinsville Mine.

Baker was doing timber work in B.8 at the time of the disaster. Dunlop was a member of the crew. Baker heard a noise which sounded like a shot from afar off and about four or five minutes later he could see haze in B.B. Dunlop remarked, " Who fired that dirty shot ?" Baker stated that the three other members of the crew—Dunlop, Torkington, and Lavercombe—all said they did not hear a shot. When Baker said he heard a shot " a few minutes back," Dunlop remarked that he could not have heard a shot as the boys were in A.B. Baker replied that someone was grunching the Dip.

By the time this conversation ended, the haze was upon them. Baker collapsed. He has a slight recollection of going up from B.8 to B.7 through the cut-through nearest the face.

He smelt no odour. He first found difficulty in breathing, then his eyes started to water and then he became unconscious. He does not remember any effect on the nose.

Frequently when shots are fired and they do not detonate properly a quantity of smoke and haze is emitted.

On Friday, 8th October, on the dog watch, midnight to 8 a.m., Baker was sent with others to cut the Dip and A.13. When he arrived, one Scharf had already finished boring half the bottom holes in the Dip. Baker helped the shot-firer with the cables and dummies. The bottom boring was completed and the cut started.

Baker, accompanied by one Monaghan, then went to A.13 to bore the bottom holes.

Baker saw in the Dip a lot of bubbles across the water on the Dip Floor and said that, when they left to go to A.13, the bubbles had increased to little " fountains."

Monaghan and Baker had finished boring the bottom holes in A.13 when A. Bulloch, who was cutting the Dip, came to them and asked Monaghan to take a deep breath and run down and turn the cutter off. Monahgan began to gasp and said he could he could not, that he was " buggered." Bulloch then asked Baker to do so and Baker replied in similar fashion. Baker felt at that time his breath was beginning to go. His eyes had started to water but he did not then know what was affecting him. Bulloch then took a deep breath and went back towards the Dip face. Monaghan and Baker started off up the Dip. He heard the machine stop. Scharf had gone for the Overman. W. Whyte, Overman, came along and raced towards the Dip. Whyte called out " You have hit a pocket of Black Damp." Baker turned back towards the Dip but saw two lights coming, the lights of Whyte and Bulloch. Bulloch called out, " Wait for me, Billy, I don't think I'll make it." Both men, however, were all right. The time was then about 2 a.m. They went up to the crib camp. The effect on Baker was that he felt very tired. The men were sent to work elsewhere. He heard Whyte tell the electrician to try and get the blower fan out of B.10 and take it down the Dip, but as far as he knows that was not done. Whyte informed him that they would not go down the Dip for a while.

The Dip was cleared by about 5.30 a.m. and Whyte then told them that they could go back and finish the cut, fire the bottoms and get the cutter out of the water.

Baker then felt tired but otherwise no ill-effects. When he got back to the Dip, he noticed no Black Damp. A test was made for it. The face had been cut far enough. The machine was taken out of the water. Six holes had been bored, charged and stemmed before the cut was made. The cable was coupled up to the two lead wires and the six shots were fired simultaneously by McCarthy, shot-firer, from a position around in A.12.

Baker's experience was that on all occasions when there was a suggestion of danger in the mine, appropriate action was taken to clear away the danger.

Baker also gave evidence that Peterson, Parkinson, and Logan were very careful men and careful of the safety of their fellow workers.

JACK HUBERT MORGAN, an Overman, employed in the State Coal Mine for 31 years, including 14 years as a Deputy, and had had 16 years' experience in South Wales before coming to

Since about July, 1954, *he had been in charge of the Dip section oa the day shift, i.e., from* 8 a.m. *to* 4 p.m. At the time of the disaster, two other Overmen were on the day shift, Harrison in charge of B side, and Templeton in charge of A side.

The Overman in charge of the Dip section has control of the Dip itself and such side bords as have not been connected with others by cut-throughs. Morgan, therefore on 13th *October,* 1954, had under his control the Dip, B.11, A.12, and A.13.

The day shift is essentially a production shift, one cutter and two loaders being allocated to each of the three subsections A, B, and the Dip, i.e., three cutters and six loaders in all. There is one Deputy on duty, as a safety man.

(It appears from the evidence of V. Davis, who was the safety man Deputy, that there were two other Deputies on the shift and had been so engaged for some time prior to the disaster—one in cleaning up operations in A.6 where work had been discontinued and the other in the second intake.)

The afternoon shift is also a production shift, having one cutter and two loaders working the whole Machine section. Timbering is also done on this shift and there are two Deputies—one being in charge of the timbering.

The dog watch is not a production shift but is a maintenance, cutting, shot-firing, and timbering shift.

On the *day shift of 13th October,* the day of the disaster, Morgan had under him a cutter crew, two loader crews, a shot-firer, a shift man, and a man cleaning spillage.

Prior to coming on duty, he had read the Overman's Report for the *dog watch of the* 13th, i.e., midnight to 8 a.m. Nothing had been done at the Dip face during that shift. On the *afternoon shift of 12th October* a set of timber had been erected in the Dip. It had last been cut and shot on the afternoon shift of 11th October and loaded out on the *day shift of 12th October* in the morning, i.e., Morgan's shift. *After loading out* on 12th *October,* Morgan noticed faulty coal on the right-hand side extending across the face for a distance of about 4 to 5 ft. at the bottom. He also noticed that the loader was picking up the floor on the right-hand side. It was soft coal. Coal had replaced the stone there. The soft coal had come in at an angle of about 30 degrees to the Dip face. The floor was faulty for about 6 ft. on the right-hand side.

Morgan caused a hole to be bored ahead in the face in the faulty coal to a depth of 9 ft. It was about 4 ft. from the right-hand rib and 2 ft. from the floor.

Another hole was bored in the floor perpendicularly about 4 ft. from the right-hand rib and 3 ft. from the face. The hole in the face was bored to see if there was a dyke or stone ahead so that the machine and men could be protected. The hole in the floor was for the purpose of finding out where the stone floor was.

An accumulation of water covered the hole in the floor and Morgan observed that the water above the hole was bubbling.

Neither hole struck stone. They were in coal for their entire depth. The hole in the floor was also 9 ft. in depth.

Morgan has noticed similar conditions before when meeting a fault. Soft coal has been met in association with a fault.

In a gassy mine (Collinsville is not a gassy mine) in South Wales, he has seen CH, (Methane at a fault.

In Collinsville mine, Morgan had had an experience with a fault some 20 years ago on the west side in No. 2 section of No. 1 Tunnel.

Morgan, with his long experience, says that bubbling was common in Collinsville. It would be met in all types of work in both tunnels. Where there was an accumulation of water, the water always bubbled. He has known this bubbling over holes in the floor for the whole of his 31 years there.

On 12th October Morgan saw no dust blowing from the hole in the face. Neither air nor gas came out. Both holes were tested for gas-, both by Morgan and Deputy Davis, and there was no indication of gas in either, neither CH, nor 00_2.

Morgan saw no indication of gas at the Dip face on the 12th.

The holes bored indicated to Morgan that there was some disturbance in the seam. He says they had struck a disturbance in the seam before in No. 2 Tunnel, where the seam folded or doubled itself more or less like a capital S letter.

The boring could have also indicated a reverse fault.

With a fault of that nature, Morgan would expect gas to bleed. He would expect to find any type of gas when approaching a fault, and alertness would be required.

On 13th October, day shift, A.12 and A.13 were loaded out. The cutter men, Nott, Cairns, Doyle, and Greenough, had cut and shot B.11 and were instructed to cut the Dip. They started about 2 p.m.

Vince Davis was Deputy. The machine started to bog on the right-hand side and Morgan was sent for. He came back at about 2.30 p.m.

The floor was soft, and there was some water there. The blade of the cutter was in about 8 ft. and had cut about 4 ft. from the right-hand side and about 1 ft. to 18 in. from the floor. The cut had been low on Morgan's instruction.

There was bubbling coming from the water in one place only, that being from the bored hole. That bubbling seemed to have decreased.

Morgan put his hand on top of the hole and did not feel any great pressure.

The bubbling on the floor had been tested in the morning and also before they started cutting and the hole in the face had been tested immediately before the cutting, by Morgan, accompanied by Deputy Davis.

Davis tested for CO, and did not find any indication of it.

The machine had stopped and, as Morgan describes it, it had pulled down on the right.. hand side.

No shot holes had been bored.

The machine was driven back and the blade freed from the coal.

Morgan put his head into the cut but did not smell anything, nor feel any effects of CO, at all.

He put his arm in and pulled out a handful of the cuttings. It appeared to be normal coal. Deputy Davis with his lamp tested the cut and there was no effect on the lamp.

Morgan decided to grunch the Dip to see what the floor would be like forwards. It was then getting on to the end of the shift and nothing further was done.

Morgan had been at the Dip face the greater part of the shift and at no time did he see any sign of gas nor receive any complaint from the cutter crew.

Such was the condition of the Dip at the beginning of the fatal shift.

The brattice end was about 6 ft. from the coal face and the blower fan was about 20 ft. from the face in the intake side.

Before going off duty, Morgan instructed that Loader No. 1, which had been loading in A.13, be put in the Dip outside B.11 under the conveyor chain. If it had been placed there, it would not have blocked the roadway for the men bringing in timber and it would have been outbye the hanging brattice giving ventilation to B.11.

Morgan said it is possible that the men would not have had time to complete the move. When he left, the loader was on the way up, being driven by Prasser and Watson. It was then in good order.

Morgan established definitely that the brattice curtain was partly across the dipway at s he mouth of B.11 at the time of the disaster and had been there for some 8 weeks. It consisted of three curtains which could be lifted.

Morgan would have expected that if a shot had been fired at the time of the disaster, it would have been fired from A.13.

Morgan had never noticed dust blowing out of any holes in the Dip face nor had he noticed any pressure of gas or air there.

Parkinson, Logan, and Peterson were all very experienced miners who, if any sign of danger appeared, would have reported it immediately to the Deputy or Overman and refused to work. Parkinson had been in the mine 15 to 20 years and Peterson and Logan some 12 years. They were all alert, intelligent men, quite fit for their work.

On 12th and 13th October, during his shift, there was one official senior to him, the Acting Under Manager, George Templeton.

On 12th *and 13th October,* CO, did not enter into Morgan's mind at all.

Over his 31 years' experience, Morgan believes that he has worked in every dip in the State Mine and he stated there have been bubbles in all.

. On one *occasion in* 1942, a Mr. Jack, Chief Government Geologist visited the mine. Morgan was present in the Dip in No. 2 Tunnel. There were bubbles there worse than any he had ever seen in No. 1 Tunnel. They came from the floor and there were little blowings from the face. Morgan had tested them regularly and so informed Jack. He made a test in the presence of Jack, who himself made a test and found nothing. Jack said that it appeared there was nothing coming out of them except water but he told Morgan to keep his eye of them.

Morgan had seen bubbles bigger than those he saw in the Machine Section at the time of the disaster.

He had seen bubbling in one place in No. 2 Tunnel with the bubbles keeping a uniform height for 7 or 8 years from a hole that had been bored 10 to 12 years ago. That hole is still bubbling but not so much now and the hole is a long way from any known fault. That hole was bored down to the Blake seam over 100 ft. below. Morgan believes that the CO, comes from the Blake seam.

Just prior to the disaster, instructions had been given to stop the Dip. It was at the limit of 200 ft. at which it would have been left standing until the side cuttings were squared up. It was ready for an extension of the belt. The operation on the 13th was to have been the last operation for the time being at the Dip face.

On the last occasion of shooting the Dip, i.e., *11th October,* Peterson had reported that he was doubtful about all the shots going off. (The Deputy's report for the afternoon shift of that date says " bottom shots in Dip unexploded.")

On 12th *October,* when loading out, Morgan, Deputy Davis and the shot-firer kept watch. The loading-out was done carefully and when they came to the wires they fired the missed shots. There were 2 or 3. That was before the boring of the test holes. There were two on the extreme left and one on the extreme right-hand side.

At the time of the diaster, there would be approximately four batteries in the mine, one for each shot-firer and one spare at the supply base in A.8 Each shot-firer has his own station for keeping his cable, stemming stick and battery.

Blower fans have been in dips in Collinsville the whole of the time Morgan has been in the mine.

Morgan said that, when he was approaching the fault on 13th *October,* he did not suspect an outburst but expected bleeding in small quantities. He said that his suspicion had no connection with the bubbles but he did suspect a small percentage of CO, in relation to the bubbles. He was more concerned with Fire Damp in relation to the fault.

The highest he saw the bubbles was some three inches. When he had the hole bored in the floor, the bubbling was confined to the one place, Before that, the bubbles were all over the water.

On *the day shift of 13th October,* Prasser, who was working in A.13, complained to Morgan that he, Prasser, was not feeling too good and that the air was no good. Morgan was working inbye Prasser and said he would send for the Deputy. He did so and Deputy Davis tested for 00_2, and apparently found none.

Morgan denied that on such occasion he told Prasser anything to the effect that he, Morgan, himself had had a " gut full of the stuff yestersay," i.e., 12th, and had " woke up crook this morning." Morgan says in fact that on the 12th he had experienced no difficulty in breathing and did not suspect any CO, was present.

We incline to accept Morgan's evidence in this matter.

On 12th *October,* Prasser had been working under Morgan.

When the holes were bored on *the* 12th, Morgan himself had bored 6 ft. of the face hole but was not present when it was finished and was not present when the floor hole was bored. He is unable to say what happened when he was absent, but it was not reported to him that when boring the holes any part of the bored material shot up into the face of the person boring.

On 12th *October,* 1954, a Union Check Inspector, W. H. Davies, was in the Dip about 12 noon. Davies took readings of temperature and asked Morgan what was in the bubble. Morgan told Davies he could not get anything on the lamp Deputy V. Davis was present with the Check Inspector W. H. Davies. He believes Davis tested in front of Davies.

Morgan never saw the bubbles become a small fountain. He has never known of an outburst of CO, even on a small scale in Collinsville. Morgan stated that he has seen more extensive bubbling than that in the Dip Machine Section, in No. 2 Tunnel, during the war years when the work was proceeding at a fairly fast rate. The bubbling followed the Dip practically all the way down, and there was no outburst nor any warning of any outburst resembling that of 13th October.

On the occasion of the Jack episode in 1942, Morgan said that Jack was more concerned with the bubbles or blowings coming out of the Dip face. When Jack asked him as to what was coming out, Morgan told him he could not get anything on the lamp but occasionally, by holding the lamp below the little bubbling blowers and putting his hat over the lamp, he got a trace of CO,. Jack himself tested and failed to detect anything but said, " Keep your eyes open because you could get $C11_4$ in this." The place was in No. 2 Tunnel between No. 2 and No. 3 pit bottom.

Cutter men usually take their machines back 15 to 20 yds. or into another bord before shooting the Dip. (This is contrary to the evidence of Buchanan.) The position of the machine after the outburst suggests that no shot was fired. Morgan has never known an instance of the face being blown with the machine up close. The machine would be damaged.

The faulty coal on the right-hand corner of the Dip was laminated—in glossy layers. Miners term it " black lead." Morgan had seen that type of coal in other parts of the mine when they have gone through faults.

Morgan said that he was under the impression that they had struck the fault at A.S. The seam had flattened out and the coal appeared similar to that in No. 2 Tunnel. It was only when he saw the soft coal just before the disaster that he suspected the real fault.

NYLES JOSEPH McENIERY, duly qualified medical practitioner and Superintendent of the Collinsville District Hospital.

The Doctor received a message at about 6.30 p.m. on 13th *October* that there had been an accident underground and that some men were injured and that some of them were probably dead.

He went to the surface at the head of the tunnel. He returned to the hospital with Hill and Baker, left Baker at the hospital, got a cylinder of Oxygen and returned to the mine ; about half an hour after his first arrival three men were brough to the surface. The time was about 7 p.m. He examined the bodies. They were dead. (Walker, Shrubsole, and Ruff.) He then went below to the crib room in A.9.

Artificial respiration was being applied to two more men (Peterson and Miller). He examined them. They were dead. The Doctor then went down the Dip to the vicinity of the first dead horse, i.e., Bill.

He smelt gas coming up the tunnel. He formed the opinion at that time it was Sulphuretted Hydrogen, HA and from the odour of the gas thought there was SO_2, Sulphur Dioxide present. He had gone down on the intake side and poked his head through the brattice. He noticed a hazy appearance in the atmosphere.

On the following day he made a post-mortem examination of the bodies of the seven men. He did not open the bodies.

He came to the conclusion that they had died from asphyxia due to inhaling poisonous gas.

He took samples by heart puncture from two bodies—Miller, and, he thinks, Shrubsole- and sent them to the Government Analyst for testing for CO. The Report from the Analyst was that no CO (Carbon Monoxide) was in the samples. The Doctor also received the results of the analyses of the samples of air.

His opinion now is that the gas which caused death was composed of a large percentage of CO_2 and a small percentage of CH_4 (Methane).

The Doctor's opinion is that SO_2 can be detected in the blood but that 11_2S cannot be so detected.

CO, can be detected, but after death it is normally present in high concentrations, irrespective of the fact as to whether death has been caused by inhalation of CO, or otherwise.

He reached his conclusion as to asphyxia on the history of the happening and the examination showing the head and neck very blue and the small blood vessels congested—full of blood. The latter condition was also present in mucous membrane lining of the mouth and eyelids. The only other thing of note was that one of them—Shrubsole, he thinks—had some blood-stained froth on the mouth. He saw no sign of injury, e.g. a bite of the tongue, to explain this.

There was no sign of trauma on any of the bodies and the general appearance was that of asphyxia.

Whether the men died quickly or slowly from inhaling 00_2, he thinks there would not be any excess CO, over that in a normal dead body.

A cyanosed colour is a symptom of CO, poisoning, which is really a form of suffocation.

The Doctor is of opinion that inhaling an atmosphere with a concentration of 76 per cent. 00_2, a person could not run very far over 20 or 30 yds. The Doctor examined the mouths of the men and found no ingrained dust in the mouths or tongues.

There were no indications on the bodies that they had been struck by coal or anything else.

It was about 7.45 p.m. when he thought that H_2S was present. He was sure he smelt H_2S. The gas he smelt had an acrid odour and he could not keep his face in it for more than a few seconds at a time. Sulphuretted Hydrogen, 11_25, does not have this effect and he thought another gas containing sulphur was most likely present, to give the biting odour. He thought this to be $S\ 0_2$.

H_2S is one of the easiest gases to detect. The air samples taken on the night of the disaster on their analyses, could not in the Doctor's opinion have been mistaken by him for 11_25. Since the disaster, however, the Doctor with others, including a Government Analyst, made a test in the Bowen Consolidated Mine for H_2S at a place where the Doctor could just detect it by smell. The test revealed that he could smell it in a concentration of one part in one and a half million.

High concentrations of CO, lie on the floor.

The odour of H_2S which he detected on the night of the disaster was fairly weak.

CO, has a narcotic effect when 10 per cent. or more is present.

With great exertion, the effect of CO, in the absence of Oxygen is very much more rapid and severe. Illness and death would be quick.

CO, has a slight but definite acrid odour—a feeling as of a burning of the nose. It causes a smarting and rawness of the eyes. It affects the lungs immediately, causing a gasping for breath.

The gas he smelt on the night of the disaster had two features, the more marked (not a sympton of 11_2S but of SO_2 and to some extent of CO_2) a stinging, burning, acrid, odour, and the second feature a faint odour of rotten eggs, i.e., the odour of 11A.

In the method of taking the samples by Spiers and Allan, if a small quantity of water were left in the bottles it might absorb H_2S if present.

(According to the evidence of Chief Inspector Platt, some of the CO_2 present may also have been absorbed by any water remaining in the bottles, so that on his own test, which discloses 76 per cent. 00_2, that percentage would be a minimum.)

DOUGLAS ARCHIBALD HECTOR McPHERSON, 14 years in the mine and Deputy for some 12 months.

He came on duty at 3.45 for the *afternoon shift of 13th October,* with his co-Deputy Peter Miller.

He inspected the main intake, then waited at the Dip winch to check the men in. They both went to B.4 (the Deputies' and Overmen's Report Room) where they saw the day shift Deputy coming off shift (V. Davis). They read his Report. McPherson then went down the B side and proceeded to inspect. Miller had the A side.

McPherson went down the B side workings to B.8, testing all the time.. He tested each level and there was no gas on the B side at all.

At B.8 there were men working (Dunlop's timbering gang). He tested there. There was no gas.

0. 5.30 p.m. He went eventually to the Dip face, getting there at 5.30 p.m. There was no-one there. He tested there and got no result. He noticed that the face had been half cut and he could see where the cutter had been bogged and that it had been backed out. The blade was then about 3 ft. from the face on the right-hand side. He saw no signs of an impending disaster or anything else to put him on the alert.

He saw bubbles coming up from the water at the Dip face and tested them and got no sign of gas.

c. 5.35 p.m. The inspection took about five minutes. He walked out of the Dip, the time being about 5.35, and through the hanging brattice in the main heading outside B.11, and there saw and spoke to some men who were going down to the Dip. They were A. Parkinson and W. Buchanan. Walker was there also. He does not remember seeing Peterson. The brattice was then hanging from the roof and in good order. It was draped over the loader and a person on the outbye could not see down the Dip.

He did not see Brunker nor Thomas. He went on up the tunnel. Neither Parkinson nor Buchanan made any complaint about the Dip nor any suggestion that there was anything unusual down there nor any complaint about gas. There was no conversation in reference to the conditions at the Dip face at all.

(Perhaps Parkinson had not been at the Dip face up to this time, although Allan said he saw him there at about 5.10 p.m. Brunker said he was working at the machine from about 5 p.m. to 5.20 p.m. with Logan, and the evidence of Hill put him in the crib room at about 5.5 p.m. Brunker put him as going towards the Dip with Logan at about 5.20 p.m. and McPerson said he met him near the crib room with Buchanan going towards the Dip at about 5.35 p.m. and said there was no-one at the Dip at 5.30 p.m. O'Reilly, electrician, said he was at the Dip face at about 5.30 p.m. and saw Parkinson, Peterson, Logan, and Buchanan there and spoke to them.

Buchanan said at one stage, the first hole had been bored at about 5.10 p.m. and also said that he thinks he saw McPherson with Walker, perhaps about A.10, at about 5.30 p.m. He further said the electrician was at the face at about 5.30 p.m.

The conflict in times is insoluble. Of course we must remember that they are all estimates and may well be inaccurate).

McPherson walked up the tunnel as far as the store at A.6. He w as there for a while when Allan came along. He was talking to Allan when Buchanan came to them, looking for the electrician. He thinks Allan told Buchanan to look on the B side and mentioned B.S. Buchanan left. He, McPherson spoke again to Allan for a while and Allan left, going into the A side through the door of A.6. McPherson walked into the store and was checking tools when Thomas and Brunker came in from the A side and told him something had happened down the Dip. A cloud of dust or smoke was mentioned by Thomas. Thomas also told him he heard someone in the Dip say " Run for your life " and that he Thomas had seen lights coming up the Dip and that something had happened down the Dip and that men were running out of the Dip and that one of them sang out and that the one who had sung out " Run for your life " he thought was Peter Miller.

McPherson got his lamp and ran down the main tunnel as far as A.9, where some men came out of the crib room.

At A.9 McPherson spoke to H. Hanson and almost immediately they went through the brattice in the main tunnel below A.9. There was gas there just through the brattice. They went as far as A.16 and saw men lying below the door of A.10 in the main tunnel. The first man was in the vicinity of the tail end of the belt.

McPherson opened the door of A.10 to get fresh air. There was gas present. His oil safety lamp had gone out and he had trouble breathing. His lamp had gone out about half-way between A.9 and A.10.

McPherson took two or three paces in A.10. It was full of gas also. He could not breathe and he called out to Hansen to get back out of it. They both ran up the main tunnel and through the brattice below A.9.

McPherson then went to the A side and saw A. Jaques who had left his working place in A.7, and instructed him to short-circuit the air—to open the doors in the companion heading above A.6 (i.e., the first cut-through).

McPherson relit his lamp at A.6. From there, he and Jaques went down the companion heading together, opening the doors. At A.7 he called out to C. Grieves and Grieves came out and they walked down to A.9. McPherson looked in through the crib room door. There was no-one there. He closed that door and they went back along A.9 and down the companion heading. They could not get into A.10 on account of the gas. His lamp did not go out, as he withdrew it from the gas. He thinks the gas in A.10 was from the roof to the floor—the ventilation was pushing it back. He sent Jaques to ring the Manager from No. 4 Drivehead. He thinks Grieves went with him. Hansen came along and they tried again to get into A.10 and succeeded. He went to the door of A.10. It had been shut. The three men from the tunnel—Shrubsole, Walker and Ruff—had been taken out. McPherson and others then went to A.11 down the cut-through, opening the doors in the cut-through or companion dip, and got along about 40 ft., towards the main tunnel but had to retreat.

The furthest point from the Dip face on the A side where McPherson found gas was at A.9 on *top of the cut-through or companion dip from* A.10. After retreating from A.11, McPherson and Hansen met Allan in A.9. McPherson told him where he had been and asked Allan if he had seen Dunlop and the other timber men from B.S. Allan said he had not seen them and sent McPherson over to short-circuit the air on the return on B side if he was able.

McPherson stepped through the doors of B.8 and found B.8 full of gas and had to retreat. Allan, Hansen and McPherson then went to A.11 and got as far as the door at its mouth.

They saw Miller lying below the chain conveyor in the intake in the main tunnel. The Damp was over Miller's body about waist high but it was then receding.

There was about 3 ft. of coal under Miller, i.e., from the stone floor. McPherson and Allan picked him up and Hansen carried him to A.9, where resuscitation was applied. About that time, the Manager and G. Templeton, Acting Under Manager, arrived.

Templeton started to break the brattice down below A.11, where Miller had been found. The breaking of the brattice was intended to let the gas escape out of the intake (by-passing the Dip).

Peterson was found. He had a detonator pouch on his belt. George Templeton, assisted by McPherson, picked up Peterson. The breaking of the brattice allowed the fresh air to clear the gas from around Peterson. McPherson did not see any exploder nor exploder handle near Peterson.

McPherson did not hear the noise of any explosion or shot.

McPherson fixed the time of outburst at about 5.50 p.m. and stated that he himself at the time was talking to Allan in A.6.

Everything appeared normal at the face at 5.30 *p.m. on 13th October*. The bubbling was about the same as on the previous night—the height of the bubbles being about 3 or 4 ins. That had been the normal condition of the Dip for two or three weeks, but since the hole had been bored in the floor it was more pronounced. The boring apparently brought up more gas from the floor.

On *the afternoon shift, 12th October,* a hole had been dug 18 ins. deep in the floor to try and get the stone floor for a leg. There was gas in the hole. It was filled in. McPherson doesn't think it was reported. (McPherson said that the written Report is made on the state of the mine, when the Deputy is leaving and, if gas is cleared by the time he reports, he does not report it.) This hole was on the right-hand side about 6 ft. back from the face and about 3 ft. from the right-hand rib. The set of which that was a leg was put in the hole, was the last set timbered before the disaster.

McPherson is unable to say if Peterson had a shot-firer's attachment on his lamp at the time he was found.

Some shot-firers carry a special equipment attached to the battery of their head lamp for firing single shots. The power is not sufficient for multiple shot firing.

In testing for Methane after the disaster, in A.13, McPherson noticed the coal on the top rib to be small grained—a difference in the general texture of the coal to that in the ribs of the bords above.

McPherson's experience as a Deputy was that, when the booster fan stops, the Black Damp makes up quickly on the floor of the Dip.

If the fan is off for about two hours, there might be 1 ft. of Damp on the floor of the Dip, but the amount of Damp so lying on the floor in such circumstances as the fan being off depends upon how far the Dip is advanced into the solid, i.e., past the last cut-through (intake). For example, if 60 yds. into the solid, it builds up at the rate of about 1 ft. in two hours.

(It is on this evidence and on evidence of like nature that we have come to our conclusion as to the nature and quality of the seam in respect of its containing in its natural state 002.)

McPherson has never known, nor has it ever been reported to him, that with the fan on, the gas became so prevalent that the men had to jump onto the cutter blade to escape from it.

McPherson himself tested more than the statutory requirement of twice a day, for Black Damp and Methane. He has never found Methane in the mine.

On the night of the disaster, McPherson smelt the gas. He knows the smell of H_2S and the gas smelt of H_2S. It seemed to him a strong sulphury smell at the beginning, but lost that smell, and afterwards it had an acid or slightly acrid smell. It " chopped " his breath off. Another effect was to put his lamp out. He is of opinion that it was Black Damp, the biggest percentage of which was 00_2. He spoke to the chemist (analyst) later and is now of opinion that the gas was chiefly CO_2.

McPherson has smelt H_2S at the face in No. 3 East jig, No. 2 Tunnel, and also at the face of A.3 in No. 1 Tunnel.

If a shot had been fired at the Dip, McPherson doesn't think he would have heard it at A.6.

McPherson never saw anything to put him on his guard as a Deputy against a disaster like this happening. He has never heard anybody, including Government, miners or check inspectors, suggest the possibility of an outburst of 00_2. It had never been discussed by the Deputies or anybody else.

He knows of no act of neglect on the part of anyone leading to or having anything to do with the disaster, or any neglect of safety precautions that had anything to do with it.

McPherson changed his opinion as to the nature of the gas after speaking to the Government Analyst.

Proto suits would not have affected the rescue of the seven men nor have any bearing on it at all, even if completely new, because they were on the surface.

WILLIAM BUCHANAN had been employed in the mine for some 13 years and at the time of the disaster was a spare machine man.

He said that he commenced work at 4 p.m. on 13th October.

He cannot say when work commenced at the Dip face on that date. He said, " We would get all our gear together, then we would start. We would have to look for drills. The drills may not be right at the place where we were working." " Me, being the spare man, I could have been away getting dummies and things like that."

(The evidence of Overman Whyte is that the cutter machines have a special container for drills.

If the drills had been taken from the machine to be used elsewhere for grunching and not returned, this fact affords further evidence of the haphazard working.

Further, there is evidence that, apart from the power borers on the cutting machines, there are extra power borers.)

He said that, when he left the surface at 4 p.m., Allan told him that Walker might be a bit late but would be there in a couple of minutes and he further said that Allan instructed him, Buchanan, to go with Arthur Shrubsole on the loader. When they got down the tunnel about 200 yds., Shrubsole's light went out and he had to go back and get another light. He, Buchanan, waited till Shrubsole returned. Shrubsole was accompanied by Walker. He, Buchanan, then went to his own crew. He joined Peterson and he and Peterson carried down explosive and dummies and by the time they got to the face it was about 4.45 p.m.

Parkinson and Logan then went to look for drills.

By the time the first hole was drilled, it was about 5.10 p.m. (This is in conflict with the other evidence, and even Buchanan himself, later in his evidence, says he is not sure of this time.)

He said that prior to this, they, Parkinson, Logan, and Peterson, when they had first gone down had a cup of tea—they decided to have a cup of tea instead of smoko. The three of them were having a cup of tea when Buchanan got there (presumably at the crib room at A.9). When he got there they had finished.'He, Buchanan, did not take crib down the mine.

Jaques and Grieves also had a cup of tea. *Allan was present when they, Jaques and Grieves, had the tea.* After the tea, they (presumably Parkinson, Peterson, and Logan) and himself went down to the Dip.

Parkinson got on to the blade of the cutter and bored the first hole. Whilst he was boring, dust was blowing out. The hole was about 4 ft. from the right-hand rib and about 3 ins. above the top of the water.

Buchanan did not regard the dust blowing out as unusual. He said he has seen it before in the Dip. It did not generally happen in the side bords.

Neither Parkinson nor Peterson nor Logan made any remark.

It was blowing sufficiently to blow the boring dust out (obviating a withdrawing and thrusting action of the drill).

Whilst Parkinson was boring the first hole, Peterson said that he would go and make up some shots. Logan was with Parkinson. He, Buchanan, said that he would go and give Pike (Peterson) a hand

He and Peterson got three or four plugs of fracture and a skewer with which a hole was made in a plug for the insertion of a detonator. He, Buchanan, gave Peterson a hand in making up six primers. That was sufficient for the bottom holes.

(There is no evidence on the point, but our technical member says that sometimes a half-plug is used as a primer.

It is interesting to note that a full maximum charge in Collinsville is 28 oz., i.e., 3i sticks of explosives, and Buchanan states that they got *three* or *four* plugs for primers.)

When Parkinson was boring the second hole, Buchanan said that he would get on and charge up, and he, Buchanan, then charged the first hole. Parkinson waited until the first hole was charged so than he could move the blade over to bore the second. (This is an example of the type of evidence Buchanan gave.)

(They were using the blade of the cutter to stand upon, to obviate standing in the water whilst boring and charging.)

Buchanan put three plugs, including the primer, into the first hole. The charge was put in to the full depth with a dummy stick, but Buchanan is unable to say what depth. (Probably about 7 ft. 6 ins.).

In his first statement to the police after the disaster, Buchanan stated that Peterson had charged the hole but in a subsequent statement he said that he himself had done so whilst Peterson was standing alongside. He said this was a mistake.

He then put in three dummies (paper enclosing sand) and he rammed the dummies in as hard as he could. Peterson was watching. Two leads from the detonator were hanging out of the hole.

Whatever was blowing out of the hole was not of such pressure as to blow the charge or dummies out—it was just sufficient to blow the dust out when boring. There was no need to push the drill in and out to free the boring dust.

He put the leads up out of the way.

He had stood on the cutter whilst charging the hole.

The blade of the cutter had been moved over to be used for boring the second hole. He thinks it was moved by the power of the machine itself.

Parkinson started to bore the second hole. He got the first drill in all right but with the second drill " it used to go in for a little while then stop."

Parkinson said to Logan, " Will you go and get the electrician." Logan said he did not feel like going. Buchanan said he would go.

Buchanan thinks there was some electrical fault in the borer.

Buchanan says that an electrician named O'Reilly was at the Dip face at about 5.30 p.m. but he, Buchanan, did not speak to him. O'Reilly would be there in the ordinary course of his duties, inspecting the machines, cutters and borers.

The cutter was not required for the grunching process except for its use as a platform on which to stand.

Buchanan left the Dip face and went straight up the tunnel to the crib room at A.9, where he saw Allan and told him the borer was playing up and asked where the electrician was. Allan told him to have a look at B side.

Buchanan went to the B side and looked in B.6. He had opened the door and had gone through. In B.6 he saw dust blowing and thought it was wind. He went from B.6 to B.7 and then to B.8, and when he got to B.8 he felt as if his chest were caving in. He found it hard to breathe. There was a haze. He was in B.8 at the first cut-through. He went down on his knees and crawled out of the door of B.8 and sat under the belt for a couple of minutes. He then commenced to walk down to the crib room where Allan told him to get out of the mine.

He went up the tunnel with W. Davis and picked up Baker and subsequently made arrangements to get Baker to the surface on the belts. Buchanan had left the Dip face *at about* 5.45 *p.m.*

On *Monday, 11th October,* on the afternoon shift, Buchanan was present when the Dip was being cut at about 8.30 p.m. Parkinson, Logan, Grieves, Jaques, Peterson and himself were present. The face was being cut towards the A side. Peterson had the hose and said to Buchanan, " You'll have to hang onto this hose. I can't hang on any longer." Buchanan took the hose and found it hard to breathe. He gave it to someone else. Peterson went out to A.13 and sat down to get some fresh air, and Buchanan went with him.

Nobody sent for a Deputy and as far as Buchanan knows no member of the cutter crew mentioned it to either of the Miners' Check Inspectors., On 13th *October,* before Buchanan left after the first hole was bored and charged, Parkinson said, I think we will bore three or four and let them go," but Peterson said " No. I had enough on Monday night ; one will be enough for the time being."

Buchanan cannot say if the second hole was blowing dust.

Peterson was ready to fire the first hole when Buchanan left. He was taking down the cable at the time. He was taking it down to hook it to the detonator leads.

He does not know whether there was an exploder there that night or not. He himself was moving up the Dip and passed Peterson as Peterson was coming down from the direction of A.13. Peterson had the cable with him. That cable would be attached either to a plunger battery or exploder or a battery in the shot-firer's head light. Buchanan does not know if there was a plunger battery in A.13. He did not see Peterson go into A.13 at all.

He passed him about halfway between A.13 and the Dip.

(Peterson could have gone to the Dip, attached the cable to the leads and gone back and attached the other end to either a plunger exploder or his light battery and fired the shot.) Buchanan said that they generally fired the face shots from the exploder battery in A.13 but if firing one shot they would use the light battery. It was unusual to fire one shot with another hole half bored.

Buchanan gave the evidence, difficult to accept, that it was usual to fire a shot when the cutter was in the position it was in that night, i.e., right up near the face.

(The Manager, Mr. Winstanley stated that the controls on cutters have been damaged due to the machine crew not bringing the machine back out of the working place, out of the range of the shots, and he gave instructions that the machines were to be taken to a safe distance before the shots were fired. He is satisfied that such instructions were carried out.)

When Peterson was walking down to the Dip as Buchanan was leaving, he was running the cable out. Some was behind him The cable consisted of two plaited wires.

They were still boring the second hole when Buchanan left. Everything appeared normal for the Dip face. The cutter bar was about 18 ins. from the Dip face.

The second hole was about 2 ft. 6 ins. to 3 ft. from the first hole towards the centre, and about 3 ins..above the water.

On the night of the disaster, Buchanan fixes six minutes as being about the time after he left to get the electrician till he first felt difficulty in breathing.

He does not know if he heard a shot fired or not. He did not hear any noise in the way of a rumble or fall or explosion.

It was unusual to fire one shot in the circumstances operating on this particular night.

He said that on the occasion of *11th October—on* the Monday—when he found it difficult to breathe, McPherson the Deputy had tested over the water before the happening.

He stated that the fortnight prior to the disaster, there had been an increase in the intensity of the bubbles. On the night of the disaster, they were about 4 ins. high. The water was right across the Dip face and extended about 10 ft. back and the bubbling was all over the water. The bubbles were not more pronounced in one place than another and he does not remember any particular bubbling near the hole bored in the floor.

Before that fortnight, there had been bubbles but not so intense.

(There were six detonators used for priming, according to Buchanan. Forty-four of the ordinary issue of 50 were found in Peterson's pouch. Of the six missing, four were recovered and the clearing up revealed a fifth in the charged hole.)

Apart from the charged hole, the primers—five of them—were left at the leg of the last set of timber at the A side of the Dip.

Buchanan was familiar with the feel of Black Damp on the legs.

Buchanan said that on *llth October,* apart from his breathing, he felt a stinging in the eyes.

None of the men present on the 11th were alarmed.

Buchanan had seen dust blowing out of a hole at the Dip face which he himself had bored on an occasion within six weeks of the disaster.

On some previous occasion within two months of 13th October, Buchanan had an experience of difficulty in breathing. It was when A.12 or A.13 was being broken out. The brattice had to be lifted to get the coal out of the face and he said that he himself and one R. Bulloch found it difficult to breathe. He said they told Overman Morgan they were getting out. They went out for a while and returned, the gas having been cleared : Morgan had gone out with them and Morgan was heaving too.

He had met with Black Damp in the mine as far back as 1942, i.e., within the first year he went underground.

On 13th *October,* apart from the stinging in the eyes, he felt his eyes were full of water. He could just see the letter and figure " B.8 on the pan in B.B. He thought the haze was stone dust blown off the rib by air.

On the night of the disaster, when he got to A.9, McPherson and Hansen opened the brattice and he saw dust coming up from the Dip then.

He repeated that Parkinson, Logan, and Peterson had tea at the crib room and were ready to go when he, Buchanan, arrived. Buchanan was then with them for about three or four minutes. The time was about 4.40 p.m. (This is in conflict with other evidence.) It was not the usual practice to have tea at that time. Buchanan recalled the horse drivers Thomas and Brunker coming down and asking Parkinson to shift the loader to enable them to get the timber past. That was about 4.50 p.m. (This is in conflict with the evidence of the horse drivers.)

He said boring commenced about 5.10 p.m. but is not sure as to the time.

Two drills were used to bore the first hole. One is used first and then put aside.

Buchanan made the extraordinary statement that, if a hole was hard to bore, the men boring it would be finished for the night in doing one hole.

He does not remember if the face was cut across and he said that, in the position the cutter was in that night, the body of the cutter was not at an angle, it was straight on. He said that after the disaster G. Templeton asked him the position and if the cutter had been shifted and that he said yes. It was at an angle then, after the disaster.

He said further that the bottom holes have been blown on other occasions with the cutter in position near the face and that Allan, Parkinson, Grieves and Logan have been there on such an occasion, and that there was a happening like that about a week before the disaster.

We do not accept this evidence. We do not think that bottoms would have been fired with the machine up against the face in the presence of the men named. Obviously portions of the cutter might be struck by the dislodged coal with considerable force, but he said that he has seen that occur more than once. He stated that this practice would be followed because when the bottoms were blown out the coal would be left in such a position as to make it impossible for the cutter to move in again to bore the top. He had never known a cutter left in and buried in coal.

(It would appear that there had been a practice of boring, charging, and stemming the bottom holes before making the cut, but if what Buchanan said is true, i.e., that they have been blown with the cutter near the face, as we understand it, so close as to serve as a platform for boring—such action indicates utter irresponsibility.)

On *11th October,* the misting apparatus on the machine was not being used. The hose was being used. Water would accumulate but there was a pump there to deal with it.

He stated also the tops have been fired with the machine close to the face. (We do not accept this evidence. If it is true such action again indicates utter irresponsibility.)

He said that, on *the afternoon of the 13th, he thinks he saw McPherson at about* 5.30. (This is the time, incidentally, when he said the electrician was at the Dip.) He cannot say exactly where he saw McPherson but said that Walker was present and there was a conversation between them about false teeth. It was not at the Dip face. Buchanan put it that he " must have been sent to do something because he thinks he talked to Doug (McPherson). It may have been about A.10 Mick Walker had come out for something."

We are prepared to believe that in the confusion that must have arisen and the shock that Buchanan received his memory may be faulty, but it is difficult to imagine why he told police on the first occasion that he himself had bored the hole.

He said he had never seen the cutter machine shifted back before firing. He had never seen the machine moved back some eight yards before firing. He said the incident of the non-withdrawal of the machine in Allan's presence occurred in A.11.

When asked about McPherson's visit to the Dip at 5.30 p.m., he said that most probably he could have been there and that he, Buchanan, may not have been there at the time.

Buchanan remembered Peter Miller talking to Parkinson and Logan about trying to get the machine shifted but he does not think that Miller went to the Dip face. He thought that Miller would be talking to them at the machine.

He does not know of any duty that Miller had that night in A.12. As far as Buchanan remembers, Miller did not go to the Dip face and he doesn't think he did.

He said he did not know where Miller's body was found, nor did he know that his lamp was found in A.12.

On the whole his evidence is unsatisfactory and unreliable.

WILLIAM WHYTE, an Overman, had been in the State Mine for 25 years and an Overman for 12 months prior to the disaster.

He said there had always been Black Damp in both tunnels of the mine, mostly in dips, and that he had seen an accumulation up to a foot deep.

The practice had been to get Black Damp out by reducing the airway and increasing the velocity of the air. The miners working in such a place would be taken out until the Damp was cleared. They were not expected to work in it.

He had also seen bubbles in dip workings in both tunnels all the time he has been undergrounds, i.e., 24 years. As Deputy for nine years he had tested them and had never been able to get anything with his safety lamp, indicating that if anything were there it could not have been in any great quantity and the velocity of the air was sufficient to remove it.

(We note here that we are strongly of opinion that the bubbles were caused by the bleeding off of CO, but that when such gas reached the air it was diffused so rapidly and so effectively that the oil safety lamp could not detect it and therefore it constituted no safety risk to the miners. *Further, the bubbling did not act as a warning of a likely outburst of CO,.* In the future however, in the light of the disaster as we point out in our Report dealing with Term III, such occurrences must be regarded as indicating potential danger.)

He never noticed any pollution of air from the bubbles. He had seen the bubbles up to 2 and 3 ins. in height. Sometimes the bubbles were isolated and at other times in a series.

He himself as a Deputy made the normal tests for CH, and CO, and, when Overman, has seen Deputies testing for gases, and he had never known CH, to be found. He did hear that some ten years before the disaster it was supposed to have been found in No. 2 East Level.

The practice with regard to the Overmen's duties was that from shift to shift the outgoing Overman would confer with the ingoing Overman and advise him as to the state of the workings and other matters, timbering, &c. The ingoing Overman would also inspect the outgoing Deputies' and outgoing Overman's Reports.

For some time prior to the disaster, he had been Overman in charge of the dog watch, midnight to 8 a.m.

On the dog watch, he had two cutter crews of four men each and three shot-firers, one being a spare, and other men.

He said that the cutter crew consisted of four men (two actually on the machine, two boring) and one shot-firer.

He was in charge of the *dog watch in the early morning of Friday, 8th October,* 1954, and was at A.6 when a cutter man, A. Scharf, came along. He belonged to a crew consisting of himself, Bulloch, Baker, Monaghan, and McCarthy, shot-firer, which crew was cutting the Dip.

Scharf told Whyte that there was Black Damp coming out of the Dip. Whyte immediately went to the Dip and Scharf went off in search of the Deputy.

When Whyte reached A.13 he felt the Damp gripping him in the nose and throat. The cutter had been switched off. Bulloch, Monaghan, and Baker were in A.13 and he ordered them to get back up into the fresh air. The three men mentioned that their breathing had been affected and that the Black Damp had come from the cut as they were cutting the Dip.

Deputy T. Miller arrived and the air was short-circuited by opening the door of A.12 to give ventilation to the B side, by-passing the Dip.

Whyte gave evidence of two characteristics of Black Damp not referred to in the publications, i.e., a feeling of warmth and a feeling of dragging as though walking through water.

Whyte and Miller remained in the vicinity of the Dip. The Black Damp crept up to about 6 ft. below A.12.

The time was about 2.15 a.m. The men on the B side finished at about 4.15 a.m. and the air was then sent back on its normal course to the Dip.

The blower fan had been going all the time.

Whyte intended that if any difficulty had arisen in shifting the Black Damp from the Dip he would get the other blower fan from B.10 and use it down the intake side to break up the Damp in the Dip. He had no occasion, however, to do so.

The cut in the Dip had been practically finished—about 19 ft. out of 20—and he understood that the Damp was coming from the cut, which was about 4 ft. from the floor. The water right at the face was about 9 ins. to a foot deep. The cutter blade had been left in the cut.

Continuous tests were being made by himself and the Deputy. There was no Black Damp in B.11. The Dip was cleared at 5.30 a.m. and a test was made at the cut in the face. There was no sign of gas on the oil safety lamp and there was no smell. He put his hand in the cut for warmth test and there was no sign of gas. They both made a thorough examination.

When the gas was at its highest, i.e., stationary about 6 ft. below A.12, he rang the Manager and told him the position, suggesting that a man be sent down with a proto suit to move the cutter back, as the electrical equipment might be damaged by water. The Manager told him not to worry about the cutter but to concentrate the air in the Dip and get rid of the Damp. The Manager also suggested that he himself should go down but Whyte told him he did not think he could do anything further.

It took about 1 hours to remove the gas with the normal ventilation as it had been.

After it was cleared, the cutter crew returned and finished the cut (Baker said it had already been sufficiently cut). The machine was withdrawn and the bottoms fired.

Another test was then made and there was no sign of CO_2 nor Methane. Whyte believes the shots were fired from A.13.

Before the shooting, the bubbles in the water were no more than 1 in. high.

Whyte had inspected the Dip about ten or fifteen minutes before Scharf reported the Black Damp. The bottom holes had been bored and he believes that Deputy T. Miller tested just before or just after he, Whyte, made this inspection.

Whyte said that the occurrence led him to believe that they were getting close to a fault. It was common knowledge that they were approaching a fault. There was no pressure behind the gas which came out. He described it as a small pocket which bled out of the cut and rolled in without pressure and filled the floor up to this point 6 ft. below A.12.

The men affected by the Black Damp recovered quickly. The ventilation at the face at the time was normal—he thinks about 10,000 cu. ft. per minute. The ventilation was adequate. It shifted the Black Damp in a short time and he does not think that any improvement was required.

The bottoms only were shot on that shift but when Whyte went on duty on *the dog watch on the 9th,* the Dip had been completely shot and loaded out.

On the *9th (dog watch), Saturday,* timbering was done in the Dip and Whyte and his Deputy carefully checked the Dip. The bubbles were tested with no result. There was-nothing unusual about the Dip.

On *Monday, 11th October, dog watch,* no work was done at the Dip. There was excessive water and, although another set of timber was required, the water stopped that project. Whyte and his Deputy inspected the Dip and found no trace of gas or anything unusual.

On 12th *October dog watch,* no work was done at the Dip. It had been shot the previous shift and was full of coal awaiting loading out. The water could not be seen. It was closely inspected and tested. Nothing unusual was found.

On 13th *October dog watch,* no work was done at the Dip owing to the excessive water. It had been loaded out and timbered ready for cutting. He learned that holes had been bored in the face and floor. He saw the water bubbling at a height of 3 or 4 ins. in the area where the hole had been bored in the floor. The bubbles had risen higher than they had theretofore been. They were tested with no result on the lamp. He inspected the coal on the right-hand side of the Dip face and felt it. It was crumbly and mushy, indicating proximity to a fault. The faulty coal came in at an angle He puts its width at about 3 or 4 ft. from the right rib on the floor. It was a triangular section.

Whyte had seen numerous faults before in the mine and none of them have caused any trouble, and he said he saw nothing in this one to give him any cause to believe that it would be different from the others.

He did not anticipate or expect or foresee this disaster and had no grounds for believing it would occur. Nor did anyone suggest it.

When he left the Dip on the morning of the 13th, everything was in order and he could not see anything to give any cause for alarm.

During the clearing operations on *the 24th October,* 1954, Whyte saw a firing cable leading from the direction of the Dip and disrupted coal, into A.13. It went about 3 ft. to 6 ft. into A.13. We gather from his evidence that both ends were loose. He is of opinion that it had been laid out for the purpose of firing from A.13. That end had not been twisted about as he would have expected it to have been, had it been attached to a plunger battery. However, if fired from the shot-firer's light battery, the end would not be twisted about. After firing a single shot, the shot-firer would probably just drop the cable where it was in readiness to fire again.

There was no sign of any detonator wiring at the time, but a cable reel was found in the centre of the disrupted coal, giving the impression that the shot-firer may have attached another length of cable to that leading into A.13. Nothing much could be gleaned from the position of the cable reel, because it was in such a position that it would not have been covered if only one shot had been fired.

On 26th *October dog watch,* during clearing operations, the blower fan was found under the disrupted coal, as was also the cutter. A tin of explosives—he thinks full, with 20 sticks of 8 oz. each—was on the seat of the cutter. (Cundith's evidence indicates three sticks were missing.) The same day at the surface he received a broken plug of explosive with a detonator in it and wires attached, which had been found at the surface screens, having been loaded at the Dip.

On *27th October,* when the cutter was cleaned, a billy can containing borer bits and a pair of pliers were found on the cutter, and on the same day another tin of explosives, he thinks full, was picked up by the loader with the coal from the right-hand side of the Dip. (Cundith's evidence indicates that 3i sticks were missing)

(It is interesting to note that Whyte said the drills are attached to the cutter, there being a special holding place for them. It will be remembered that Buchanan said that some of the men may have gone away looking for drills on the night of the disaster. Either they were at the machine or had been taken elsewhere and not returned to their proper place.)

VINCENT DAVIS had been employed in the mine for some eight years and was a Deputy for about two years before the disaster.

From *4th October, up till the 13th October,* 1954, he was on the day shift. Two other Deputies were also on the day shift. One supervised the clearing up of A.6, that bord having gone to its limit

Another Deputy was employed on the second intake, stopping off old workings. (This evidence reflects on Barrett's complaints about that intake.)

Davis did the actual safety work in the Machine section.

On *Friday, 8th October,* Deputy T. Miller, coming off shift from the dog watch, told Davis of the Black Damp incidents of that shift.

Davis visited the Dip as his first duty and carefully tested it. It was clear. He paid particular attention to it all day and never at any time found gas in it.

On *Monday, 11th October,* he tested the Dip at different periods and found no signs of gas. The bubbles were there and he tested them, not immediately above them but in a corner on the return side where the ventilation might be expected to carry the gas if present.

Between the 8th and the 12th, he not only made his usual two inspections of the Dip on his rounds, but visited the Dip in between rounds and tested the air.

On *12th October, Tuesday,* he tested the Dip when it was being loaded out before 10 o'clock. At about 10 o'clock or a little after, at the report room B.4, Overman Morgan mentioned to him about the boring of the holes. He is not quite certain of the time, but some time before or some time after crib time (? smoko) (10 o'clock) he again tested the Dip. The holes had been bored. Morgan was there. The water covered the hole in the floor but Morgan told him it was 9 ft. deep and had not met stone. There was a bubble over the hole about 3 or 4 ins., as " thick " as a saucer. It was a continuous flow, not a series of bubble, pause, and another bubble. It was definitely associated with the hole. It appeared that the other bubbles had decreased, as if they were all feeding into the one position.

The hole was about 4 ft. from the right-hand rib and 2 or 3 ft. back from the face. The water was right across the floor, being perhaps 2 ft. wide at one rib and wider at the other. It was about 3 or 4 ft. wide where the hole was.

Prior to this date, the bubbles had shown a distinct pattern, as if following the direction of the fault. (We gather it was following the line of the disturbance in the coal.)

He saw the hole in the face about 2 ft. from the floor and 3 to 4 ft. from the right-hand rib.

He tested the bubble carefully, shielding his lamp from the current of the ventilation air, and took every precaution to make a proper test. He also carefully tested the hole in the face with his lamp. He smelt both holes. He put his hand over the one on the floor over the water and felt no pressure. He did the same to the one in the face. He listened carefully to them. He detected no gas at all in either of them in any of his tests.

Davis said that one could see they were approaching a fault. The coal had taken a distinctive turn down and they had lost the stone floor. A sooty band was coming in and on the floor it was about 2 ft. wide on the one side, tapering to almost nothing on the other.

Morgan and himself had discussed matters on Friday, 8th, or Monday, 11th, when the Dip was shot out. Methane was mentioned. On that occasion they went all over the face and Davis gave Morgan his lamp and Morgan himself went all over the face and double checked.

Davis had met a fault in No. 2 Tunnel workings and thought this to be a continuation of that fault.

Davis tested at the Dip again on *the* 12th between 2 and 3 p.m., and found no sign of gas.

On 13th *October,* Morgan told him he intended to cut the Dip. Davis thereupon went straight to the Dip after he commenced work, i.e., before 9 a.m. He tested over the bubbles and also the hole in the face. The bubbling appeared to be the same as it was on the preceding day. There was no sign of gas. He then went on his round of the section, visiting the Dip again in the course of it. The cutter cable had been run over and was being repaired.

He spoke to one Prasser, and Watson. They were, he thinks, in A.13. He tested the holes at the Dip and also tested A.13, with no results.

He again visited the Dip after lunch, when the men were about to cut the face. He went over the whole of the Dip face and got no indication of gas at all.

He noticed nothing unusual and saw no indication of any outburst.

He does not recall Prasser making any remark about gas or that it was hard to breathe. Possibly Prasser made a remark that it was warm or hot and one of them may have said that the air was not good. It was hot there. Davis did not deny that one of them may have said " We are finding it difficult to breathe " but he does not remember it being said, and if it had been said Davis would have looked for the reason and he does not remember looking for the reason.

He went to the Dip again after the cutter had been pulled out. Morgan was there. The face had been partly cut and the blade had been turned over for a low cut. (The intention was to cut a floor in the coal). The men were knocking off at the time and Morgan and himself were the only two men there. Again there was no sign of gas on the oil safety lamp and he smelt nothing.

Davis stated that he stayed on until about 4.20 p.m. and at B.4, the report room, he saw Deputies P. Miller and D. McPherson coming on shift. They saw and read his report and he had a conversation with them.

Davis had regularly tested for Methane and had never found it. Davis always reported in his Report the finding of gas. The men were never allowed to work in any place where gas was present.

Davis agreed that Black Damp might come in very quickly, up to a depth of 2 ft. in half an hour.

The men would send for the Deputy if they knew Black Damp was there. They were safety-minded.

The brattice was hanging partly across the main heading outside of B.11 on the night of the disaster.

Davis had paid special attention to the Dip from the 8th October onwards.

Davis thinks that pilot holes bored ahead would be a very good idea.

Consistently with all of the other witnesses, Davis stated that he did not expect the possibility of an outburst and nobody in the mine contemplated such a possibility.

He also over a long period of time had met Black Damp in the mine. On the B side he thinks it was emanating from the coal there.

Davis agreed with the proposition that in shallow non-gassy mines like Collinsville there is generally a greater presence of small patches of Black Damp than in deep, gassy mines.

Davis said that the over-all position of Collinsville on the day of the disaster and prior to it, was that a high standard of care was exercised in the mine and that the workers, including a number of experienced miners, some with experience on fields other than Collinsville, were all safety-conscious.

A small fault had been met in A.1 companion heading.

VINCENT CHARLES PRASSER had been employed in the mine about ten years and prior thereto had been coal mining elsewhere. He had had 15 years' experience in all in coal mining and was a machine man at the time of the disaster.

He said he had noticed H_2S from A.3. down to A.7 and had reported it to Deputies. He also said that at times he thought he smelt it in the Dip.

On 13th *October,* he was operating a loader in the Dip section on tlie day shift. Watson was with him and during the day they were loading out A.13, tandem loading at the rear. He said that Watson passed a remark that the air was no good. He himself felt very uncomfortable. The air felt worse than it usually was. He said he told Overman Morgan that the air did not seem any good and that he had difficulty in breathing. He said Morgan replied, that he, Morgan, had had " a gut full of the stuff " the day before and felt a bit " crook."

Deputy Davis came down and tested on the right-hand side (apparently of the Dip) and lowered his lamp right down on top of the water. There was no result. He, Prasser, was at A.13 and could see the lamp apparently burning brightly. He was reassured. If there had been a quantity of Damp, he thinks the lamp would have picked it up. He said Davis did not test A.13 and thinks that, if Davis had tested the left-hand side (apparently of the Dip) where the blower was not blowing directly on to the lamp, he might have got traces of Black Damp.

He stated that Davis does not test every bord during his rounds. He said the Overman may have sent for Davis without Prasser's knowledge.

Prasser stated they went to A.12 and A.13, and in A.12 he noticed a strong smell coming from the Dip—a " rotten, stinking " smell. He noticed it coming out of the intake. It had no effect on his eyes and did not smell like " stink damp " nor like rotten eggs. It had no effect on the nose or throat and it did not smell like soda water. He did not report it to the Deputy nor the Overman nor a Mines Check Inspector. He did not suspect any danger from it.

Prasser also said that he had noticed in cutting B.11 bord that gas had come out. He said he had seen a Deputy testing for Black Damp over the bubbles but suggested that the tests were inefficiently made because the Deputy did not take precautions against the flow of air. When asked directly if the Deputies were negligent, he said No."

He also said that he had never seen Deputies test for Methane.

We do not believe Prasser's account of some of the happenings of the 13th October.

We feel that he is a trouble-maker and unreliable.

We are satisfied Davis made a proper and competent test both in the Dip and A.13 and moreover, wherever Prasser's evidence is in conflict with that of Morgan or Davis, we prefer to accept the evidence of the two latter witnesses.

We do not believe his implied suggestion of negligence on the part of the Deputies in general in testing for Methane.

Prasser had been on the loader which caused the hindrance to the horse drivers on the night of the disaster. He said that he and Watson took the machine out of A.12 and parked it up near the pans near B.11. He stated they did not leave it in the middle of the road but left it alongside the pans in a position in which he thinks there would be room to get the timber past it. He said he parked the loader about ten yards above the brattice. He suggested at first that the immobile loader which caused the trouble to the timber men was not the loader that he and Watson had driven up on the previous shift and he then later suggested that someone else could have shifted it on the disaster shift.

We do not believe him We are satisfied that it was the same loader that he was instructed by Morgan to put under the conveyor pans outside of B.11.

(Morgan said if his instructions had been carried out, the loader would have been out of the way of the men bringing in timber.)

We are further satisfied that it had not been moved from the position in which Prasser and Watson parked it when the horse drivers found it to be an obstruction. The whole incident establishes in our mind Prasser's unreliability, both as to his evidence and as to his work in the mine.

CECIL JAMES DUNLOP had been employed in the coal mining industry for 14 years and at the time of the disaster was a timber man in the mine. On 12th October, with others he timbered the Dip in the afternoon shift. He noticed that the stone floor had dipped or rolled over very sharply at an angle across the bord.

There was water extending back from the face to a distance of 6 ft. to 8 ft. and it gave Dunlop the impression that it was bubbling.

On the left-hand side the stone floor was right up to the face but on the right-hand side the stone floor disappeared about 12 ft. back from the face.

They were timbering from about 4.20 p.m. until 7 p.m.

The Deputies examined the Dip whilst it was being timbered. One of the timber crew suggested a test of the bubbles, which was made. He thinks Miller was the Deputy. McPherson was also present. There was no result on the lamp. McPherson remarked that Allan must have been correct in his contention that the bubbles were caused by air.

Dunlop said that he did not feel any effects of Black Damp there. *They had a pretty good velocity of air from the booster.*

There was a stone floor for the left-hand leg but Dunlop dug a hole in what he describes as mushy, sooty ground for the right leg. He says it did not resemble coal—it was a " sort of muck." He dug a couple of feet. McPherson said he would like to see it on stone if he could get it and Dunlop replied that, if he (McPherson) wanted it any deeper, he (McPherson) had better have a go at it himself. McPherson said he would put a drill hole down it and see if he could find stone. He drilled with an ordinary power drill to a depth of about 4 ft. and did not find stone. When the drill was pulled out, there appeared to be dust of a greyish colour or " something " blown up the hole or through the hole or " puffing " or blowing out. It was not very much. It was very thin. It came out for about half a minute after the drill was pulled out. There appeared to be some slight pressure driving it up. It could have been the dust created by the boring but, in his view, it would have hardly lasted so long if such were the case. (It had apparently ceased when they were setting the leg.) McPherson put his safety lamp down the hole and it went out, It was quite common with a hole or cavity like that, that Black Damp would accumulate in it quickly.

This appears to have been the last timbering done in the Dip.

On 13th *October,* Dunlop and crew Lavercombe, Torkington and Baker were working in B.8 on the *afternoon shift.* He noticed a haze in B.8 at about 6 p.m. They were working at the face past the second cut-through and more that 100 yds. from the main tunnel, and he noticed it coming in. It came up the air return from B.9, i.e., the nearest cut-through to them. Before he saw the haze he did not hear anything and when he saw it he remarked " I wonder who fired that dirty shot." He thought a very smoky shot had been fired and had caused the haze. That was what the haze looked like. He asked the others if they had heard a shot. The others said they did not hear a shot. Dunlop was up the ladder and Baker may have said something about hearing a shot but he did not hear him.

The haze came to where they were working.

Dunlop thinks he smelt some kind of sulphur smell. His eyes smarted and he found it hard to get his breath. Fracture (explosive) smoke has a distinct smell—not sulphury. Dunlop said " Let us get out of here " and they ran out along the level through the haze to the door between the first and second cut-throughs. He had difficulty in opening it as he was just about overcome. However, he got up the first cut-through into B.7. They were running together. Baker seemed more affected than the others. Baker had to sit down and rest when they got out.

From B.7 he heard the belt running and went out into the main tunnel and across the belt.

(Evidence was given by Brunker that there was no machinery working at the time of the disaster, but obviously the belt was running, as also were probably the chain conveyors in B.10 and A.11.)

He looked down the Dip, saw some lights and went down to A.9. He saw Allan and asked what was wrong. He said Allan was in a bit of a flurry and waved his arms and called out, " Everyone out." Dunlop went to No. 3 level and later assisted in rescue operations.

Dunlop said that, as far as he is concerned, there was nothing to put him on his guard that there might be an outburst of that nature.

No-one suggested that it would happen.

Dunlop said that, as far as the Dip was concerned, he found the ventilation when he was down there on 12th and 13th to be quite good. That was on account of the booster. There have been occasions when the booster has been cut off—two occasions he thinks, once about three months before the disaster, when, half an hour after the booster stopped, Damp started to accumulate and the men got out. He felt it accumulate around his feet. The men sent up word to the Deputy that the booster had stopped. They returned as soon as the booster got going again.

On *the* 12th, he does not know if any noise came from the hole McPherson bored. There was a continual noise coming from the floor along the face and it would be hard to hear. There were bubbles coming up in the water. He knew there had been a hole bored in the floor during the day shift but he did not know of, neither did he notice, the one in the face. He did not see any dust blowing from the face.

He heard a more or less continual rumble. When Dunlop was asked if that was usual in the Dip when water was present he said not to the same extent.

The hole bored by McPherson was about 3 ft. from the right-hand side and near the lip of the water, i.e., about 8 ft. back from the face. The hole was about 14 ft. from the booster fan. The fan was directed on the floor.

Dunlop said the employees were safety-conscious.

The leg placed in the hole on the night of *12th October* was put on a timber sill. After finishing that set, Dunlop was not at the Dip face at any other time up to the disaster.

As a rule the brattice goes up to the second last set and a top strip of brattice to the last set.

(The average distance between sets was about 6 ft.)

JAMES CLEMENT HILL had been employed in the mine for some 12 years and at the time of the disaster was working as a shift man or labourer.

On *Monday, 11th October,* he was on the *afternoon shift,* first working at the junction of the chain conveyor from A.8 and the main belt. A.8 was loaded out by Walker and Shrubsole. After A.8 was loaded out, he went to the Dip at about 6.45 or 7 p.m. He said the Dip was being cut. There was water on the floor near the face. The cutter was at the face. There was a strong smell appearing to him like rotten onions. He complained about it. The Deputy—he thinks McPherson—was present and made a test. Nothing showed on the lamp. The Deputy put his lamp across the bubbles on the floor. Walker was present and make a strong complaint to the Deputy, who referred him to Overman Allan who, according to Hill, did nothing.

(The Overman's report for this shift is signed " G. Temp "—presumably G. Templeton, Senior Overman—not Allan, but Jaques also says Allan was Overman on the shift, at least at one stage.)

After a while Walker said " Come on, let us get out. We will go and load the other bord." Walker and Shrubsole then went and loaded B.8. At the Dip there was nothing ready to load. It was intended that they should load if it had been shot, but it was still in the process of being cut when they went down. Jaques, Peterson, and Grieves were the crew. Hill cannot say if there were any others there.

On the afternoon shift of the 12th, Hill was assisting the fitters and went down to the Dip at about 8.30 p.m. and again later. His evidence is rather confused. It appears that he was down at the Dip for a considerable period before 10.45 p.m. assisting fitters with pans at the Dip.

There had been a hole bored in the middle of the floor. He detected no smell, but the water was bubbling. On the return side, however, there was a faint smell of rotten onions. He spoke to Allan about the bubbling in the floor and Allan told him that the hole had been put down during the day shift to see how far the floor went down in the spongy matter. Hill asked Allan about the bubbles and Allan said it was just fresh air and invited Hill to put his head over and smell it. Hill put his hand over and he felt the air was cold. (There is evidence that Black Damp gives a feeling of warmth to sensitive persons. However, the authority Stutzer to whom we later refer states that released CO, expands, uses up heat, and lowers the temperature.)

Hill left the Dip at about 10.45 p.m. Three shots were fired, he thinks simultaneously, in A.12 just before he left, and the dust and fumes from the shots came down to the Dip face and into the return airway. The fitters had finished their work. Hill said to Munro, who was present, " Come on, Bob, let us go," and the two fitters McIntosh and Bushell said that, if it was not good enough for them (Hill and Munro), it was not good enough for themselves, and they left with Hill and Munro.

On the way to A.9, they met Allan, and Hill complained to Allan about the firing when men were in the Dip. He said that Allan then said " That's the last time we are going to fire to-night. *We are going to finish up shortly." The time was then about* 10.50 *p.m.*

Hill went to the crib room and hung around for a while and in fact did no more work on that shift.

Hill stated that, *on the afternoon shift of 13th October,* he was first attached to Jaques and Grieves. He said there was no work for Jaques and Grieves as cutter men and they were sent timbering. Then, he said, they were sent to grunch an opening cut-through, he thought from A.8 to A.9. Hill was to assist them in any way possible. When they got to their place, the timber was not in a position for grunching and Allan then directed him, Hill, to fill spillage at the flight conveyor. He started filling spillage at about 5.30 p.m.

He said he went straight from the surface to A.9, the crib room, getting there at about 4.30 p.m., and had a cup of tea and did no work until 5.30 p.m., when he started to fill spillage coal.

A number of men had a cup of tea. After they had their tea, he said, Allan came in and allocated the men their jobs. He said he was in the crib room for about three-quarters of an hour, leaving at about 5.10 or 5.15 p.m. When he left, Allan was still there with a couple of others, the names of whom he cannot recall, but thinks they were probably Peterson and Logan.

Buchanan was not at the crib room. Peterson, Parkinson and Logan were there. He did not see P. Miller. Walker and Shrubsole were there and he thinks Ruff was there also because Ruff was the man on the drivehead.

In a statement made by him before the Inquiry and put to him by the Solicitor-General, which he admitted to be correct, he said : " I went to A.7 and commenced to fill spillage coal. That would be approximately 5.15 p.m. Previous to that I had a cup of tea with the seven men who lost their lives, with Aubrey Jaques, Charles Grieves, Bob Munro." He said it was the first time he had ever had a cup of tea before smoko. He said Allan must have known they were having a cup of tea. He saw them there when he came into the place.

(Apparently Hill went with Jaques and Grieves *to A.7,* where it was found that the timber position interfered with the breaking off of a new bord A.7 D.)

Allan arrived at about 5.5 p.m., when they were having their cup of tea, and he stated that Allan gave him his instructions to clean spillage at about 5.15 p.m. It was usual to get their instructions on the surface, but on this occasion, for the first time, Allan told them he would give them their instructions down below.

The witness later in his evidence said that the instructions to grunch were given by Allan immediately lie arrived at about 5.5 p.m. The three of them immediately left to do so and found the timber difficulty. Allan came to the spot and gave Hill his other instructions, to clean spillage, which he started to do at about 5.15 p.m.

In the crib room there was a conversation about the smell in the Dip. He said that about 5.30 p.m. he was in the main tunnel near A.7 when Hansen and Staples came out of B.7. He asked them if they were going for smoko. They said they were going to load out A.11 and would, do half an hour's loading before smoko, and went on their way towards A.11.

At about 5.45 p.m. he thought he heard a shot coming from the direction of the Dip. He was then in the main tunnel outside A.7. He looked at his watch. He did not hear any other noise.

About five minutes later, two men came from the B side, one of them being Dunlop. Dunlop asked what had happened down the Dip and said that there was a terrific smell of gas coming up the return B side and that it was burning his eyes.

Hill started to walk towards A.9 down the main heading, when McPherson came running down from outbye, grabbed his safety lamp from the ambulance cabin at A.7 and ran towards the Dip..

Hill kept walking down and next saw McPherson come through the brattice door below A.9. McPherson called out " Get out ". Hill was approximately at B.8. When McPherson opened the doors of the brattice, a haze came across the top of his (McPherson's) head, which appeared in colour to be whitish or bluish like cigarette smoke. The time was then about 5.55 or 6 p.m.

Hill got on the belt and went to No. 4 drivehead, where he saw Baker who looked very ill. Baker's eyes were inflamed. He put Baker on the belt and took him to the surface.

The men at the crib camp stayed there until Allan arrived. Walker, Shrubsole, Parkinson, Peterson, Logan, Munro, Hansen, and Staples were there. He thinks Ruff was sitting outside the crib camp. He cannot place Buchanan. Thomas, and Brunker were not there. Hill was talking to Lavercombe at the entrance to the crib room, and Baker and Dunlop were with Lavercombe. He remembers Grieves being at the crib room but thinks that Jaques was along A.9 level.

Allan did not give any instructions to Walker and Shrubsole at the crib camp that night. In fact, in cross-examination, Hill said he did not hear Allan allocate work to anyone in the crib room that night except himself to go with Jaques and Grieves to grunch a bord (between A.7 and A.8).

Allan could have allocated some work before he got to the crib room at 5.5 p.m. on the night of the disaster. When Hill arrived with the others at their working place, the timber position was unsatisfactory. No part of A.7 D had been broken out. Hill was told to clean loose coal around the bord and he said that Allan also told him to go out to the main tunnel and clean spillage. He said he got to the main heading at 5.15 p.m. and whilst there he saw Buchanan at about 5.30 p.m. come up from the Dip face looking for an electrician. (This time appears to be wrong.) He stated that Buchanan said there was something wrong with the boring machine. Hill said it was about the same time that he saw Buchanan and spoke to Hanson and Staples.

When Hill got Baker to the surface the ambulance was already waiting. Baker had a drink of water and the doctor arrived. The doctor asked if there was a resuscitation outfit on the surface. Hill said he did not know and the doctor said that they would get one from the hospital. Hill then accompanied the doctor to the hospital, taking Baker with him. They, the doctor and Hill, got back about 6.20 or 6.25 p.m. and the first bodies arrived at the surface at 6.40 p.m. They were Walker, Shrubsole, and Ruff. The three were dead.

(Such is the evidence of Hill. It speaks for itself as showing the general state of affairs, and the system of work, that night.)

RICHARD O'REILLY, an electrician, was on duty on the night of the disaster. He had left the mine at the time of the Inquiry and did not give evidence before us. The Solicitor-General, however, put before us a statement made by him, which we accept as evidence.

He said that it was part of his duties to check the electrical installations on the machinery and that at about 5.30 p.m. he checked the electrical installations on the cutter at the Dip face. c. 5.30 p.m.
The machine was partly across the Dip with the blade inserted about 2 ft. from the right-hand side of the face and about 18 ins. from the floor. He there saw Peterson, Parkinson, Buchanan, and Logan, and spoke to them. He did not notice anything abnormal at the Dip face apart from the bubbles coming from the water on the floor of the Dip roadway. He had seen this for two to three weeks previously. No remark was made to him by any of the men there as to any abnormality.

As far as he could see, no work had been done in the way of boring or firing the Dip face.

He found the electrical installation in order, as were also the cables.

He then went up the main tunnel to A.9 at approximately 5.50 p.m., where he met fitter c. 5.50 p.m.
R. Nutt and accompanied him into A.9 and helped him to do some work on a loader at the face of that bord. While so helping him at approximately 6 p.m., he heard a noise which appeared to e. 6.00 p.m.
him as though a shot had been fired, and he has some vague recollection that this was followed by a lesser explosion similar to that of a small bore rifle.

Very soon afterwards he heard a commotion and went to the intersection of A.9, where he met Deputy McPherson, who told him there was gas in the Dip.

(His evidence as to the position of the blade of the cutter does not tally with other evidence, and the time he fixes as to his movements is contrary to that given by R. Nutt although consistent with that given by W. Buchanan. His evidence does not tally with Nutt's as to the time he was helping him.)

HORACE ROY NUTT, a senior fitter of some six years' experience in the State Coal Mine.

He had been on the day shift of the 13th *October* and continued on into the afternoon shift, and at the time of the disaster was working on a loader in A.9 with one Richard O'Reilly, an electrician.

At 4 p.m. he was at A.9, getting his tools ready for work on the loader. (The fitters' room is near the crib room near the mouth of A.9.)

Several of the employees came along before he left to go to the loader at about 4.20 p.m. to 4.30 p.m.

He difinitely saw Parkinson and Peterson at the crib room. He said he saw Walker and Shrubsole walking past on the other side of the main tunnel, and greeted them. They did not stop nor come into the crib room.

He first said he saw Allan in the vicinity of the crib room at about 4.30 or 4.45 p.m., after he had seen the other men come by.

He also saw Munro working outside the crib room. He cannot recall seeing Logan.

(It appears to us that Logan was probably with Parkinson and Peterson in the crib room.)

He cannot recollect seeing Ruff nor can he recall seeing Buchanan, and he said he did not see Hill, Thomas nor Brunker.

The men who came into the crib room put their crib away while he was assembling his tools.

When he left the crib room it was about 4.20 or 4.25 p.m. and there were five or six men in the crib room then.

He remembered definitely that Peterson and Parkinson were among these men.

He did not remember seeing Jaques and he said Baker was not there.

He said that instructions were usually given at the surface to the employees as to their work, but some of the men assembled below at the crib room to get their tools from the Overman, and some, generally labourers, received their instructions at the crib room.

Nutt stated he did not see Allan talking to any of the men in the crib room.

Before Nutt had seen Allan, he, Nutt, had instructed Munro to procure some material from A.2. (Apparently he did this without consulting Allan as he should have done.)

Nutt did not see any men of the timber gangs that night. He did not see Hansen until after the disaster.

He said he had a faint recollection of seeing Grieves and Jaques with others at the crib room but was not sure.

At about 4.20 p.m., Nutt saw McIntosh and Bushell, fitters, near the crib room at A.9 and sent Bushell down to do a job on a loader in A.11. He believed McIntosh went with Bushell to A.11.

At about 4.50 p.m. to 5.00 p.m., Richard O'Reilly came near the face of A.9 and at Nutt's request helped Nutt with the loader and stayed with him right up to the time of the disaster. (This conflicts with O'Reilly's version as to time.)

Nutt was working on the loader at the face of A.9 when he saw Deputy Miller at about 5 p.m. Miller made his inspection.

Nutt saw Allan at the end of the chain conveyor of A.9 in the main tunnel at about 5.15 p.m., when some words were passed by Allan about Munro being sent for the material at A.2.

(Unless Nutt saw Allan on two occasions, it appears that when he said he first saw Allan at about 4.30 or 4.35 p.m. he is confused. He had gone into the face at about 4.20 to 4.30 p.m. O'Reilly had joined him some time later, and Miller had made an inspection at 5 p.m. Nutt had gone out of the face of A.9 to the main tunnel when he saw Allan at about 5.15 p.m.)

Nutt said that when he left the crib room the men there were having a cup of tea. There were some five or six men there. Parkinson and Peterson were two of them. (The evidence of this witness and others leads to some difficulty in our minds as to who were the others.)

Nutt said the loader men could not start work until the belt started and that the belt sometimes did not start until 4.30 or 4.40 p.m. He also said that other men had to wait at the tool room (the crib room) to receive equipment, ropes, axes, &c.

According to Nutt's evidence, Nutt and O'Reilly worked at the machine at the face of A.9 continuously, i.e., Nutt from about 4.30 p.m. onwards and O'Reilly from about 4.50 p.m. to 5 p.m. onwards (with the exception of the trip out by Nutt to the main tunnel at 5.15 p.m. when he saw
c. 6.00 p.m. Allan) until about 6 p.m.

They had finished the job and were going out towards the main tunnel when Nutt saw the men running up the cut-through (also referred to by some of the miners as the intersection or companion heading) from A.10.

Nutt met Hansen, McPherson, McIntosh, and Grieves. Grieves called out " You can't go down there. The damn place is full of gas."

Allan came on the scene and directed Nutt to stop persons from going down from A.9.

McPherson and Hansen, however, did go down the cut-through, and Nutt himself went up to A.6. The Manager later arrived.

Nutt said that during the whole of the time he spent at the mine he had encountered Black Damp on many occasions. It was well known among the miners, some of whom had been miners all their adult life.

The likelihood of an outburst had never been raised by Parkinson nor Peterson, and no suggestion of an outburst had ever been made by anybody else so far as Nutt knows.

The Deputies carried out their duties to the best of their ability.

Nutt does not think anybody was negligent.

Nutt further said *that the events on this night were typical of the ordinary working of the mine.*

AUBREY CLARENCE JAQUES was a machine operator and had been employed in the mine for 14 years. He left the mine three weeks after the disaster.

He was a spare shot-firer and was with a cutter crew—Parkinson, J. Logan, C. Grieves, Peterson, and Buchanan—on the *afternoon shift of Monday, 11th October,* working at the Dip face.

The bottom holes were bored and charged. The top holes were then being bored and they were on the second last one when the borings (gummings) commenced blowing out of the hole. They did not take much notice and commenced to bore the last hole when the borings in that one also started to blow out and a foul rotten egg smell came from it. They stopped boring. Both holes were about 1 ft. from the roof, the last one being at the rib on the left-hand side of the face and the second-last one some 3 to 4 ft. from the left-hand side.

One could not put his face to the hole on account of the gummings blowing back and the smell.

Deputy T. Logan was sent for. The miners put their headlights out and Logan tested the holes with his oil safety lamp. He could not find anything wrong. They finished the last hole and the Deputy tested the floor where he found nothing.

Jaques said he could not breathe and his eyes were sore. Parkinson also complained of his eyes and his breathing. Deputy Logan stayed on. At no time was his oil safety lamp affected.

The men went to the booster fan where they remained for some five to ten minutes.

On their return, Jaques could not smell anything. They commenced the cut and had half completed it when his eyes and breathing again became affected. They went back to the booster fan and again remained for some five to ten minutes.

The Deputy was still there but nothing showed on his safety lamp.

They returned to the Dip face and eventually finished the cut after paying two more visits to the booster fan.

The matter was reported to Allan, the Overman, who came along to where they were cutting. Deputy Logan had remained all the time.

The bubbles were showing in the water and Jaques stated that he asked Allan what he thought they were. Allan replied that they were probably air.

Jaques told Allan about the gummings blowing out and the effect on the breathing and eyes.

The bord was fired from A.12, some of the men standing up the tunnel about 25 yds. from the face. Shot-firer Peterson fired the six bottom holes together and after the dust cleared they went back and charged the middle series, shot them and finally charged and shot the top series. After the operation, Peterson and Jaques trimmed the face while the cutter crew took the machine elsewhere.

On *Tuesday, 12th October,* Jaques was again on the *afternoon shift.* He did no work at the Dip, but visited it. He says the bubbles in the water were bigger. He was told holes had been bored in the floor and face. He said that the floor had a different appearance from that which it had on the preceding night. " It seemed to roll away."

On *13th October,* he was again on the *afternoon shift.* He received his instructions from Allan at the crib room at A.9. He did not remember the time, but it was after 4.30 p.m. There were a number of men at the crib camp. He said definitely he did not have a cup of tea and that he does not know of anyone else who had one.

(It is difficult to reconcile this evidence with other evidence, i.e., that of Hill, unless Jaques had left the crib room before the other men had had a cup of tea.)

Jaques said that at the crib camp there were present Grieves, Parkinson, Buchanan, Logan, Peterson, Walker, and Shrubsole, but he did not remember seeing Ruff, Staples, nor Hansen, and did not remember seeing Hill down the mine at all that night. (This evidence is at variance with that of Nutt as to Walker and Shrubsole.)

Allan came along behind the men and gave orders to the various employees.

Jaques and Grieves were the first to receive instructions which were to grunch A.7 down.

They went to A.7 D. The bord was not ready. There was no carrying set and the coal was right up to the legs.

Jaques thought that it would not be wise to grunch on account of the position of the timber and that a mistake had been made. He went to A.8 to see if that was the place meant by Allan but that apparently was not ready either. He then went out and got Allan, told him the position and brought him back to A.7 D. Allan said that there was something wrong but that they were his orders and for Jaques and Grieves to see what they could do. The cut-through had not been marked out.

Jaques said that it was not unusual to get orders down at the crib room ; the oncoming Overman might not get the outgoing Overman's report until about 4.00 p.m. and that if it was a bit late, the Overman would say " I will meet you down at the crib camp."

Jaques and Grieves commenced to grunch A.7 D. They bored about three holes and fired them and then, a pick being required, Jaques went to A.6 to the store room to get one. He was returning when, at the cut-through or intersection or companion dip up to A.6, he saw McPherson who raced up that cut-through out of breath and called out " The Dip has blown up. There are men down there and we have got to get them out."

Jaques called out to the fitters who were working in A.6. McPherson and Jaques decided to short circuit the air. Grieves arrived and Jaques and Grieves went ahead opening up brattice doors down the companion dip, others following propping the doors open. They got to A.10, opened the doors into A.10, entered that level and ran into the gas. Jaques turned to go back. His light as it swung round revealed a blackness. Usually, by the aid of the light, one can see a certain distance. It did not appear to him as a haze. He smelt nothing. He felt his breath being taken away. Grieves called out " Run for your life, it is here." Jaques was practically down on his knees and felt that he could not run. He did not notice his eyes affected at the time.

They retreated to A.9. McPherson was at hand and it was decided that Jaques ring the Manager.

Jaques went to the drivehead telephone outbye A.I and finally got in touch with the Manager by 'phone. Someone else (probably Allan), was trying to get in touch with the Manager at the same time. Jaques said he asked for the ambulance, doctor, and the rescue squad and that the Manager said " There is no equipment."

Jaques said that before he saw McPherson and whilst still in A.7, he heard a shot or an explosion go off and remarked to Grieves at the time " It sounds like the boys have started in the Dip." He did not take much notice. He had himself just fired his third shot. He is definite that he did hear a shot or explosion.

He stated that it was more than ten minutes (as he puts it, " easy " ten minutes) from the time he heard the shot or explosion until he saw McPherson.

When firing, the men may not retreat around the corner, they may go back some 25 yds. and watch the result of the shot. (This is a bad practice and should be discontinued.)

The cutter would be withdrawn a sufficient distance from the face when firing to prevent it from being covered by coal—sometimes only 5 or 6 yds.

Apart altogether from the matter of the disaster, the evidence of Jaques highlights some matters concerned in other terms of reference, particularly in relation to the system of work and actual work done.

What stands out, from the evidence is, that apparently Black Damp was becoming increasingly prevalent just prior to the disaster, particularly from the dog watch of 8th October, 1954 onwards ; the fault had been met ; yet nobody at all anticipated or even thought of the likelihood of an outburst.

FOUNDATIONS FOR OUR FINDINGS.

The foundations for our findings as to the cause of the disaster and the cause of death are—

(a) The evidence of the various witnesses as above set out ;

(b) The evidence of Victor Reginald Cundith, Senior Government Analyst, as to—

(1.) The analyses of the samples taken by Allan, Spiers, and Platt, and

(ii.) His own investigations, tests, observations and opinions ;

(c) The results of the clearing operations and testing up to date, including the examinations made by Mr. Cribb, Government Geologist ; and

(d) Our own observations.

VICTOR REGINALD CUNDITH.

The evidence of this witness, as indeed does the evidence of others, cuts across more than one term of our Inquiry. His evidence is most material, not only to Term I but also to Term III.

Mr. Cundith is a Senior Analyst in the service of the State Government. He is also Inspector of Explosives in the Department of Health and Home Affairs, Government Analyst's Office. He is a Bachelor of Science of the University of Queensland, is an Associate Member of the Institute of Mining and Metallurgy and Associate of the Royal Australian Institute of Chemistry. His work includes inorganic analyses, testing of explosives, and dealing with hazards incidental to the handling of inflammable liquids and explosive substances. He also deals with the testing of ores and minerals and has had 40 years' experience in the Government Analyst's Department.

Mr. Cundith gave the result of the tests of the samples taken by Allan, Spiers, and Platt.

(It will be remembered that Allan and Spiers took their samples about five hours after the outburst.

They were taken in the main heading in the return airway approximately halfway between A.12 and A.13, about 12 yds. down from A.12, Allan being a couple of yards inbye of Spiers. Allan took his about 5 ft. from the floor, Spiers about 2 ft. 6 ins. from the floor.

Platt's sample was taken on 15th October on top of the erupted coal, about 14 ft. past the last standing leg in the main dip at A.13.)

	Allan.	Spiers.	Platt.
	Per cent.	Per cent.	Per cent.
	14.5	13.6	76
Oxygen	17.6	17.8	4.75
Nitrogen	67.7	68.4	18.25
CH_4 Methane	.2	•2	1

Mr. Cundith himself was at the mine from 23rd October, 1954, up to 2nd November, 1954, and again early in December, 1954.

He made various scientific tests with the following results as to CO, :—

Date.	Place.	Result.
		CO_2
23-10-54	Return airway near erupted coal	1.8%
23-10-54	Over bubbler in water ..	4.6%
24-10-54	Return Dip	1.8%
25-10-54	Return Dip	2.0%
26-10-54	Return Dip	1.4%
27-10-54	Intake—in brattice—near working party	.1%
27-10-54	Return Dip	1.8%
27-10-54	B.10—B.9 cut-through ..	.4%
27-10-54	Main Return B.3	•6%
27-10-54	Main Return B.3, windward of pump discharge	.5%
28-10-54	Main Dip in Triangle brattice return .. (He thinks the difference in the figures of these tests, taken at about a 20-minute interval, is due to the fact as to whether the loader was operating in the erupted coal or not. He got a higher figure when the loader was operating.)	1.8% and 2.1%
29-10-54	Return Main Dip	2.0%
29-10-54	Bubblers from water at foot of erupted coal. (He took these samples before the gas broke through the water and therefore before it came into contact with or was diluted by the air.) Two samples.	96.0% and 98.0%
30-10-54	Return Main Dip	2.0%
31-10-54	Return - -	1.0%
31-10-54	Return - -	2.0%
1-11-54	Dip No. 1 Return	1.0%
1-11-54	No. 2 Tunnel- Bubbler—Iron compounds—white crusts—makes a little noise in bubbling (gas essentially CO_2— conditions of taking sample not good).	82.0% (air 10% Nitrogen 8%)
1-11-54	No. 2 Tunnel— Bore Hole gas—essentially 002 . .	75% (air 25%)
2-11-54	No. 1 Fan Drift ..	.6%
2-11-54	No. 2 Fan Drift ..	.8%

During his investigations on this first visit to Collinsville, Mr. Cundith found a strong concentration of CO, in *No.* 4 *(old) Dip No. 1 Tunnel.* He did not test it by his instruments but he is satisfied it was over 70 per cent. It came from a blower under the water. He heard the pulsation coming through the water.

In other tests early in December, 1954, on the second visit, he found in the return triangular brattice 1.0 per cent. of CO, and in B.3 return •5 per cent. of CO, (No. 1 Tunnel).

(The justification for our findings as to the nature of the lethal gas is in the samples taken by Chief Inspector Platt on 15th October, 1954, on top of the heap of erupted coal and those taken by Mr. Cundith on 29th October, 1954, on the bubblers.)

It is important to point out in relation to Term III the significance of the samples taken by Cundith on 1st November, 1954, *of the bubbler and bore hole in No.* 2 *Tunnel and also what he found in No.* 4 *West (old) Dip No. 1 Tunnel.*

Dealing with other gases, Mr. Cundith's evidence is that between 22nd October, 1954, and 2nd November, 1954, in eight tests for *CH, Methane,* three of them at the scene of the disaster, three in No. 2 Tunnel and one in each of the two fan drifts, *he found none.*

In three further tests he made on his second visit early in December, 1954, viz. in the return triangular brattice, at the face of the erupted heap and in the B.3 return, *he found none* (i.e., *CH, Methane).*

On 22nd October, 1954, he found at A.3 face (No. 1 Tunnel) *a trace of* parts in a million—which he says could not possibly have had any connection with the outburst at all. Again, on 24th October, he confirmed the presence of H_2S in A.3. On 27th October, he found a very small trace of H_2S at the face of B.10, less than 20 parts in a million, which again he says had nothing to do with the eruption. In some 12 or 13 other tests, including five or six at the scene of the disaster (some two or three being on top of the erupted coal), one in each fan drift, four in No. 2 Tunnel and one in the return dip No. 1 Tunnel, between 22nd October, 1954, and 2nd November, 1954, *he found* none (H_2S).

On his second visit early in December, in tests at the face of the heap, and in B.3 return, *he found none* (i.e., H_2S)

In only one place in the mine in the same period did he find CO, viz on 23rd October, 1954, •1 per cent. at a hole in a stopping in 3 East level No. 2 Tunnel, a sealed area.

On his second visit early in December, in tests at the face of the heap, and in B.3 return, *he found none* (i.e., CO).

He gives no evidence of finding any SO_2 at all.

Mr. Cundith is of opinion as a result of his tests that H_2S was not present in the outburst. Apart from a small percentage of CH, of no significance, the gas comprising the outburst was essentially CO_2—pure CO,. *No* CO *was present.*

He estimates that something like 500,000 cu. ft. of gas was expelled at the outburst, having been held in the coal at a pressure of some 250 lb. per sq. in.

Apart from his evidence as to analyses, Mr. Cundith gives very important evidence on other matters.

On 26th *October,* there was shown to him at the mine a broken cartridge (plug or stick of explosive) in two pieces, one of which was primed with a detonator—also an open battered can containing 17 8-oz. cartridges. (A full tin contains 20 sticks, 3 sticks are therefore missing. A charge is a maximum of 28 oz.) The cartridges were wet and mushy.

On *27th October,* he was shown at the mine another broken cartridge in two pieces, in one of which was inserted a detonator. The leads of the detonator were wrapped around the cartridge. On the same day he was shown two more detonators. One was marked " Staples 26-10-54 " and the other " B Conway 27-10-54."

On 28th *October,* he was shown another open battered can containing 16i cartridges (the 17 were not quite complete but Mr. Cundith says he does not know if that is of any significance). He also saw a billy can, steel pliers, two bits and some cotter pins.

(Taking into account the charged hole which was revealed during clearing operations, one detonator is apparently not accounted for, and if a full stick were used for each primer there should be more than 6i sticks missing, if Buchanan is to be believed that six primers were made. It may be that there were other sticks surplus to the two full tins.)

He took nine samples of the erupted coal at varying depths and found them to be fragmented to a fairly high degree—indicating movement in the coal.

He is of opinion that there had been a back-throw or reverse fault and portion of the coal had been comminuted or fragmented. That, in turn, would considerably favour absorption of OO_2, particularly under pressure.

He also mentioned the hypothesis that CO, is inherently in the coal at the time of its formation.

He thinks the most rational explanation of the origin of the CO, would be volcanic or igneous activity during the closing stages of which CO, and other gases are formed, and CO, waters originate, and that the CO, had traversed the fault per medium of cracks or fissures from elsewhere and ultimately had come to rest in this particular section, possibly as a result of hydraulic pressure.

He pointed out that in other sections of the mine, particularly No. 2 Tunnel, carbonated water is actually being delivered on to the roadway. Possibly CO, is resident further down in the strata.

He also mentioned a possible geological explanation, i.e., that a carbon or limestone base further down, has contributed, but he thought that the presence of the CO, was the result of igneous activity and migration to this particular section as a result of weakness in the strata or fault.

Mr. Cundith was of the opinion that the CO, has " shot its bolt " in this particular section, but there may be other areas of soft coal in the mine from which an emission of CO, may come.

Boring ahead and in the flanks and floor might not in his view necessarily pin down an inherent outburst area.

Mr. Cundith thinks the chances of finding an inherent outburst area by such means are about five in ten, but boring ahead is the only technique that he knows and he recommends that it should be pursued and thinks that, irrespective of the proximity of a fault, precautions should be observed.

He was asked, as a scientist, if in his opinion there would be any sign before the actual outburst that the Management or any other person in authority could have looked for as indicating trouble and if it would have evinced any sign of its happenings before it actually burst. He replied that a sign worth following up would be the structure of the coal ; that perhaps ninety-nine times out of a hundred it would not indicate anything at all, just movement of strata, but by virtue of record and inspection of the strata, and the curve or slickenside nature of the coal bands in the seam, it might afford some clue as to the possibility of an outburst area ahead.

The evidence continued :-

> " That would indicate troubled ground ? Certainly.
>
> If they had gone through that before, was there anything to indicate that there would be . . ? They had already been through country like that without any serious emission.
>
> Was there anything about this particular one that you can indicate as a scientist would have given an indication to anybody that an outburst was likely to occur ? No, not without any previous history of occurrences like that being prevalent in the field.

In your opinion, also as a scientist—you have already partly answered this to Mr. Barrett—what is the possibility of another outburst of a similar nature ? It would be wise to assume there would be, by virtue of this occurence.

Immediately, or in the distant future ? It may occur next week. It may be in 15 years' time.

What do you say as to the future ? Is there anything from your analysis in this case—and you analysed various things and examined certain coal—any sign or signs that could be looked for in the future as a portent of a similar outburst ? I have read of data relating to that matter but unfortunately it does not quite apply to this. That is in respect of getting sore eyes, sore nose, coincidentally with contacting blowers. If you take the authority of one of these writers here, the proof would be given with the experience of sore eyes, nose or mouth, if you are in the vicinity of outburst areas. I cannot very well agree with that because I can find you areas in that mine where I have experienced those things and yet I would not necessarily assume that that was in proximity to the outburst area.

I suppose you would get those things from the Black Damp which we are told is ordinarily in a mine ? That is so.

Without any question of an outburst at all ? That is so.

Scientifically again, is there anything in your opinion that could be done scientifically in the way of looking for signs of any other trouble ? No, unless you put bores down over the area.

You have already mentioned that ? Vertically.

I think you mentioned to Mr. Barrett about boring ? Vertically in the seam down to the pavement. It need not be ahead as in normal practice but, in this particular case, revealing the possibility of CO, at 20 ft. down.

We are asking you these questions as a scientist, to obtain any ideas that you may have ? I have given the matter thought myself and it seems to me that it is very difficult of solution. There are, I believe, warnings sometimes in respect of ground movement and you get a cry or cracking of the seam.

Can you tell us anything useful about that ? Roof's start to work without any consequence of being near an outburst area."

At a later stage his evidence reads :—

" What other signs are there that you know of that would lead you to believe that you are coming to an outburst area ? You cannot be dogmatic, because the signs are not apparent. Even if the area is under pressure, it does not necessarily give a hissing sound. If the gas is under pressure—the area containing the outburst—you would not necessarily get any manifestation of that, that is by hissing or by sound of issuing gas. There may not be any gas coming from it at all. When the barrier is broken, the whole thing goes. There is no preliminary warning at all. It is so variable."

Mr. Cundith gave evidence that the authority Stutzer quotes instances of a crackling roof, decrepitation of the strata and exfeliation. Also the advent of acidic gases.

Mr. Cundith stated that conditions are different in European mines.

He agreed that, the greater the depth, the greater the pressure of pent-up gases could be. He cited the authority of Redmayne for the proposition that, when CO, is present, CH, is not prevalent.

He does not think any system of ventilation could be devised to withstand an outburst like that of the 13th October.

On the matter of the appearance of the haze on the night of the disaster, he said that such appearance may have been due to the light shining on particles of dust, but a hazy appearance may also be due to refraction (producing a mirage effect) caused by lights shining on two bands of air of different make-up and temperatures.

The air above the erupted material would be at a different temperature and of different moisture content from that obtaining in the Dip.

The wall of ashes, however, would certainly be a body of coal dust blown along.

He said that his examination showed that there was no evidence to support Dr. McEniery's opinion, that he, the doctor, thought that H_2S was one of the gases present when he went down the mine on the night of the disaster.

He said that there was only one case recorded as far as he knows of an outburst occurring at a shallower depth than that of Collinsville (610 ft.). That was in France.

The majority of outbursts occur at depths greater than 1,000 ft. The Metropolitan Colliery, Helensburg's outbursts in 1925 and 1954 were at 1,200 and 1,500 ft. respectively.

There is no evidence as to the depth of cover of the earlier outburst at this colliery.

He is of opinion that in the Collinsville outburst the CO, was held in the coal in the fault area.

He is of opinion that the general standard of ventilation and layout in Collinsville compares very favourably with every other mine in Queensland.

He stated that the men at the face on the night of the disaster may have received some short warning by some sound or rumbling, associated with " decrepitation " which had been found in Europe to be a premonitory sign of an outburst of CO,.

In Europe, outbursts sometimes occur in virgin coal without any evidence of alteration in the coal by a disturbance, but generally in the severe outbursts fragmentation is present. In the smaller ones the coal does not show such fragmentation. Outbursts sometimes occur from cavities.

He recommends that in future the miners retire behind solid barriers when firing (but, as we shall see hereafter, we recommend another method).

Cundith's evidence confirms our view of the imprisoning of the CO, in fragmented coal in a place in the vicinity of, or connected with, the Dip face.

We are unable to say how it got there, i.e., as to whether it was deposited there at the time of the original disturbance of the seam by the igneous intrusion and fault or whether it migrated there from elsewhere. We incline to the former view, having in mind what we believe to be the fact that the nature of the coal itself, even when not disturbed, is such that it inherently contains a high proportion of 002.

Whatever the case may be, our considered opinion is that there is every possibility and even likelihood that there are other concentrations of 00_2, under presure, in the mine.

If the first theory is correct, i.e., the " local origin " one, then the same circumstances which caused the build-up there may well, under similar conditions, have built up a lethal concentration elsewhere.

If the " migration theory " is correct, the 00_2, being carried along by water or just simply travelling as a gas, may well have migrated from its point of origin along other cracks or fissures to some other places where similar conditions exist as those which existed at the Dip.

The influence of any carbon or limestone base further down, if such exists, would have an equally potent effect elsewhere.

We bring to attention again the existence in No. 2 Tunnel of a bubbler emanating 82 per cent. CO, and a bore hole emanating 75 per cent. CO, and a blower in No. 4 West (old) Dip No. 1 Tunnel emanating over 70 per cent. CO,.

Results of the Clearing Operations and Testing Up To Date, including the Examinations made by Mr. Cribb, Government Geologist ; and Our Own Observations.

Annexures 1, 2 (a), 2 *(b),* and 2 *(c)* consisting of Mr. Cribb's report and plans, show the nature of the disturbance.

Having examined the report and plans and having made our own inspections we are satisfied as to the nature of the disturbance as we have stated in our findings already set out.

We endorse Mr. Cribb's opinion in this regard.

TERM ID.

AND, IN PARTICULAR, WHETHER THERE WAS ANY OMISSION TO TAKE REASONABLE PRECAUTIONS TO AVOID THAT DISASTER IN THE COURSE OF MINING OPERATIONS IN THE SAID TUNNEL NO. I.

We think the answer to this question mainly revolves around the presence of noxious gases in the mine and whether indications of such existed in such way and to an extent as to reasonably call for precautions to be taken over and above those normally taken.

Another matter was raised on the question of negligence. It was suggested that some of the deceased men may have escaped if the companion headings had been kept up to the main heading. In other words, the main dip heading was so far in advance of the cut-throughs that the deceased men would have had to travel a further distance than they otherwise would have had had to travel, to escape into an aspirable atmosphere, if the companion headings had been further advanced.

This part of the term is allied to Term III, inasmuch as it involves the past in certain respects, whilst Term III involves the future operations of the mine in those respects.

Noxious Gases.

There is no doubt whatever now that there was in the mine various noxious gases, namely *:* —

Carbon Dioxide, CO_2, which was the cause of the disaster ; *Black Damp,* which for all practical purposes in this matter means a gas of which CO, was the major constituent ; *C.1-1_4Methane ; $H_2$5 Sulphuretted* Hydrogen ; and *CO, Carbon Monoxide.*

SO_2, Sulphur Dioxide, was mentioned by Dr. McEniery, but there is really no evidence that it was or is present in the mine.

We deal first with Methane ; Carbon Monoxide ; and the Sulphur gases :

METHANE CH_4.

It would appear that in mechanized mining the rapid rate of advance involves the release of more Methane (if present), than occurs in hand mining.

In the sample taken by Spiers and Allan on the night of the disaster, .2 per cent. of Methane was found. In that taken by Chief Inspector Platt on 15th October from the top of the heap, 1 per cent. of Methane was found.

Between 22nd October, 1954, and 2nd November, 1954, in eight tests, three of them at the scene of the disaster, Cundith, Senior Government Analyst, found none. In three further tests in December he found none.

We cannot take seriously any suggestion that CH_4 or Methane was associated with the disaster, in the sense of being in any way a material contributing factor.

Allan said that since he had been in the mine Methane was never reported to him, and he further said that in the whole history of the Bowen Coalfield it is not a prevalent gas.

Some evidence was given that it was found or supposed to have been found many years ago in No. 2 East level, apparently in a sealed section.

Baker said he had never heard of Methane being in the mine except on one occasion a shot-firer told him he thought he could smell it.

Morgan gave evidence that the only time he ever heard of Methane was an occasion some 15 years ago in No. 2 Tunnel, when there was a report that someone was lighting a shot hole when Methane had lit in the shot hole. Although tests were made by a Government inspector with a gas detector, Methane could not be found. The percentage was much below •5 per cent. which, of course, is not dangerous.

Morgan gave further evidence that during his 14 years as a Deputy, he tested the roof for Methane on every day and on every shift. On his morning inspection he tested for it and also any place where it was likely to be, such as a roof cavity. He stated that as an Overman he still carried on tests, borrowing the Deputy's safety lamp for the purpose and he has insisted on the Deputies testing for it. He said the Deputies do test for it. He said he made it a practice, after a place was cut, the the Deputies get up on top and take advantage of the heap of coal to get to the roof. He said, " You see them carrying around a ladder."

Indeed, up to a certain period the mine was a naked-light mine and it has never been considered a gassy mine and is not so classified for the purposes of the Acts.

All the Deputies' reports for the year 1954, up to the time of the disaster have been tendered to us. We are completely satisfied the Deputies more than sufficiently carried out their statutory duty in testing twice a shift. There has never been any report made as to the presence of Methane in that period and we would have expected it to have been so reported had it been found.

We find in respect of Methane that there was no omission to take reasonable precautions to avoid the disaster in the course of mining operations in Tunnel No. 1, for the reason that we are satisfied that Methane was not a material contributing factor to the lethal quality of the outburst gas.

We are also satisfied, and although it is unnecessary, we find that adequate and reasonable precautions have been taken in respect of it and that it did not, and does not, constitute a danger in the mine, reasonable precautions being taken.

CARBON MONOXIDE, CO.

There is no evidence to suggest that Carbon Monoxide was ever a danger. The small amount (i.e., •1 per cent.) found by Cundith on one occasion only, came from a hole at a stopping in No. 3 level—a sealed area in No. 2 Tunnel, work having been discontinued in that tunnel.

Morgan gave evidence that he thought he was affected by CO, Carbon Monoxide, on one occasion about 20 years ago when he was taking pillars out of the No. 2 section West of No. 1 Tunnel, but on his evidence we think it not established that he was affected by this particular gas. He was working in a place which was ventilated from No. 2 Tunnel and traces of gas were coming through unknown, perhaps from a leak in a seal. Compensation was claimed but was rejected. He said the doctor said it was Carbon Monoxide, We have no reason to believe that on recommencement of work in any area in which workings had ceased over a period of time, adequate precautions would not be taken. We are satisfied that Carbon Monoxide did not and does not consititute a danger in the mine if ordinary precautions are taken.

We are satisfied it was not present in the outburst gas.

SULPHURETTED HYDROGEN, H_2S, AND SULPHUR DIOXIDE SO,.

Sulphuretted Hydrogen, H_2S, was present in minute quantities in certain places in No. 2 Tunnel, A.3, and B.10, but Cundith could not find it at the Dip. The doctor, however, on the night of the disaster, believes he smelt it and he first ascribed the cause of death to a poisoning (apparently by some Sulphur gas). McPherson smelt something like H_2S on the night of the disaster. Dunlop speaks of a sulphur smell on the same night. Jaques says that during boring operations on *11th October in the Dip face* he smelt from the last hole bored at the left-hand rib and about a foot from the roof a smell of rotten eggs. Hill refers to a smell like rotten onions at the Dip on the *11th October*.

We are doubtful of Prasser's evidence that he has noticed H_2S in any other place than A.3.

The doctor changed his opinion as to the cause of death. He, himself, made a test and found that he could smell Sulphuretted Hydrogen in a concentration of one part in one and a-half millions (an innoxious concentration).

The doctor also thought that perhaps SO_2 was present on account of the acrid odour or effect on his nose. CO, produces some such effect in the nose.

As we have stated, there is really no evidence that SO_2 was or is present in the mine. Cundith apparently did not find any—at least he does not report it.

We are satisfied that they, i.e., H_2S and SO_2, did not and do not in the normal operation of the mine constitute a safety risk to the miners.

If H_2S is present in small quantities it advertises itself.

We find in respect of Sulphuretted Hydrogen ELS and Sulphur Dioxide SO_2 that there was no omission to take reasonable precautions to avoid the disaster in the course of mining operations in No. 1 Tunnel, for the reason that if either or both of them were present at all in the outburst gas, it or they were present in so minute a proportion as not to have been a material contributing factor to the lethal quality of the gas.

BLACK DAMP AND CARBON DIOXIDE CO,.

We are left with Black Damp and CO,. We have already pointed out the difference between CO, and Black Damp, although the terms appear to be interchangeable in miners' parlance.

We have found that the outburst was practically pure CO,. We have given the results of various tests made after the disaster. We now propose to give the history of Black Damp in the mine as disclosed in evidence and the Deputies' reports for the year 1954.

Deputies' Reports.

The Deputies' reports for the year 1954 show that Black Damp or CO, was reported on 32 occasions on 15 days in the month of January. It was present mainly in the main dip but was also present on the A and B sides. (It will be borne in mind that there are three shifts in the ordinary working day, which fact accounts for the different figures.)

In the month of February it was reported on nine occasions on eight days in the month, in the Dip and on the A and B sides.

In the month of March it was reported on 18 occasions on 15 days in the month, in the Dip and on the A and B sides.

In the month of April it was reported on 18 occasions on ten days, in the Dip and on the A and B sides.

In the month of May it was reported on 62 occasions on 26 days, in the Dip and on the B side, not on the A side.

In the month of June it was reported on 56 occasions on 27 days, in the Dip and on the A and B sides.

In the month of July it was reported on 22 occasions on 14 days in the Dip and on the B side, not on the A side.

In the month of August it was reported on 14 occasions on 13 days in the Dip and on the A and B sides, In the month of September it was reported on 34 occasions on 22 days, in the Dip and on the B side, not on the A side.

In October up till the date of the disaster, it was reported on nine occasions on six days, in the Dip and on the B side, not on the A side.

To take the reports for the month of October, it appears that on 1st October a quantity of Black Damp was reported in B.6. On 2nd October traces were reported around the edge of the stone and coal in the Dip and also in B.8, where a " no road " sign was erected. On the 4th there was still a quantity of Black Damp in B.8 and the Dip. It was cleared in the Dip at 10 a.m. The " no road " sign was in B.8. On the 7th a trace of Black Damp was found in B.7 in one shift and a trace of CO_2 found in the same bord in another shift. On the 8th it is reported that an excessive quantity of Black Damp was in the Dip when it was being cut at 2.15 a.m. It was cleared at 5.30 a.m. On the 10th a small trace of Black Damp was found in B.9.

A scrutiny of the reports for the year shows that CO, or Black Damp was reported in the Dip, B.2, B.3, B.4, B.4D, B.5, B.5D, B.6, B.6D, B.7, B.8, B.9, and B.10.

The only reports of Black Damp on the A side were in respect of A.3, A.4, A.4D, A.6D, and A.11.

The reports show the steps taken from time to time to clear out the Damp, i.e., erection of brattice and the use of a blower fan in the Dip. They also show that at times " no road " signs were erected for safety purposes. It will be observed that the gas came mainly from the Dip and the B side. The reports also indicate that by and large the ventilation was poorer in the Dip and B side than on the A side. This, of course is natural, A side being the intake side.

We think it significant that the Damp was present also on the A side. It caused trouble in A.3 and A.4 in January, February, and March In April it was found in A.6 and in August it was found in A.11.

So much for the written records and the scientific analyses. We proceed to deal with the evidence.

Witnesses' Evidence.

As the Dip was pushed ahead, water, partly natural as drainage to the lowest level and partly due to mining operations, accumulated on the floor near the Dip face. A pump had been installed. For some time prior to the disaster there had been bubbling through this water.

No doubt this afforded evidence of something coming from the floor under pressure. It will be borne in mind that the coal was being stripped from the floor, but the evidence discloses that some coal in a crushed condition was left on the stone floor.

We have indicated elsewhere that we believe it was a type of coal which exuded or from which emanated CO, when broken. Such broken coal on the floor would, in itself, have given off some CO,.

As we have found, the fatal accumulation of gas was held under pressure in the coal at some place where such coal had been crushed or broken or pulverized by some disturbance of the seam.

The bubbles had been tested repeatedly by the oil safety lamp, but with no result. These tests were made over the bubbles and not at the point of origin, under the water. That the lamp was not extinguished indicates that about 17.5 per cent. or more of oxygen was present at the point of the testing, which means that there was no danger to human life.

Up to the time of the boring on 12th October, 1954, the bubbles were not confined to a particular place but were spread out over the water.

The bubbling had been fairly normal in the working of No. 3 West dip, particularly where the work had been proceeding on steep rolls. It had been intermittent, being more noticeable when the coal was " rolling over."

This fact conforms to the theory of the exudation of gas at places of disturbance of the seam.

There is some evidence that the bubbling had increased for some two or three weeks before the disaster.

THOMAS HENDERSON ALLAN, Overman, said that the bubbling was first noticed in the Machine section when the Dip was at about B.8, i.e., early in August, 1954. He was present on one occasion with Deputy P. Miller when the bubbling was tested by both of them about a fortnight before the disaster, in the middle of the dip heading somewhere below A.13. There was no result and both P. Miller and he wondered if the bubbling was caused by air.

Allan stated that generally, Black Damp had been found over the whole of the Bowen Coalfield in deep workings ever since the inception of the field.

No chemical analysis was made of the gas before it passed through the water.

The outburst was unprecedented in the history of the field.

Apart from Allan, other witnesses gave evidence as to the presence of Black Damp in the mine.

ALBERT WINSTANLEY, Manager for some eight years, stated that as far as his information went the outburst at Collinsville at the depth at which it took place was a record for shallowness. He does not consider it could reasonably have been anticipated and had not heard any responsible person at Collinsville suggest, since the event took place, that they could have anticipated it. He had not heard *anyone at all* say that it could have been anticipated.

THOMAS PLATT, chief Inspector of Coal Mines, with 45 years' experience in the coal mining industry, was asked if there was a possibility of a blow taking place anywhere where there is an igneous intrusion in the mine. He said, " Yes, I think there is a possibility of eruptions in the vicinity of faults and dykes." It will be seen that he did not confine the possibility to igneous intrusions.

Mr. Platt gave the cause of the disaster as a sudden eruption of coal caused by 00_2, with some trace of Methane and stated that the gases had been either generated " in situ " in the vicinity of the fault line, or that the rock movement at the time of the faulting, would have ground the coal to a powder leaving it a receptive body for the absorption or adsorption of CO, which might either have been manufactured by chemical action in the immediate vicinity or have been transported along the fault plane from burned out or coked areas of coal in the Bowen Blake or Scott Seams.

He said-

> " I inspected the mine in relation to another matter in August of this year and I have perused the Deputies' reports over the period of some weeks prior to the outburst, and, in my opinion, neither my inspection of the mine nor any reports furnished with respect to it prior to the outburst gave *any indication whatever of the possibility of such an outburst occurring."*

JAMES ALFRED BAKER, Timber man, had known of Black Damp in B.8 and had even worked in Black Damp when it had been present to a depth of 4 or 5 ins. He had bent down and inhaled it at a height of 18 ins. from the floor, with a result that there was no smell but that it affected his breathing. He had done this on two occasions on the B side, once being in B.6. Baker gave an additional piece of evidence that Black Damp may come into a bord very quickly.

JACK HUBERT MORGAN, Overman, with 47 years' experience in coal mining, including 31 years at Collinsville, had known of Black Damp being in the mine during the whole of those 31 years. He never anticipated any outburst of this nature, nor was it ever suggested by anybody.

JAMES ALEXANDER NISBET, Secretary of the Queensland Colliery Employees' Union, Collinsville, is the only witness who suggested negligence in relation to the anticipation of an outburst of gas. He referred to suggested precautions to be taken in the future, in the light of the outburst, i.e., boring ahead about 70 ft. in virgin country. He conceded the possibility that such boring would not prevent a recurrence, but it should give such a warning as might prevent further fatalities or a disaster. He also suggested continual tests of gases coming from the coal.

Nisbet suggested of the actual outburst that, if there had been a man present at the mine with sufficient technical and mining knowledge, he would have known there were unusual circumstances.

He stated that he himself, seeing the " geysers " in the water on the floor, felf that everything was not as it should be. He admitted that there had always been bubbles in all dips in the mine.

He did not suggest that the Manager should have anticipated an outburst, as he possibly did not have sufficient knowledge of what could happen. He conceded that to his knowledge it was in no way suspected there would be an outburst.

He said that a person on the field about two weeks before the disaster, with knowledge of outbursts elsewhere, seeing what was taking place at the Dip, may have got an idea.

He mentioned Mr. Platt may be such a person and also Mr. J. Barrett.

He conceded that he himself is not an expert in these matters, but claimed to be a practical miner.

He did not himself foresee the outburst or the possibility of an outburst.

We think that Mr. Nisbet's opinion now is based on hind-sight.

JAMES CLEMENT HILL gave evidence that when the men were having the tea on the night of the disaster there was a conversation about the smell in the Dip and one of them, he thinks Walker, said that it would not be very long before somebody looked like going to the hospital.

It is straining the words to read into them any suggestion of anticipation of an outburst of CO,.

We think it is unnecessary to refer further to the evidence given by other witnesses in connection with the presence of the bubbling and of the Black Damp, excepting, however, for that of Mr. HERBERT KITCHENER WILLIAMS, a machine man with 21 years' experience in the mine, a man who has taken a prominent part in union affairs at Collinsville and who has been a Miners' Check Inspector, who said that he has known of the bubbling for years and never at any time had he made any recommendation about CO, or Black Damp or gas.

Although provision is made for inspection by the Government Inspectors, including the Chief Inspector, two Miners' Inspectors, i.e., employees with not less than five years' practical mining experience, and two Union Check Inspectors not necessarily employees but elected by the Union, and having full access to all parts of the mine and anxious, we take it, to do everything in the interest and safety of the men and report or suggest anything appearing to them to be dangerous, nobody ever suspected such an outburst or the likelihood of an outburst or took any steps to anticipate or safeguard against any consequences arising from an outburst of this nature.

The bubbling over a period of time both in No. 1 and No. 2 Tunnel in dip places must have been obvious to all.

No complaint was made nor any trouble foreseen in respect of it by any of the Inspectors nor by the mine staff generally nor by the experienced miners themselves and no special precautions were taken in regard to it.

The conclusion is dear, the bubbling was taken as a peculiarity of the particular mine, with no implication as to the proximity of a lethal concentration of gas under pressure.

With the history of Black Damp in the mine, the history of the bubbling in the dips everywhere in the mine and over the whole period of the mine's operation, with Morgan's evidence as to the Jack episode years ago, with the constant inspections of the mine by the Government Inspectors (including an inspection by Mr. Platt, Chief Inspector, in August, 1954), Miners' Inspectors, Union Check Inspectors, the continual testing by the Deputies and the actions and the attitude of the experienced miners themselves, we are completely satisfied there was no negligence on the part of anyone.

All the evidence goes to the same result . . . Knowledge of the bubbles, knowledge of 'Black Damp, and no anticipation or foresight of an outburst or likelihood of one.

Possibility of Escape if Companion Headings Kept **Up.**

The other matter touching on negligence was the allegation that the main dip heading was advanced too far in relation to the companion headings.

It was put to us that if the companion (intake) heading had been kept up to the main heading some of the deceased men may have been able to escape into an aspirable atmosphere, having a shorter distance to travel from the Dip face.

This matter was also urged as an argument for inadequacy of ventilation at the Dip. Both questions are interlocked.

We must remember that we are now viewing the matter in the light of knowledge of the outburst.

On the question of negligence we must view things in the light of what was known and reasonably anticipated immediately prior thereto.

In the dictum of Lord Justice Denning in the case of *Roe against the Ministry of Public Health* 1954 2 *A.E.R. p.* 131, *at p.* 137.

> . . . but I do not think their failure to foresee was itself negligence. It is so easy to be wise after the event and to condemn as negligence that which was entirely misadventure. We ought always to be on our guard against it, . . ."

We need hardly say that, in view of the overwhelming evidence that the outburst was not anticipated by reasonable men and that reasonable tests were made from time to time that it follows that any lack of precautionary measures to guard against fatal consequences of such, does not constitute negligence. The danger must have been reasonably anticipated before any question arises as to the precautions which should be taken.

However, in any event, even if the intake companion heading were up with the Dip heading, having in mind the volume and pressure of the gas released, and the fact that it forced its way against the intake current of air up to the top of the cut-through at A.9, *it is our view that none of the men would have escaped.*

Chief Inspector Platt, whilst dealing with ventilation said that in his opinion the ventilation of the Dip heading was for all normal purposes quite adequate. Had the cut-throughs been put in between A.11 and A.12 and B.11 and B.10, a shorter brattice line would have been necessary and the ventilation at the face of the Dip improved. That improvement however, whilst it would have made working conditions more pleasant would not, in the ordinary course of mining activities in the area, have been a necessity before the outburst.

He further stated that bearing in mind that the ventilation arrangements were made for the purpose of ordinary mining operations and presuming that there was no indication in the area of the possibility of any outburst such as occurred, he considered that the ventilation of the Dip face prior to the disaster was adequate.

Lastly he stated that the requirement of ventilation at the Dip face, now, in view of what has happened, is very much greater than any reasonable mining man would have anticipated prior to the outburst.

Overman Allan said that it was good mining practice to keep the ventilation headings as close as possible, but owing to the steep pitching nature of the seam and the difficulties encountered with the machines, it was considered advisable to drive the main heading on, take off the side bonds, and then connect it through by way of headings going up rather than additional dips going down.

He also stated that they were preparing for an extension of the belt to a predetermined point, to which the belt was to reach, i.e., just on the top rib of **B.13** a distance of 150 ft , and that when the belt was so extended there would be a large body of coal ready for production on either side.

Allan finally stated that under those circumstances he considered sound mining practice was adopted (presumably the pushing ahead of the main dip heading in advance of the companion headings).

On this aspect of the question we are of opinion and so find that the failure to keep the companion headings up to the main tunnel did not constitute an omission to take reasonable precautions to avoid the disaster in the course of mining operations in Tunnel No. 1.

Finding.

We answer the question therefore :

We find there was no omission to take reasonable precautions to avoid the disaster in the course of mining operations in Tunnel No. 1.

TERM I E.

AND WHETHER THE CONDUCT OF THE OWNER, THE MANAGEMENT OR ANY EMPLOYEE WAS A CONTRIBUTING CAUSE OF THE SAID DISASTER.

The answer to the question in this part of the Term follows from what we have already set out.

Finding.

We find that the conduct of the Owner, the Management, or any employee was not a contributing cause of the disaster.

SUMMARY.

TERM I.

The disaster of the 13th October, 1954, in Tunnel No. 1 of the State Coal Mine, Collinsville, and the causes and circumstances of and relating to that disaster, and, in particular, whether there was any omission to take reasonable precautions to avoid that disaster in the course of mining operations in the said Tunnel No. 1, and whether the conduct of the Owner, The Management, or any employee was a contributing cause of the said disaster.

FINDINGS.

We find :-

(1) The causes of the disaster of the 13th October, 1954, in Tunnel No. 1 of the State Coal Mine, Collinsville, are—

(a) That the disaster was caused by an outburst of gas from, or in the immediate vicinity of, the face of the workings at the " Dip " in the main heading of the mechanized section No. 3 West No. 1 Tunnel ;

(b) That such gas was almost pure Carbon Dioxide, CO„ probably about 98 per cent ;

(c) That such other gases as may have been present in the outburst, i.e., Methane, CH, ; Sulphuretted Hydrogen, H,S ; Sulphur Dioxide, SO_2 or Carbon Monoxide CO, were in so minute a proportion as not to warrant any finding that they or any of them were in any way a material contributing factor to the lethal quality of the outburst gas, containing as it did CO, in such proportion as to almost, if not entirely, exclude Oxygen ;

(d) That such outburst gas was released at such pressure and in such volume as to cause the disaster ;

(e) That the outburst occurred at about 5.50 p.m. on the evening of 13th October, 1954 ;

(f) That such gas was held at such pressure by absorption or adsorption in or to the coal in such place, sufficiently near to, or connected with the Dip workings, as to have been ready to erupt or break out, when the pressure overcame whatever resistance may have been theretofore offering ;

(g) That the gas was in great volume when released, probably of the order of 500,000 cu. ft. ;

(h) That the gas was so held by reason of some fault, roll, sill, dyke, igneous intrusion, or other disturbance of the seam, i.e., the Bowen Seam, causing such a fracture, grinding and pulverization of the coal, as to allow the gas to be so imprisoned in the disturbed, broken and fine coal ;

(i) That the nature of the disturbance as revealed by the report of Mr. Cribb, Government Geologist, dated 14th October, 1955, and plans dated 30th September, 1955, showing the results of test borings, was an igneous intrusion, coupled with a down throw fault causing a displacement of the seam of approximately 15 ft. with considerable disruption at the break ;

(j) That the nature and quality of the coal in the Bowen Seam is such that, even in its undisturbed state, it holds or contains 00_2, which is given off more freely when the coal is broken or disturbed.

(2) The cause of death of the seven men,

Alex Parkinson
Peter Miller
Henry Peterson
James Reid Logan
Arthur Shrubsole
Frederick Ernest Walker, and
Herbert Ruff.

is—

Asphyxiation due to the inhalation of an irrespirable atmosphere containing such a high proportion of Carbon Dioxide as to exclude the Oxygen necessary to maintain human life.

(3) There was no omission to take reasonable precautions to avoid that disaster in the course of mining operations in the said Tunnel No. 1.

(4) The conduct of the Owner, the Management or any employee was not a contributing cause of the said disaster.

TERM II.

The Mechanization of the said Mine, the circumstances of and relating to that Mechanization, the working of that Mine under such Mechanization, and whether Mechanized Mining should be discontinued in that Mine.

We have considered this term under the following headings :-

TERM II A.—The Mechanization of the said Mine.

TERM II B.—The circumstances of and relating to that Mechanization.

TERM II C.—The working of that Mine under such Mechanization.

TERM II D.—And whether Mechanized Mining should be discontinued in that Mine.

TERM II A.

THE MECHANIZATION OF THE SAID MINE.

1. Historical Summary.

2. Geological Summary.

3. Coal Quality and Analyses.

4. History of Mechanization at Collinsville State Coal Mine—
    - (a) The Davidson Report-1945-46.
    - *(b)* First Winstanley Report-1947.
    - *(c)* Powell Duffryn Technical Services Reports-1948-49.
        - (i.) Report by Mr. D. G. Hemmant-1948.
        - (ii.) Report by the Company-1949.
    - *(d)* Report by Messrs. A. Crowley and K. D. Woolley-1950.
    - (e) Second Winstanley Report-1950.
    - *(f)* Various Conferences on Mechanization—March 1950 and June 1950.
    - *(g)* Third Winstanley Report—July 1950.
    - *(h)* Joint Scheme by Powell Duffiyn Technical Services Ltd. and Mr. A. Crowley—August 1950.
    - *(i)* Submission of Alternative Schemes to the Minister for Mines-18th September, 1950.
    - *(j)* Submission by Mr. T. Platt—Supervisor, State Coal Mines-18th October, 1950.
    - *(k)* Cabinet Approval of Department of Mines' Scheme-12th March, 1951.
    - *(1)* Developments in Mechanization Plans following appointment of Mr. A. Lightfoot as General Manager.
    - (m) Memorandum to Minister for Mines submitting Mechanization Proposals-14th December, 1951.
    - (n) Approval by Cabinet of Mechanization Proposals-17th December, 1951.
    - (o) Statement on Mechanization by Minister for Mines-20th December, 1951.

5. Comparison of Equipment Tenders and Orders.

6. Installation of Mechanized Equipment.

7. Comparison of Values of Tenders and Actual Cost.

8. Comments and Conclusions.

Term U A. (1).

Historical Summary.

The Bowen River Coalfield was extensively examined by Mr. J. H. Reid, A.S.T.C., Government Geologist, and the results of his examination were published in a Department of Mines Manual entitled " The Geology of the Bowen River Coalfield "-1929 (Exhibit 102) from which the following historical and geological information is largely taken.

The date of discovery of coal in the Bowen River area is not recorded, the earliest reference being that by Richard Daintree, who wrote from Bowen to the Rev. W. B. Clarke under date 10th February, 1866, regarding the fossils of the Bowen River Coalfield.

In 1872, Daintree published descriptions of coal-bearing sections on Pelican Creek, a tributary of the Bowen River, and on the river itself.

During 1875-6 a party of prospectors was sent out by the Bowen River Coal Association to investigate the field between Havilah and Jack's Creek with the object of interesting capital in the construction of a railway from Bowen and the development of the coal seams.

In 1879 Dr. R. L. Jack reported comprehensively on the Bowen River coalfields and recommended boring at four sites selected to test the possibilities of that section of the field prospected.

In 1885 a bore was sunk, by the Government, at a site near Pelican Creek, some 4i miles north-easterly from Birralee station. The Garrick Seam was met at 71-76 ft. and two lower seams were penetrated before boring ceased in igneous rock at 390 ft. All were intruded by igneous sills. The drill was then moved to a site near Havilah station and in 1886 a bore was put down in the Upper Bowen Coal Measures. These were found to be intensely intruded and the bore was completed at 340 ft.

In 1912, B. Dunstan, Chief Government Geologist, examined portion of the field following a request for Government assistance to sink deep bores. He recommended a subsidy for prospecting the Garrick Seam on the banks of Pelican Creek and a 4 ft. 6 in. seam of good quality coal was afterwards proved there. Following this, coal outcrops were discovered near Mount Devlin and these discoveries were the prelude to prospecting, and subsequently mining operations in the State Mine Area.

In 1913 on examination of these outcrops and the seams disclosed in prospecting shafts, Dunstan expressed the opinion that an immense area of coal existed there and recommended a diamond-drilling campaign.

In 1914, some 12 companies were engaged in boring and shaft sinking to prove the seams close to outcrops and at depth below cover of marine strata.

In 1915 development made little progress due in part to the prospecting licenses under which the land was held being cancelled and the necessity for those interested in mining to take up areas as coal-mining leases. The Department reserved areas for State mining purposes totalling about 12 square miles.

Late in 1915 the construction of a railway between Bowen and the coalfield (surveyed in 1913) was sanctioned by Parliament.

In 1916 Departmental drilling, accompanied by detailed geological mapping was commenced. In No. 1 State Mine area, the existence of seven seams of coal with total thickness of 40 ft. was proved over an area of 11 square miles. As a result of this work, Dunstan recommended construction of the railway from Bowen and this was commenced during that year.

In 1917 on completion of boring on State Mine Area No. 2, the drilling plant was engaged on the leases of Bowen Consolidated Coal Mines Ltd. and by the end of the year a total of 30 bores had been sunk north of the Bowen River. Reserves in the Bowen seam with maximum thickness of 13 ft. were reported to be 30 million tons of available coal.

In 1918 the site for the State Mine on the Bowen River Coalfield was selected near the terminus of the surveyed railway and plans were prepared for opening up on the Bowen Seam, which was considered to be the best. Necessary plant and machinery were assembled at Bowen.

In March, 1919, operations commenced. Work was directed to provide an output as soon as the railway was completed. The main tunnel on the Bowen Seam was driven to a distance of 300 ft. from the surface. Careful tests of bulk samples showed the coal to make good metallurgical coke. An experimental coke oven was erected and brickworks established and the machinery necessary for development transported.

In 1920, the tunnel on the Bowen Seam was extended further, and 3,914 tons of coal produced. A tunnel to the Garrick Seam was started a half-mile to the south-east meeting the seam at 80 ft., thence for 50 ft. gradually cutting through it.

During 1921, underground development on both seams had been completed as far as was advisable until the railway reached the field and mining operations were suspended during the first eight months of 1922.

On 24th August, 1922, the Bowen Coalfield railway was opened for traffic. The rails reached the mine on Saturday, 4th September, and coal production was recommenced on the following Monday.

During 1923, operations were confined to the Bowen Seam, the output being about 400 tons per day.

In 1922-24, J. H. Reid continued the geological work initiated some years earlier and the results of his investigations formed the basis for subsequent mining operations.

In 1935, No. 2 Tunnel was commenced.

In 1940-1 drilling was done to prove further coal areas. Sites were selected by Reid to the south of the workings and one hole (1A) was drilled to 780 ft. A seam met at 755 ft. 6 in. to 766 ft. was correlated with the Bowen Seam. Further drilling was then done in the area east of No. 1 Tunnel workings without proving additional workable reserves.

In 1944 15, underground boring was done to test the Blake Seam below the workings but this seam was found to be unworkable.

Coal production continued by hand mining and hand wheeling from the Bowen Seam, and this was the position when the present Manager, Mr. A. Winstanley, was appointed in January, 1946.

Term II A. (2).

Geological Summary.

As with the Historical Summary most of the geological information regarding Bowen River Coalfield was compiled by Mr. J. H. Reid, A.S.T.C., and is also to be found in the booklet previously mentioned " The Geology of the Bowen River Coalfield "-1929 (Exhibit 102).

The Bowen River Coalfield lies at the nose of a southerly pitching asymmetrical geosynclinal structure in Permo-Carboniferous rocks and extends southwards for some 360 miles to Cracow on the eastern limb and to beyond Springsure on the western, thus having a width at its southern limits of some 130 miles.

Annexure No. 5 shows the locality map of the Bowen River Coalfield. Annoxure No. 5.

The Collinsville Coal Measures have been mapped at intervals over a distance of about 48 miles, extending from the Bowen River south of Birralee to the Bowen River at Emu Plains road crossing. The coal seams, however, have not been traced south of the Pelican Creek vicinity in the west, neither has their identify been definitely established south-easterly from Collinsville. Within the area north of Pelican Creek tested by boring, they appear to be, in general, persistent.

Annexure No. 6 shows a geological sketch Section 1, line E.-W. across Bowen River Coalfield. Annexure No. 6.

The succession of seams and average intervals between them within the Collinsville Coal Measures in State Mine Area No. 1 have been determined from the results of drilling operations as follows in descending order :—

Sandstone and Shale-120 ft.
GARRICK SEAM-3 ft. 4 in.-8 ft. 4 in.

Sandstone-220 ft.
SCOTT SEAM-2 ft.-6 ft. 10 in.

Coarse sandstone-12 ft.
DENISON SEAM-4 ft. 6 in.-8 ft.

Sandstone-25 ft.
POTTS SEAM-0 ft.-5 ft. 1 in.

Sandstone-50 ft.
VALE or LITTLE BOWEN SEAM-1 ft.-7 ft. 9 in.

Sandstone-0 ft.-5 ft.
BOWEN SEAM-10 ft. 6 in.-14 ft. 6 in.

Shale, conglomerate and sandstone-90 ft.
BLAKE SEAM-6 ft. 3 in.-11 ft.

Shale, sandstone and conglomerate-135 ft.

Annexure No. 7. *Annexure No. 7* shows a vertical section of Collinsville Coal Measures in the State Mine Area.

The six seams (regarding the Vale as an upper part or " split " of the Bowen) have an average aggregate thickness of 48 ft. 9 in.

It is interesting to note that the results of the N.S.I. Bore put down in October, 1955, at the request of the Commission, shows the Sandstone between the two seams as 22 ft.

Annexure No. 6. *Annexure No. 6* shows section on line of No. 1 Tunnel, State Coal Mine to No. 14 Bore showing dip of coal seams.

The otherwise simple structure of the northern part of the syncline is complicated along its north-eastern margin by a belt of intense folding and overthrusting from the north-east, and this has limited mining development in an esterly direction. To the west of this, within the working area, the strata are gently folded into a succession of minor anticlines and synclines and to some extent disturbed by overthrust faulting in direction parallel with the major overthrust. Minor faulting of normal type has been produced during subsequent readjustment.

The general dip of the measures in the working area is southerly at grades of 1 in 6 to 1 in 10.

The coal measures have been extensively intruded by igneous rocks of basic to intermediate composition, mostly in the form of irregularly-shaped sills. In general, there is little surface evidence of their presence but drilling has shown that *all seams have been destroyed or detrimentally affected over portions of the field* though not always in identical areas. The destructive effect of intrusions is most serious in the western part of the field, where the seams have been destroyed over large areas.

In the northernmost section of the Bowen Consolidated leases, contiguous to the State Mine lease, the Bowen Seam has been so affected. Drilling in the northern part of the State Mine Area No. 1 has shown the Scott, Denison, and Potts Seams to have been destroyed over large areas, but although dykes have been met in the State Mine workings on the Bowen Seam, there is, to date, no evidence that either the Bowen or Garrick Seams within that area have been invaded by sills. However, *the southern part* of the area has *not* been drilled to test for the presence of *intrusive sills*.

The underground development has in the past been carried out on the Garrick and Bowen Seams but is at present confined to the Bowen Seam.

Annexure No. 8. *Annexure No. 8* shows the Bowen River Coalfield showing bore holes to Bowen Seam.

Annexure No. 9. *Annexure No. 9* shows sections of Bowen Seam in bores. The available tonnage in the Bowen Seam was estimated at 25,200,000 tons in State Mine Reserve No. 1 not allowing for any deductions for intrusions.

Annexure No. 10. Full particulars regarding these reserves and the method of their computation is shown in *Annexure No. 10,* coal reserves in State Reserves Nos. 1 and 2 areas.

Term II A. (3).

Coal Quality and Analyses.

The coal of the Bowen Seam is dense, black, fairly hard, and bright with some dull bands, of good appearance and general utility in spite of a relatively high inherent ash content. It produces a good metallurgical coke. In rank based on fuel ratios, it lies within the range of low volatile bituminous coals.

The coal has been tested in various gas works and submitted to other technical analyses. Lightfoot thought its figures came out something around, as far as gas coal is concerned, about 8,500 cu. ft. of gas per ton, which has to be compared with about 13,000 from Maitland coal. Its return of coke under those conditions was somewhere about 70 per cent.

It is described as semi-bituminous. Its B.T.U. is 12,700.

Mr. Lightfoot siad that Collinsville coal could be classified as first-class steaming coal, first-class coking coal, and second-class gas coal.

It has a moderate ash content, high calorific value and thus is suitable for either coking or steam-raising purposes.

In connection with their investigation into the Coal Industry in Queensland, the Powell Duffryn Technical Services Ltd. in their report, show the analyses of coal in the various seams of the Collinsville Coalfield. These can be found in Exhibit 114 and represent tables D/XVII-D/XXXV shown on pages 304 and 313 respectively.

Annexures No. 11 & 12. These are shown as *Annexures Nos. 11 and 12.*

We have compiled the table below partly from the said Report and partly from the other sources shown :-

BOWEN SEAM.

STATE COAL MINE, COLLINSVILLE.

	1.* (234-49 Geological Survey).	2. (3-47 Geological Survey).	3. (Powell Duffryn Technical Services Report, Exhibit 114, 1949).
Proximate Analysis-			
Moisture at 105°C. ..	0.9	0.79	1.4
Volatile Matter	21.7	17.36	21.7
Fixed Carbon	63.0	65.26	64.2
Ash	13.5	16.59	12.7
Calorific Value-			
Calories per gram ..	7,239	6,940	..
BTU/I b.	13,030	12,490	13,200
Specific Gravity	*1.422*	1.506	..
Ultimate Analysis-			
Moisture at 105°C.	0.96	0.79	1.4
Carbon	74.87	72.15	75.3
Hydrogen	4.10	3.96	4.10
Nitrogen	1.64	1.65	1.50
Sulphur	1.24	0.36	1.20
Oxygen (diff.)	3.69	4.50	3.80
Ash	13.50	16.59	12.7
Ash Fusion Temperature-			
Initial deformation	1,380°C.	1,550°C.	
Complete fusion	1,460°C.	..	..
Coking Properties..	Good quality hard grey non-swelling coke		

* (1949) Run of mine sample taken by the Manager in May, 1949, for Power and Gas Corp. Pty. Ltd., Melbourne.

From the foregoing figures and the Annexures it seems safe to say that the Bowen Seam coal appears to be of a standard to attract demands not only for all local purposes, but also for bunkering or export.

This judgment is supported by the experience of the mine over a period of years, and if sufficient supplies were available, it is safe to say that it could fulfil 90 per cent. of the requirements of North Queensland coal.

Term H A. (4).

History of Mechanization at Collinsville State Coal Mine.

Any detailed consideration of the mechanization of the Collinsville State Coal Mine seems to us to necessitate in the first place an historical summary of the major events leading up to and finally culminating in the actual introduction of mechanization and the working of the State Coal Mine as a mechanized unit.

(a) THE DAVIDSON REPORT-1945-46.

Even in the early 1940's, Mr. Thomas Platt, who was at the time Supervisor of State Coal Mines, gave consideration to the possibility of mechanizing the Collinsville State Coal Mine and thought to the type and initial preparation of plant for such. This in the main represented merely early thinking though some additional attention was focused on the subject as the result of a report in 1945-46 by the Hon. Mr. Justice C. W. Davidson, a Judge of the Supreme Court of New South Wales who, associated with owners' and miners' representatives, made an investigation into and reported generally on the Coal Industry in Australia.

The Davidson Report suggested a tunnel be driven to the Blake Seam in the vicinity of the Bowen Seam No. 1 Tunnel and that the drift be so placed that with a conveyor belt installed and extended to the surface it would have its delivery end at the existing screens.

This proposition would have provided good roads in virgin country for ventilations, coal haulage and man transport. It envisaged a drift from the Blake to the Bowen Seam and the fault in 3 West, thus allowing development of a new area in the Bowen Seam, free of the old workings which were known to be liable to spontaneous combustions.

This matter was dealt with on pages 345-350 in the Report of the Commissioner, Volume II-1945-56 and the advantages claimed for the recommendations were as follows :-

1. The virgin coal below the fault could be exploited by modern methods at the minimum of cost and time ;
2. Transport for workers could easily be installed ;

3. Risk of spontaneous heating and fire could be controlled ;
4. Adequate ventilation could be assured ;
5. Danger from gas and dust could be reduced to a minimum ;
6. Hand and horse wheeling could be replaced by mechanized haulage of the latest type ;
7. Work in both the No. 1 and No. 2 Tunnels could proceed in the meantime with some alleviation of existing defects ;
8. The Bowen Seam could be exploited to full advantage ;
9. Should the Blake Seam prove to be as good as is anticipated, it would provide a second developed mine as a reserve which would ensure a long and valuable life to the State Mine with the best working conditions.

These recommendations were not implemented.

(b) FIRST WINSTANLEY REPORT-1947.

The present Manager, Mr. A. Winstanley, commenced duty in his present position on 26th January, 1946. He was instructed by Mr. T. Platt, Supervisor, State Coal Mines, on 13th June, 1946, to investigate the proposed extension of No. 3 West District and submitted a preliminary report dated 26th June, 1946. Mr. R. W. Glazebrook, Mining Engineer, of Noyes Brothers (Sydney) Ltd., was consulted and tendered advice in connection with the report.

On 5th August, 1947, Mr. Winstanley recommended a form of mechanization to the Supervisor of the State Coal Mines, Mr. Platt. This recommendation was passed on to the Under Secretary, Department of Mines, on 2nd September, 1947. The details of this scheme were submitted to the Commission as Exhibit 150 and this is shown as *Annexure No. 13.*

Annexure No. 13.

The scheme envisaged mechanization in the No. 3 West Dip section of No. 1 Tunnel workings, and included-

		£
(i.)	*Main Haulage Systems-30* in. troughed belt conveyors	33,500
(ii.)	*Production Units*—	
	Two crawler-mounted coal cutters	
	Two crawler-mounted loading machines.	
(iii.)	Secondary transport of *one unit* to consist of a scraper type conveyor. Secondary transport on the other unit to comprise battery-driven shuttle Cars.	
	(ii.) and (iii.)	34,500
(iv.)	Electrical equipment and trailing cables, &c.	20,500
(v.)	Other equipment for Pick section at No. 4 Pit bottom	400
(vi.)	Spare parts ..	2,500
	Underground total ..	£91,400
	Surface.	
(i.)	Construction of steel storage bin, 400 tons capacity	1,900
(ii.)	Two conveyors from storage bin to screens ..	1.,000
	One new screen ..	350
(iv.)	Miscellaneous ..	125
		£3,375
	Total estimated expenditure :—	
	Underground ..	91,400
	Surface ..	3,375
		£94,775

Again, no action was taken to implement this scheme.

The recommendations were—

(1.) The provision of £100,000 for mechanization along the lines suggested by the Manager ;

(ii.) Discussions with the Commonwealth Joint Coal Board, New South Wales, and its officers, pertaining to the scheme, augmentation and implementation ;

(iii.) Discussions with New South Wales mining engineers who had recently visited the United States of America ;

(iv.) Authorising a consulting mining engineer, the Mine Manager or Supervisor of State Coal Mines to carry out (ii.) and (iii.) and to concentrate on the production of a detailed scheme for the earliest partial mechanization, and subsequent total mechanization, of the means of production of coal at the State Coal Mine, Collinsville.

(c) POWELL DUFFRYN TECHNICAL SERVICES REPORTS-1948-49.

Xrc November, 1947, Powell Duffryn Technical Services Ltd. (of England) was commissioned by the Government to report on the coal industry of Queensland.

The final report was not presented until 1949.

(i.) REPORT BY MR. D. G. HEMMANT-1948.

Before the final report was completed, Mr. D. G. Hemmant of that organisation issued on 31st July, 1948, a memorandum on the immediate programme for the Collinsville State Mine (Exhibit 113), in which he suggested that the maximum proportion of the future output consistent with market requirements should come from the upper seams, working them in descending order, solid work being followed up by pillar extraction after as short an interval as possible. He also recommended that the No. 3 West level in *No. 1 Tunnel* should be pushed on with all possible speed, as the water which had accumulated in the past in these workings had at that stage been pumped out and the Management was negotiating for the purchase of two scraper-loaders in New South Wales. He stated that these machines were comparatively cheap and of such wide applicability that there should be no difficulty in disposing of them in the event of their being found not suitable for further use in the mine after the completion of these drivages. He strongly endorsed the Management's action in this regard.

(ii.) REPORT BY THE COMPANY-1949.

As part of their investigation of the Queensland Coal Industry, the Company dealt fully with the future of the Collinsville State Coal Mine. It proposed that new workings should be developed in the area then being worked in the Bowen Seam at the No. 1 Tunnel, in the colliery. It further proposed that new workings should be commenced in the *Garrick Seam* and that the seams should be worked in descending order so as to avoid damage to the unworked seams.

The details of their conclusions and recommendations are to be found in the Powell Duffryn Technical Report (Exhibit 114) pages 247 to 250, which dealt with-

(aa) Geographical position and climate ;

(ab) Stratigraphy and structure of the Bowen Series ;

(ac) Results of past and present investigations of the area.

The conclusions and recommendations were :

(30) There appears to be a considerable area, west and south-west of the present workings of the State Mine, available for future development, but testing so far in this area has been limited to Boreholes Nos. 27, 18, and 15.

(31) The uncertainty introduced by intrusions necessitates close drilling in any further prospecting area, but apart from the effect of these intrusions the seams appear to have a fairly consistent thickness.

(32) In the State Mine severe tectonic disturbances prevent exploitation in an easterly direction and future development will have to be in a west-south-westerly direction.

(33) The results of Borehole No. 7 assume some importance as they give an indication of the depths at which the seams may be expected in the remaining area towards the south. It is probable that workable areas of the upper seams are considerable in extent, particularly in the eastern portion of the coalfield.

(34) The results from boreholes in State Reserves Nos. 2 and 3 have shown severe destruction of some of the seams, especially the Bowen Seam, and this western portion of the coalfield appears to be less promising.

(35) Drilling should be carried out in the first place to supplement the information already in existence concerning the other seams in the present working areas and then to obtain further information about all the seams beyond the limits of the present workings. Such drilling should be on a 20-chain grid in the first instance, but supplementary holes at closer intervals may be required subsequently to define more accurately the areas affected by intrusions. The depth to which the holes designed to prove all the seams should be drilled will increase from 800 ft., immediately in advance of the present workings, to possibly 2,000 ft. in the southern corner of State Reserve No. 1 . . ."

It was estimated that if the seams persisted over the area chosen for future development, the extent of such area being set out in their report, Volume II, on page 485, with a section equal to the average proved in the existing bores, the total reserves of coal in such area would be :—

	Million Tons.
Garrick Seam	2.68
Scott Seam	3.26
Denison Seam	3.16
Potts Seam	2.60
Bowen Seam	2.69
Blake Seam	6.37
Total ..	20.76

Further details of the developments proposed by Powell Duffryn Technical Services Ltd. are set out in Exhibit 114—Volume II, pages 485-488, also Plates 41 and 63, Volume III.

REPORT BY MESSRS. A. CROWLEY AND K. D. WOOLLEY-1950.

At this time declining production of the State Coal Mine partly, at least, due to the increasing difficulty in getting sufficient contract miners was becoming the concern of the Queensland Coal Board and on 13th February, 1950, Mr. A. Crowley, the Engineer of that Board and Mr. K. D. Woolley, Mining Engineer of Powell Duffryn Technical Services Ltd., issued a report dealing with the problem of obtaining an immediate increase in production at the State Mine.

This report somewhat naturally divided itself into two parts-

(i.) The attitude of the employees-

(aa) The Union Committee,

(ab) The Darg ;

(ac) The Deputies ;

(ad) Absenteeism ;

(ae) Delays in Reference Board Findings.

(ii.) The immediate technical problems-

(aa) Boring of Shot Holes,

(ab) Haulage Systems,

(ac) Development Programme,

(ad) Employment of an Excessive Proportion of Non-production Labour.

Most of the matters dealt with in this report are more relevant to another term of this inquiry. However, with regard to mechanization, the report did at that stage recommend the immediate introduction of power borers.

At that time there were 47 pairs of contract miners working at the coal face and every pair had to bore some five to six shot holes each shift by utilizing antiquated types of hand-operated machines. The miners informed Messrs. Crowley and Woolley that the hand boring of these shot holes was the hardest work they had to perform in a normal shift. They further stated that if power borers were introduced they would uphold the State Union's undertaking to fill one extra ton per miner per day. It was estimated that the introduction of power borers at that stage would result in an immediate increase of about 400 tons of coal per week, and Messrs. Crowley and Woolley recommended that the installation should be proceeded with immediately as a matter of urgency.

The Department of Mines adopted this recommendation and one power borer was installed in No. 1 Tunnel on 10th January, 1951, and power borers were completely installed for the cavil on 24th March, 1952. (Their effect upon production is shown in Term II B). The Crowley-Woolley Report (Exhibit 174) is shown as *Annexure No. 14.*

Annexure No. 14.

(e) SECOND WINSTANLEY REPORT-1950.

Virtually at the same time as the Crowley and Woolley Report was issued, Mr. A. Winstanley (on 14th February, 1950), reported to the Supervisor, State Coal Mines, regarding visits he had paid to mechanized mines in New South Wales in company with the Assistant Engineer of the State Coal Mines, Mr. S. Plath.

Annexure No. 15.

Judging from this report, which is Exhibit 115, and appears as *Annexure No. 15,* Mr. Winstanley had an excellent opportunity of observing an average cross section of mechanized mining in New South Wales:-

(i.) At Wollondilly, the face equipment consisted of one 11 B.U. coal loader ; one 8 B.U. coal loader ; four Joy shuttle cars Model 60D, battery driven, and two arc shearing machines, crawler mounted type.

(ii.) At Stanford Main Colliery, near Cessnock, again accompanied by the Assistant Engineer, he made an inspection in an area where the plant consisted of one 11 B.U. Joy loader, one 10 R.U. coal cutter, one Joy shuttle car.

At this colliery he was also able to observe six scraper-loader units in operation working on grades of 1 in 4.

(iii.) At Elrington Colliery, the face equipment consisted of one 11 B.U. loader ; one 10 R.U. coal cutter, with two battery shuttle cars.

(iv.) At Corrimal Colliery, South Coast, New South Wales, he was able to see Jeffrey equipment, which was track equipment, consisting of Jeffrey loaders and coal cutters. This was the only mine in which he inspected Jeffrey equipment and it must be noted that it was track equipment.

He reported to the Supervisor that, taking everything into consideration, the mining equipment inspected and supplied by the various firms was of good standard for the conditions in which they were operating.

The scraper loaders, however, were in his opinion unsuitable for the conditions at the State Coal Mine, Collinsville. What he thought was suitable for the State Coal Mine, Collinsville, was the trackless mining type of large units, with cable reel type shuttle cars designed for varying grades and belt conveyors. He recommended these for the proposed mechanization of *No. 1 Tunnel,* and also recommended two complete trackless mining type units worked on a transfer system, into small skips for No. 2 Tunnel, contending that this would completely mechanize the State Coal Mine, Collinsville, and would place every employee on a weekly wage instead of remaining on the contract system which was then operating.

(f) VARIOUS CONFERENCES ON MECHANIZATION—MARCH, 1950 AND JUNE, 1950.

It can be well understood that the somewhat conflicting advice from the various interested parties would have tended to confuse and it was not surprising, therefore, that *in March,* 1950 a conference was held at the Mines Department, Brisbane, at which the Hon. the Minister for Mines, Mr. Moore, presided. This sought to bring all the parties together and there were accordingly representatives from the Mines Department (Messrs. Clark, Platt, and Winstanley), the Chief Geologist (Mr. Morton), the Queensland Coal Board (Messrs. Dunne, Evans, and Crowley), Powell Duffryn Technical Services Ltd. (Messrs. Hemmant and Woolley). Apparently the first matter detailed was the suggestion originally made by Mr. Hemmant and later endorsed by Powell Duffryn Technical Services Limited that a new mine be opened up in the Garrick Seam.

After lengthy discussion this project was abandoned and it was decided to concentrate on the mechanization of the Bowen Seam, the two major arguments being that that was the Seam being currently worked and that the coal was of good quality and eminently suitable for the North Queensland requirements.

The next plan discussed was that prepared by Mr. Winstanley on 5th August, 1947. This plan for the mechanization of No. 1 Tunnel was criticised by representatives of Powell Duffryn Technical Services Ltd. because of the small area of coal on the top side of a down-throw fault. They pointed out that this fault gave a displacement of the Coal Seam approximately 100 ft. opposite No. 3 West Section, No. 1 Tunnel. The direction of the fault was in a south-easterly direction from No. 2 Tunnel, coming towards No. 1 Tunnel.

Arising out of this discussion (and because of something in the nature of an objection by Powell Duffryn Technical Services Ltd.) it was agreed at a later meeting that Mr. Hemmant prepare a scheme for mechanized trackless mining with light or medium type of mining equipment recommended by himself, together with an alternative scheme which would employ heavy-duty type mining equipment with cable reel type shuttle cars and belt conveyors.

June, 1950.—It was three months later, on 5th June, 1950, a further conference was held, Messrs. Platt and Winstanley, Mines Department, Messrs. Evans and Crowley, Queensland Coal Board, and Mr. Woolley of Powell Duffryn Technical Services Ltd. being present. Mr. Woolley outlined his scheme for mechanization which scheme favoured light mining type of equipment with scraper conveyors. He had, however, no alternative scheme to submit relative to heavy-duty type of mining equipment with cable reel type shuttle cars. As a result, Mr. Evans of the Queensland Coal Board and Mr. Platt supported Mr. Winstanley's recommendations that heavy-duty type of mine equipment was the most suitable for the conditions at the State Coal Mine. Mr. Winstanley was then asked to submit an alternative scheme to the one Mr. Woolley had prepared so that both schemes could be considered by Cabinet which could then make a decision. It was at this conference that the first reference was made to the preparation of plant for the complete *mechanization of No. 2 Tunnel,* with heavy-duty type mining equipment.

(g) THIRD WINSTANLEY REPORT—JULY, 1950.

On that date, Mr. Winstanley submitted an alternative scheme (which we have called the Third Report) and the name of the scheme is interesting-

> " Alternative Scheme re the Proposed Mechanization and General Surface Installation, &c. State Coal Mine, Collinsville, employing the use of Heavy-Duty Type Trackless Mining Equipment also Troughed Belt Conveyors Underground in Opposition to the One Submitted to the Mines Department by K. D. Woolley, Mining Engineer, Powell Duffryn Technical Services Ltd. on 5th June, 1950, in which he recommends Light-Duty Type Mining Equipment and Scraper Conveyors, &c., Underground, *for the Mechanization of No. 2 Tunnel, State Coal Mine, Collinsville."*

Mr. Winstanley's scheme was outlined in what appears to be a carefully prepared report (Exhibit 99) which deals in detail with everything that would be involved in complete mechanization of the No. 2 Tunnel *(Annexure No. 16).* He supported heavy-duty type mining equipment and he also dealt with the surface and underground installations, conveyor transportation, various mechanical aspects, ventilation, a new screen building at the surface, as well as a description of the Gullick Coal Buster and Cardox Shooting. He mentioned that by such a scheme a minimum output of 900 to 1,050 tons per day could be obtained and he estimated the personnel required. He then made estimates of the working costs and endeavoured to arrive at the percentage of profit upon a capital investment of £400,000 which he estimated as the cost of mechanization. Annexure No. 16.

In working out his estimates he prepared the various details on a sliding scale of production of 200, 300, 400, and 500 tons per unit per working day in a year of 230 working days.

Mr. Winstanley recommended that Cabinet give consideration to this matter as soon as possible as he felt the installation should proceed without any undue delay, so that it is quite evident that his visit to the mines in New South Wales had convinced him that the heavy-type trackless Joy equipment was most suited to the Collinsville Mine and he was prepared to try the 10 S.C. cable reel type shuttle cars for conveying the coal from the face to the main truck conveyors.

It must be remembered that this was in respect to the *No. 2 Tunnel* because, when it was finally decided to drop the suggestion of working the Garrick Seam as initially favoured by Powell Duffryn Technical Services Ltd. apparently all parties (according to Mr. Platt) became agreed that No. 2 Tunnel was the one that should be mechanized.

When this scheme was considered by the various authorities Mr. Platt indicated that whilst he did not agree with everything contained in it he felt it was a really good effort to put forward a successful scheme and he commented favourably upon it. Futhermore, he mentioned that Mr. Crowley of the Queensland Coal Board came around to this point of view and also supported the scheme.

Apparently Mr. Platt's one major reservation throughout was that Mt. Winstanley had taken the optimum view and particularly in relation to the preparation of the figures he had cut all the expense to a bare minimum.

When reporting on the scheme, therefore, Mr. Platt increased Mr. Winstanley's expected costs by 33ird per cent. and furthermore he made some reductions in the amount of the expected output.

This was not, however, the end of the reports submitted.

(h) JOINT SCHEME BY POWELL DUFFRYN TECHNICAL SERVICES LTD. AND MR. A. CROWLEY, QUEENSLAND COAL BOARD—AUGUST, 1950.

Despite Mr. Platt's belief that Mr. Crowley of the Queensland Coal Board was in favour of the scheme submitted on 22nd July, 1950, by Mr. Winstanley, Mr. Crowley himself in August, 1950, in conjunction with Powell Duffryn Technical Services Ltd. submitted a proposed scheme for partial mechanization of No. 2 Tunnel. They concentrated upon the area accessible to No. 4 Pit bottom in No. 2 Tunnel and stressed the desirability that mechanization should be confined to one tunnel and the contract miners kept operating in the other. Subsequently it was agreed that a panel immediately below No. 3 West level should be the area to be mechanized.

Annexure No. 17.

The scheme which is to be found in Exhibit 112, and appears in *Annexure No. 17,* provided for an average output of 820 tons per day and the total cost of the equipment was estimated as £337,242. Because of the distance from No. 4 Pit bottom to the surface (1,500 yd.) and from the mouth of the tunnel to the existing screening plant (a further 1,050 yd.) totalling in all 2,550 yd., the report suggested that the coal be transferred via a surge bin to the existing skips and that the endless rope haulage operating at that time be used from No. 4 Pit bottom to the tunnel mouth and to the existing screens. For intermediate haulage to the surge bin, a 36-inch rubber belt conveyor was proposed with scraper chain conveyors feeding from the face to the 36-inch rubber belt. Trackless mobile loading machines and cutting machines with mobile timber setting machines were suggested for the coal face.

There was apparently still a great deal of confusion if not of conflict, because it was finally agreed that, as the Manager of the State Coal Mine was very strongly in favour of shuttle cars, and alternative scheme involving their use should be drawn up. This was apparently done and thus having arrived at the two schemes, opportunity was sought to place them both before the Minister.

(i) SUBMISSION OF ALTERNATIVE SCHEMES TO THE MINISTER FOR MINES-18TH SEPTEMBER, 1950.

Annexure No. 18.

A report signed by the Chairman and Members of the Queensland Coal Board and the Under Secretary and Supervisor of the State Coal Mines was submitted to the Minister of Mines on 18th September, 1950—Annexure *No. 18* (Exhibits Nos. 116 and 182). This report dealt with the two separate schemes that had been prepared, i.e., the one by the Mine Management in conjunction with the Supervisor of the State Mines, Mr. Platt (and dated 22nd July, 1950) and the other prepared by Powell Duffryn Technical Services Ltd. in conjunction with Mr. Crowley of the Coal Board (submitted in August, 1950). The object of this report was to set out both schemes for the benefit of the Minister and a logical attack on the problem was adopted by first considering those main proposals which could be regarded as common to both schemes and acceptable to each. It was suggested that they be adopted virtually without discussion. These totalled in all 20 items.

There were six other items upon which there was only qualified agreement but as the results of discussions some general recommendation was formulated. In the main these covered new screening facilities, surface belt transport, coal cutters and loaders and the depth of cut, height of face, and the drilling of the coal. When these had been dealt with consideration was given to those matters which remained and on which no final agreement was reached. These were :-

(i.) *The transference of coal to the gathering belt.* Powell Duffryn Technical Services Ltd. favoured the utilization of scraper chain conveyors whilst the Mine Management and the Coal Board desired pneumatic-tyred cable reel type of shuttle cars.

kii.) *Ventilation of Face.—Powell* Duffryn felt that it would be necessary to apply auxiliary ventilation by the use of small forcing fans and ventilation tubing. The Mine Management and the Coal Board felt that each machine section should be ventilated by a separate split of fresh air and carried to the working face by brattice.

Mr. Crowley of the Coal Board agreed with the latter but felt that the time factor may force the use of the former.

(iii.) *Provision of a Servicing Diesel Truck.—Powell* Duffryn felt this was unnecessary. The Mine Management and the Coal Board regarded it as essential.

The Powell Duffryn scheme provided for an average output of 820 tons per day or 196,800 tons per 240-day year and the total cost of the scheme as indicated above was estimated at £337,242.

The scheme prepared by the Mine Management and the Coal Board was to cost approximately £400,000 on a comparable basis with that of Powell Duffryn. Actually, however, by the time other factors were involved, the grand total of the Mine Management's scheme was £471,750.

This report to the Minister thus made certain recommendations which were really that the Minister authorise the implementation of the scheme of mechanization prepared by the Department of Mines and the Coal Board and which was likely, in the final analysis, to cost £500,000 and requested that authority be given for (1) the immediate commencement of the underground development to cost £7,700 and (2) for the calling of separate tenders through the State Stores for the supply and installation of heavy-duty-type machines and ancillary equipment together with the supply and installation of conveyor belts, surge bin, and feeder, and the construction of surface screening plant.

It should be noted in passing that one of the reasons for disagreement between the two schemes was that Powell Duffryn doubted the ability of the shuttle cars as recommended by the Department of Mines to negotiate the grades existent in the area at Collinsville, viz., 1 in 9. The Department of Mines were satisfied they would do so.

(j) SUBMISSION BY MR. T. PLATT, SUPERVISOR STATE COAL MINES-18TH OCTOBER, 1950.

Just one month after submission of the two schemes to the Minister, Mr. Platt made some further observations to the Under Secretary, Department of Mines, giving additional reasons why the Mine Management's proposal was, in his opinion, better than that of Powell Duffryn Technical Services Ltd. He suggested that if there were any further doubts about the matter, he, Mr. Platt, should visit New South Wales, West Australia, the United States, and Great Britain with the Minister, the Co-ordinator-General or any other representative of the Government to show in actual operation, the weakness of the Powell Duffryn Technical Services' report and the strength of that submitted by the Mine Management. In any case he felt that he should be given the opportunity to visit New South Wales and West Australia.

(k) CABINET APPROVAL OF THE DEPARTMENT OF MINES' SCHEME-12TH MARCH, 1951.

It was six months after the conference with the Minister for Mines (September, 1950) before the matter came to Cabinet. As with the Minister, the two schemes were placed before Cabinet. Indeed the submission to Cabinet was couched in identical terms with that used in the discussion with the Minister. It forms the subject of Exhibit No. 182, already referred to, *Annexure No. 18.* Annexure No. 18.

Both schemes envisaged the mechanization of *No. 2 Tunnel.* The Powell Duffryn Technical Services Ltd. scheme was intended as an interim scheme pending further proving of overlying seams by a further prospecting campaign as recommended in the original Powell Duffryn Report. The final selection of the most suitable area for the opening of a new mine would be deferred pending the results of the further prospecting. An output of 820 tons per day, that is 196,800 tons per 240-day year was envisaged. The cost of the underground equipment was estimated at £178,500 which together with a cost of surface installations of £158,742 gave a total cost of £337,242.

The main objection by the Queensland Coal Board and the Mines Department to the Powell Duffryn scheme was to be found in their belief that the equipment recommended for use in the vicinity of the coal face was unsatisfactory, and had in fact been superseded in New South Wales mines. They considered it too light, and favoured in its place heavy pneumatic-tyred cutters, loaders, and shuttle cars. Powell Duffryn still doubted the ability of shuttle cars to negotiate the grades existent in the area, viz., 1 in 9.

The Department of Mines scheme specified a minimum production of 900 tons per day and a maximum of 1,200 tons per day. On a 240-day year, these two figures were 216,000 tons and 288,000 tons respectively. In addition, however, the workers not required on the mechanized work at No. 2 Tunnel would be employed under contract mining conditions using hand methods in *No. 1 Tunnel* and a further production was envisaged of 350 tons per day or 71,400 tons per 240-day year.

The broad details of the scheme favoured by the Department of Mines and the Queensland Coal. Board set out in paragraph 16 of the report were as follows :—

Underground-		
(i.) Development ..		7,770
(ii.) Heavy-duty-type equipment, comprising—		
(a) Four coal cutters		
(b) Four coal loaders		
(c) Eight cable reel type shuttle cars		
(d) Three mobile boring machines		256,657
(e) Three timbering mobile units, and		
(f) Necessary cables, transformers, switches and control boxes for all the above		
(iii.) Conveyor belts—		
South panel ..	4,320	
North panel ..	4,320	
Main development heading	17,430	
Spare panel ..	4,320	
Spare main ..	17,430	
		47,820
(iv.) Coal surge bin and feeder, &e.		1,000
(v.) Conveyor from surge bin to surface conveyor		47,182
		£360,429
Surface—		
(vi.) Conveyors to screens		46,047
(vii.) Screening Plant ..		34,050
		£80,097
Incidentals . . .		£31,224

(NOTE.—Subparagraphs (ii.) and (iii.) above include an additional complete mechanized unit (1 cutter, 1 loader, 2 shuttle cars) with spare belt conveyors to allow continued development with some increase of production, as well as spares to be used as replacements to ensure constant output. The total cost of these spares is £71,750 and this additional expenditure will result in the costs shown in paragraphs 10 and 11 being lowered.)

Summary.

Underground	360,429
Surface - -	80,097
Incidentals	31,224
Grand Total ..	£471,750

Paragraph 17 RECOMMENDED—

(a) Approve of implementation of the scheme of mechanization set out in paragraph 16 hereof, at an estimated cost of £471,750 which figure under present day conditions of increasing prices and costs is likely to attain £500,000 ;

(b) Authorise—

Executive Approval.

(i.) Immediate commencement of the underground development estimated to cost £7,770 ;

(ii.) Calling of separate tenders through State Stores for—

(a) Supply and installation of heavy-duty-type machines and ancillary equipment as listed in (ii.) of paragraph 16 ; (State Stores could be informed that there are only two firms making such equipment, the Brisbane Agents being Beiers and Ridgway (Joy Sullivan) and Underhill and Day (Jeffrey).)

(b) Supply and installation of conveyor belts as listed in paragraph 16 (v.) and (vi.) and coal surge bin feeder, &c., as listed in (iv.) of Paragraph 16 ;

(c) Construction of surface screening plant capable of handling 3,000 tons of coal per day to be constructed of steel in conformity with the general outline of the plan to be submitted.

Submitted—

For the Queensland Coal Board-

(Sgd.) E. F. DUNNE, Chairman. (Sgd.) IDRIS EVANS, Member. (Sgd.) A. CROWLEY, Member.

For the Department of Mines-

(Sgd.) G. F. CLARK, Under Secretary. (Sgd.) THOS. PLATT, Supervisor, State Coal Mines.

18th September, 1950.

In relation to power supplies, there was (in view of later developments) a somewhat disturbing statement-

" It is expected by the Department of Mines that the existing powerhouse at the mine, with alterations and additions as already approved and under construction, will furnish the necessary electricity for that scheme, whereas Powell Duffryn in their proposals state additional plant above that provided and proposed would be required."

Cabinet approved the recommendation in the report dated 18th September, 1950, and two days later the Under Secretary directed that an Executive Council minute be prepared for the expenditure of £7,770 referred to for devlopment underground and at the same time gave instructions that the matter of calling of separate tenders for the various machines required should be referred to the State Stores Board. He drew attention of the State Stores Board, however, to the fact that further necessary information for supply to prospective tenderers was being prepared and numbers of copies would be furnished to the Board as soon as available. He asked Mr. Platt to prepare all the necessary information.

The original document had, on the last page, a note by the Under Secretary to Mr. Platt-

> " As there is a possibility of a new General Manager it is desirable to widen the para. (a) of (ii.) by inserting the word " trackless " in asking State Stores to obtain quotations."

From this we have concluded that Cabinet approved the recommendation and steps were taken to authorise the expenditure of £7,770 for preparing the west back heading for mechanization of the mine, but, in view of the possibility of the appointment of a General Manager the scheme was not further implemented, except to the extent of preparing necessary information for prospective tenderers and arrangements with the State Stores Board for the calling of tenders.

(1) DEVELOPMENTS IN MECHANIZATION PLANS FOLLOWING APPOINTMENT OF MR. A. LIGHTFOOT AS GENERAL MANAGER.

The notation made by the Under Secretary, Department of Mines, in relation to a proposed appointment of a General Manager emanated from the fact that advice had been given to the Minister that, if a sum of £500,000 was to be spent on mechanization, there would be a strong case for the appointment of a General Manager, whose whole time could be devoted to the State Coal Mines. Previously Mr. T. Platt had had the joint position of Chief Inspector and Supervisor of State Coal Mines. This move, therefore, envisaged a separation of these functions, and in March, 1951 applications were called for the position of General Manager. On the 19th July, 1951, Mr. Athol Lightfoot was appointed to this position, and that day the Minister for Mines (Hon. W. Power, M.L.A.) announced the appointment, (Exhibit 183)—Annexure *No. 19.* Annexure No. 19.

One of the special factors stressed by the Minister was that Mr. Lightfoot was a person thoroughly competent not only to advise as to mechanical methods to be installed, but to ensure the proper use of the equipment installed, with subsequent benefit to both employer and employee. Reference was made to the £500,000 to be spent on mechanization and the essentiality of having the control and management vested in a well-qualified and experienced person.

As soon as Mr. Lightfoot's appointment was confirmed on 19th July, 1951, the Under Secretary, Department of Mines, forwarded a copy of the Collinsville State Mine mechanization scheme prepared by Mr. Winstanley together with other information regarding the mine likely to be of help to Mr. Lightfoot. (Exhibit 185).

As a result of a study of these papers, Mr. Lightfoot on 10th August, 1951, specified in detail the equipment which he felt would be required for the mechanization proposals in hand, and listed the various agents who could be contacted in connection with the equipment—(Part 2, Exhibit 55)-*Annexure No. 20.* Annexure No. 20.

The Under Secretary referred Mr. Lightfoot's letter of the 10th August, 1951, to Mr. Platt asking for the latter's opinion about the points raised by Mr. Lightfoot.

On 21st August, 1951, Mr. Platt replied to the Under Secretary, Department of Mines, and whilst in the main he agreed with everything which Mr. Lightfoot had said, he did utter the warning that he felt it would be wise for Mr. Lightfoot to become acquainted with the whole position in regard to the State Coal Mines before he made any decisions, even the calling of tenders for equipment. (Exhibit *187)—Annexure No. 21.* Annexure No. 21.

The Under Secretary, Department of Mines, passed on Mr. Platt's comments in a letter addressed to Mr. Lightfoot and dated 22nd August, 1951. As far as can be seen, however, he did not include the suggestion by Mr. Platt that it might be wise for Mr. Lightfoot to become acquainted with the whole position before proceeding further. (Exhibit 188)—Annexure *No.* 22. Annexure No. 22.

A week later, on the 29th August, 1951, Mr. Lightfoot wrote in answer to the Under Secretary's letters and suggested certain amendments to the letter to be sent to the Manager of the State Stores Board. This apparently was well in line with the proposals previously made, and on the 13th September, 1951, a letter was addressed to the Manager of the State Stores Board requesting that tenders be called for equipment which was outlined and described in that letter. (Exhibit *55)—Annexure No. 23.* Annexure No. 23.

The Manager of the State Stores Board called for tenders on 20th September, 1951, and indicated that the tenders would close at the office of the State Stores Board at 11 a.m. on 15th November, 1951. (Exhibit No. *55)—Annexure No. 24.* Annexure No. 24.

Two important factors should be noted in connection with the tenders thus called :—

The first is that nowhere is there any indication that this equipment was required for anything but the No. 2 Tunnel. That was the basis of the original recommendation to Cabinet, both in respect of the State Mines Department scheme and that of Powell Duffryn.

The second factor is that Mr. Lightfoot did not commence duties until the 1st October, 1951, and consequently, up to the time that the tenders were called by the State Stores Board, he had not seen the mine, and any information regarding Tunnels No. 1 or No. 2 must have been gained from an examination of the data forwarded to him by the Under Secretary, Department of Mines.

On the 1st October, 1951, Mr. Lightfoot took up his position as General Manager of the State Coal Mine and the Coke Works and immediately proceeded to Collinsville (accompanied by the Under Secretary), spending 10 days at the colliery.

Annexure No. 25.

He made two inspections each of the No. 1 and No. 2 Tunnels and examined every working place twice. He also had lengthy discussions with the Manager and other Executives. (Exhibits 189)—Annexure *No. 25* is a plan of Portion of Workings, State Coal Mine, Collinsville, showing Basic Data available at 1st October, 1951. After visiting Mount Mulligan and Ogmore he returned to Brisbane and further studied the data available.

Approximately one month later he returned to Collinsville, made further underground inspections and had further discussions. By that time he said, " We arrived at certain conclusions." (Page 2337).

Though he had " formulated certain ideas " of what he thought mechanization should consist of and what should be purchased, after approval by the Minister for Mines, he and Mr. Clark visited New South Wales, inspected several collieries, surveyed the equipment used, had discussions with eminent mining men and showed the latter the plans and schedules he, Mr. Lightfoot, had in mind.

In his evidence (page 2338) Mr. Lightfoot at this point added-

> " On my return I had certain reassurances from them in regard to the type of plant. I then contacted, through Mr. Clark, the State Stores Board and tenders were called for equipment for the job,"
>
> (We have found it difficult to reconcile this statement with the fact that tenders were actually called on 20th September, 1951, and Mr. Lightfoot did not commence duty until 1st October, 1951.)

Mr. Lightfoot in evidence, continued-

> " . . . and after tenders had closed I had several ideas about what we would purchase, so I invited several of the experts from the major machinery companies to accompany me to Collinsville . . . "
>
> " These gentlemen made inspections down the mine accompanied by myself and other officials. We took them down individually so that there would not be any clash of opinion on the job and we discussed at some lengths with each of the experts the benefit or otherwise of installing their equipment.
>
> "After a thorough inspection down the mine some of those persons who had been most keen to install their equipment in Brisbane, after having a look at the physical conditions amended their views and were prepared to concede that their equipment was not to be compared with some of their competitors for operating in those grades."

Mr. Lightfoot then returned to Brisbane and on 13th December, 1951, prepared a schedule of equipment recommended by him for the Collinsville State Coal Mine. These recommendations form the subject of Exhibit 44 and are shown as *Annexure No. 26*.

Annexure No. 26.

(m) MEMORANDUM TO MINISTER FOR MINES SUBMITTING MECHANIZATION PROPOSALS-14TH DECEMBER, 1951.

One day later, Mr. Lightfoot as General Manager, and Mr. Clark, Under Secretary, made a report to the Minister for Mines submitting the mechanization proposals.

For the first time it was stated in clear language that the proposal was to mechanize No. 1 Tunnel. It was pointed out that such a proposal would call for considerably less conveyor belt and cables than would mechanization of No. 2 Tunnel and would-

> " also have the additional advantage that—
>
> (a) During the installation normal production will continue in No. 2 Tunnel
>
> (b) After installation surplus labour can be continued in employment in No. 2 Tunnel in hand-winning coal on day-wage conditions."

The memorandum drew attention to the fact that an appropriation of £500,000 had originally been sought, but that following the general percentage reduction in loan funds it was recognised that only £420,000 would be available for the then current financial year for mechanization purposes.

Actually the equipment ordered was-

(i.) Three coal-cutting machines complete with boring machines mounted thereon.

(ii.) Six coal-loading machines.

One main trunk belt conveyor system.

(iv.) Two subsidiary conveyors.

(v.) Fifteen small chain conveyors.

(vi.) Necessary cables, transformers and gate end boxes, together with all necessary additional ancillary equipment and spare parts.

Apparently the reference to spare parts did not include all spare parts because the memo. went on to say that the above expenditure of £420,000 made no provision for—

(1.) Spare parts for cutters, loaders and shuttle cars.

(ii.) New pit-top.

(iii.) Provision of a 200-ton storage bin.

It was estimated that the spare parts would cost approximately £10,000, and whilst the new pit-top could be deferred, a 200-ton surge bin was essential, and this built largely by colliery labour would cost about £15,000.

The amount also included import duties of not less than £45,000, and it was suggested that representation be made with a view to remission of such duties.

The additional £10,000 for spare parts and £15,000 on bin construction brought the total to £445,000 and this was the amount recommended for approval to the Minister.

The memorandum to the Minister is Exhibit 146 and is shown as *Annexure No.* 27. Annexure No. 27.

(n) APPROVAL BY CABINET OF MECHANIZATION PROPOSALS-17TH DECEMBER, 1951.

On 17th December, 1951, a summary of the proposals put before the Minister for Mines was prepared by the Under Secretary and read as follows :—

STATE COAL MINE, COLLINSVILLE-MECHANIZATION.

SUMMARY.

1. *Proposals*—

Complete mechanization comprising—

(1.) Mechanical cutting, boring and loading at the face,

(ii.) Subsidiary chain conveyors and main belt trunk conveyor.

2. *Aims*—

Increase in production, initially from 500 tons to 1,500 tons daily, with scope for still further expansion, if and when required.

3. *Recommendations*—

(a) Purchase of cutters, loaders, and conveyors with all necessary ancillary equipment, at tendered prices totalling ..	415,852
(b) Purchase of spare parts for cutters, loaders, &c. ..	10,000
(c) Expenditure in construction of storage bin of 200 tons capacity in present pit-top ..	15,000
	£440,852

The totals of (a) and *(b)* above include import duties of approximately £45,000. It is expected that the whole or at least a substantial portion of such duties will be remitted by the Commonwealth Government so that the total sum required will be within the amount of £420,000 provided in the estimates for the current financial year.

(Sgd.) G. F. CLARK,
Under Secretary.

17th December, 1951.

Three days later, on 20th December, 1951, the matter was submitted to Cabinet and Executive Council approval was given in the following terms :—

MECHANIZATION—STATE CO AL MINE, COLLINSVILLE.

Ministers recommend that an expenditure of up to Four hundred and twenty thousand pounds (£420,000) from Loan Funds be approved for the purchase of—

(a) Three (3) coal-cutting machines complete with boring machines mounted thereon ;

(b) Six (6) coal-loading machines ;

(c) One (1) main trunk belt conveyor system ;

(d) Two (2) subsidiary conveyors ;

(e) Fifteen (15) small chain conveyors ;

(f) Necessary cables, transformers and gate end boxes ;

together with all necessary additional ancillary equipment and spare parts, for the purpose of fully mechanizing production of coal at the State Coal Mine, Collinsville. Minute ends.

Both the submission to Cabinet and its approval are to be found in Exhibit 146 and are included as *Annexures Nos. 28 and 29.* Annexures Nos. 28 & 29.

It should be noted that approval by Cabinet covered the plant specified in Mr. Lightfoot's memorandum of 13th December, 1951, and this in turn included the Shuttle Car (£14,990), though it was not separately noted in the list for Cabinet,

(o) STATEMENT ON MECHANIZATION BY MINISTER FOR MINES-20TH DECEMBER, 1951.

Annexure No. 30.

Approval by Cabinet was speedily followed up. Three days later the Minister for Mines issued a Press Statement on the proposed mechanization of the mine. This appears as *Annexure No. 30.* (Exhibit 190).

From this it will be noted that the Minister drew attention to the following :-

(i.) The expenditure was stated as £420,000 ;

(ii.) Attention was drawn to the increasing North Queensland coal requirements ;

(iii.) There was a serious shortage of labour ;

(iv.) The coal was of good quality and the reserves immense ;

(v.) Reference was made to Mr. Lightfoot's experience ;

(vi.) Production was expected to increase from 500 to 1,500 tons—or more if desired—daily ;

(vii.) There would be no displacement of persons employed at that time ;

(viii.) Of the two tunnels, one would be mechanized and labour not required in the use of mechanized equipment would be required for reconstruction ;

(ix.) Mechanized mining would commence at the beginning of 1953 ;

(x.) The State Stores Board was proceeding to place orders for equipment ;

(xi.) Among the results of mechanization would be the improved development of North Queensland, the creation of infinitely better working conditions, more harmonious relationships and continuity of production and the acceleration of mechanization by private mines.

Term II A. (5).

Comparison of Equipment, Tenders and Orders.

The actual purchase of the equipment finally used in the mechanization of the mine had been preceded by the following schemes and/or suggestions :—

18th September, 1950	Mine Management and Coal Board.
10th August, 1951 ..	Suggestion by A. Lightfoot.
21st August, 1951 ..	Suggestion by T. Platt.
29th August, 1951 ..	Suggestion by A. Lightfoot.
13th September, 1951	Tenders called.
13th December, 1951	Equipment ordered.

It is of interest to compare the equipment nominated for each of these and a schedule comparing these and that finally ordered follows. The evolution of the order can be gauged therefrom.

EQUIPMENT FACTORS.

Factors :— Ex. 116 (15). 18th September, 1950. No. 2 Tunnel.	P.D.T.S. Ltd.	Coal Board.	Department of Mines.
1. Coal Reserves	Agreement	Agreement	Agreement
2. New Screening Facilities	2nd stage	Required	Required
3. Surface transport from No. 2 Tunnel to screens ..	Skips	Belt	Belt
4. Delivery belt in West Back Heading No. 2 Tunnel ..	Skips	Belt	Belt
5. Reconditioning of West Back Heading	Agreement	Agreement	Agreement
6. Gathering belt from face to main belt	Agreement	Agreement	Agreement
7. Surge bin at Gathering Belt Heading	Agreement	Agreement	Agreement
8. Transference of coal to Gathering Belt ..	Scraper Chain	Cable Reel Shuttle Car	Cable Reel Shuttle Car
9. Coal Cutters	Cats	Tyres	Tyres
10. Loaders	4 ton	8-10 ton	8-10 ton
11. Depth of cut	ft.	..	9-9-1 ft.
12. Height of face	9-10 ft.	..	10-12 ft.
13. Drilling of coal	Hand held	Evans—Mobile Machine ; Crowley—Hand held	Mobile Machine
14. Timbering	Agreement	Agreement	Agreement
15. Ventilation of face	Tubing	Brattice (Crowley-Tubing)	Brattice
16. Stock piling at surface	Agreement	Agreement	Agreement
17. Man riding and supply haulage	Agreement	Agreement	Agreement
18. Provision of servicing diesel truck	No	Yes	Yes
19. Cables	Agreement	Agreement	Agreement
20. Development. Preparation of West Back Heading ..	£7,700	£7,700	£7,700
21. Tons per day	820	900-1,200	900-1,200
Cost ..	£337,242	£400,000	£400,000

EQUIPMENT FACTORS.

FACTORS:—18th September, 1950. Ex. 116 (15) No. 2 Tunnel.	10th August, 1951, Ex. 55 (17).	Memo. to Under Secretary 21st August, 1951.	Letter 29th August, 1951 to Under Secretary.	13th September, 1951. From Ex. 55 (19).	13th December, 1951. Equipment to be purchased. Ex. 44 (22).
Recommended by— Mine Management and Coal Board.	A. Lightfoot.	[illegible]	A. Lightfoot.	Under Secretary to State Stores Board.	A. Lightfoot.
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Term II A. (6).

Installation of Mechanized Equipment.

Contract mining in No. 1 Tunnel ceased at the end of 1952 and the instal'ation of the mechanization equipment commenced in January, 1953, immediately after the Christmas vacation.

Whilst Mr. Lightfoot in his capacity as General Manager was of course in charge in the main, Mr. Winstanley, the Manager, concentrated upon the ordinary mining operations and Mr. Lightfoot's chief aid in the mechanization was therefore Mr. F. W. Stansbury, Chief Electrical Engineer, who was, during the course of the installation made Assistant Manager.

Mr. Lightfoot was of the opinion that the installation was a good one, but that this was in spite of the employees and not because of them. Indeed he seemed to give most credit to himself and to Mr. Stansbury because of the drive which they put into the effort and the very long hours they both worked.

We have no doubt that both Mr. Lightfoot and Mr. Stansbury did work exceedingly hard and probably beyond what could possibly have been expected of them. Mr. Stansbury in his evidence indicated that he worked 14 hours almost every day for seven days a week and he paid a tribute to Mr. Price and Noyes Brothers who were interested in the installation of the main conveyor belt.

Mr. Lightfoot felt that the employees did not pull their weight and that the installation dragged accordingly. He felt, too, that the careless and lazy attitude of the employees as shown in the work of installation may have been caused by opposition to mechanization which in turn arose out of fear of over production and of insecurity of employment. Mr. Lightfoot had taken a contract for the supply of coal to Korea and this had finally to be cancelled. It was not possible to get the installation through in time. Furthermore, in the early stages of mechanization sufficient production was not realised to fulfil the contract.

Mr. Lightfoot was in fact scathing in his denunciation of the work of the employees in the installation. In the main, Mr. Stansbury's evidence usually supported Mr. Lightfoot but in the matter of the work of the employees, Mr. Stansbury felt that the fitters and employees generally worked well during the installation. Indeed when he was asked by Mr. Ryan, Solicitor-General, in his capacity as Counsel assisting the Commission, if his assistants were good workers, Mr. Stansbury replied that he would say that they were equal to the best in the country. To a further question asked by Mr. Ryan-

> " Were your colleagues in preparing for mechanization keen, energetic and enthusiastic ?"

Mr. Stansbury answered-

> " There was no reason for complaint whatsoever."

Mr. Stansbury felt that the installation was a good one and was erected in reasonably good time.

Mr. Fallins, when appearing as a witness before the Commission, was asked by Mr. Ryan if he had any criticisms to make of the installation and of the belt conveyor. To this Mr. Fallins replied that he was very conversant with it because it was similar in every respect to his own equipment, and in his view it was a first-class installation and with a detail or two cleared up here and there it should be a trouble-free installation. His answer, " None whatsoever," to the question of whether it should give any trouble, speaks for itself.

Mr. Fallins was also of the opinion that the installation must have been effected in good time and this factor must have indicated a good work effort throughout.

We ourselves inspected the installation and are of the opinion that the equipment was installed in a reasonable time and very efficiently. We think that the Mine Management, particularly Mr. Lightfoot and Mr. Stansbury, worked extremely hard and did not spare themselves. Some of the fitters in particular must also have done a splendid job and whilst there may have been one or two exceptions, the employees generally engaged upon the installation, in our view, must have given a satisfactory work effort.

Term II A. (7).

Comparison of Values of Tenders and Actual Cost.

It will be remembered that *Annexure No. 28* indicated that the cost of the equipment which was the subject of recommended tenders was £415,832, but this figure made no provision for—

(a) Surface 200-ton capacity bin ;

(b) New pit top ;

(c) Spare parts for the loaders, cutters and shuttle car.

It was estimated that the cost of the 200-ton bin, which was essential, would be £15,000, on the assumption that it would be designed and constructed chiefly by colliery labour. It was recognised also that further sums would have to be spent upon spare parts, and an amount of £10,000 was provisionally nominated. Furthermore, the amount of £415,832 included import duty to the extent of £45,000. It was pointed out that, as the equipment was not procurable in Australia and the project was of utmost national importance, an attempt should be made to obtain a total exemption of import duty.

The actual amount charged to mechanization was £509,726 and a comparison of this amount with that of the accepted tenders appears as *Annexure No. 31* (Exhibit 191). Annexure No. 31.

It will thus be seen that the original approval of £420,000 was exceeded by £89,726, and this necessitated a subsequent approval of £100,000 which was also given. Actually, therefore, the expenditure charged to Mechanization Account was £10,274 less than the provisions made by Cabinet.

In addition to the amounts included in *Annexure No. 31* and shown there as a comparison between actual amounts expended and the amount of accepted tenders, other amounts were also spent which, though not in the main charged to Mechanization Account, were occasioned by mechanization. These are also shown as part of *Annexure No. 31*. They total in all £63,981 8s. 11d. It will be seen that the break-up of these is :—£6,563 for cables ; £4,224 for two transformers ; £13,972 for four diesel generating sets ; and the balance, £39,222, for spare parts. (Incidentally this far exceeded the original estimate of £10,000.) Of this total of £63,981, it is understood that the amounts for cables and transformers actually found their way into the Mechanization Account and therefore formed part of the £509,726, whilst the generating sets were charged to a Plant Account in the mine ledger, and the balance, representing the spares, was charged to Stores, which would be treated as an asset account and would be reduced in accordance with spares taken for repairs.

If the cost of cables and transformers was excluded from the £63,981 because of their inclusion in the £509,726, mechanization total, and the rest were taken as having been occasioned by mechanization, it would mean that the total amount involved in mechanization would have been £562,921. This figure is, however, only given as an indication, because only £509,726 appears as the cost of mechanization.

It will be seen from this figure of £562,921, however, that the total approval of £520,000 would have been exceeded. The annexure shows the other six approvals which were obtained to cover the total expenditure of £63,981. As the expenditure on two of these, however, (cables and transformers appeared in the £509,726 cost of mechanization, the total approvals for mechanization really amounted to £532,260.

If, on the other hand, approvals for spares and generating sets were also included so as to check the approvals against the figure of £562,921 previously referred to, the total approvals would have been £591,569.

It will be seen, therefore, that all the expenditure was properly authorized and the total expenditure involved did not use up all the approvals given.

The amount of £509,726 6s. 9d. charged to Mechanization Account was split amongst the various Loan and Trust Accounts as follows :—

	£	*s.*	*d.*
Loan—Mechanical Equipment	372,276	4	6
Loan—Special	13,703	9	2
Trust—P.W.R. and Development Fund	95,829	8	9
Trust—State Coal Mine	27,917	4	4
	£509,726	6	9

Term II A. (8).

Comments and Conclusions.

We are now in a position to outline some conclusions and make some relevant comments.

1. A great deal of the early historical and geological information on the Bowen River Coalfield is available from a publication in a 1929 Department of Mines Manual entitled " The Geology of the Bowen River Coalfield," written by Mr. J. H. Reid, A.S.T.C., Government Geologist.

2. The Collinsville coal measures have been mapped at intervals over a distance of about 48 miles and they comprise six seams which have an average thickness of 48 ft. 9 in.

3. The coal is of good appearance and general utility, though with a relatively high ash content. It may be classified as first-class steaming coal, first-class coking coal, and second-class gas coal.

4. The State Coal Mine commenced operations in 1918 and, in August 1922, the Bowen-Collinsville Railway was opened for traffic. Coal production commenced immediately thereafter and by 1923 output was about 400 tons per day.

5. The earliest thinking on mechanization was done in the early 1940's by Mr. Thomas Platt, at that time Supervisor of State Coal Mines. The first official reference was in the Davidson Report, which made recommendations regarding conveyors.

6. Mr. A. Winstanley commenced duty as Mine Manager on 26th January, 1946, and prepared three reports, one in 1947 and two in 1950.

7. Other reports were prepared by Powell Duffryn Technical Services, Mr. D. G. Hemmant of that company, and Messrs. Crowley and Woolley.

8. Particularly in 1950, numerous conferences were held regarding mechanization, at some of which the Minister for Mines presided.

9. Thinking on mechanization was ultimately reduced to two alternative schemes—one by the Mines Department and Mine Management and the other by Powell Duffryn Technical Services Limited and Mr. A. Crowley of the Queensland Coal Board.

10. Both of these alternative schemes were submitted to the Minister for Mines in September, 1950, and recommendations were made to the Minister that the scheme of mechanization prepared by the Mines Department and the Coal Board should be accepted.

11. Cabinet approved of this Department of Mines' scheme on 12th March, 1951, and this envisaged mechanization of No. 2 Tunnel. The total cost was estimated at £471,750 and likely to reach £500,000.

12. Limited underground development was proceeded with but finalisation of other factors was delayed pending the appointment of a General Manager.

13. Mr. A. Lightfoot commenced duties as General Manager on 1st October, 1951. Subsequent to his appointment on 19th July, 1951, he had examined all papers and data in connection with mechanization. Upon taking up duties, he immediately visited the mine and took all steps to finalise all aspects regarding equipment and operations, and this was in respect of the No. 1 Tunnel.

14. After tenders were investigated, Cabinet gave approval for the expenditure of £420,000, with a subsequent approval of £100,000 making £520,000 in all, for a mechanization scheme, largely along the lines prepared by the Department of Mines and Mr. Winstanley but altered in relation to two or three important matters prompted by the change from No. 2 Tunnel to No. 1.

15. The Minister for Mines announced the proposal to mechanize the mine in the Press on 20th December, 1951.

16. Contract mining in No. 1 Tunnel ceased at the end of 1952 and the installation of the mechanization equipment commenced in January, 1953. It was completed in time to allow mechanized mining to commence on 7th November, 1953.

OUR COMMENTS IN RELATION TO THESE MATTERS.

1. The final plan for mechanization was thus the result of some five years' close thinking on the subject.

2. The actions of the Minister for Mines throughout were wise and correct. He allowed the various authorities to examine the various schemes and when there was a deadlock he presided at conferences to try to settle the issue.

3. The recommendations brought to Cabinet by the Minister were the result of lengthy and careful thought and discussions.

4. We are of opinion that the Minister was wise in arranging for the appointment of a General Manager who would have a greater knowledge of the day-to-day working of a mechanized mine and of the type of equipment likely to be used than was already available.

5. The procedure for the calling of tenders was entirely correct and all care appears to have been taken.

6. As far as all aspects covered by this Section II A. are concerned, therefore, we have no criticism to offer against the Government, the Minister for Mines, the Department of Mines, or any officers who played any part in the procedures and decisions to mechanize the mine.

7. The question of whether the reasons advanced for mechanization were sound and sufficient reasons is considered in Section II B.

CONCLUSIONS.

Our conclusions in connection with the general aspects of mechanization are :-

1. The final plan for mechanization was the result of some five years' close thinking on the subject.

2. The actions of the Ministers for Mines throughout were wise and correct. Each allowed the various authorities to examine the different schemes and, when there was a deadlock, the current Minister for Mines presided at conferences to try to settle the issue.

3. The recommendations brought to Cabinet by the Minister for Mines were the result of lengthy and careful thought and discussions.

4. We are of the opinion that the Minister for Mines was wise in arranging for the appointment of a General Manager who would have a greater knowledge of the day-to-day working of a mechanized mine and of the type of equipment likely to be used than was already available.

5. The procedure for the calling of tenders was entirely correct and all care appears to have been taken.

6. As far as all aspects covered by Section II A. are concerned, therefore, there are no grounds for criticism against the Government, any Minister for Mines, the Department of Mines, or any officers who played any part in the procedures and decisions to mechanize the mine.

TERM II B.

THE CIRCUMSTANCES OF AND RELATING TO THAT MECHANIZATION.

(1) Reasons given for mechanization.
- (a) By the Minister for Mines.
- (b) By the Under Secretary, Department of Mines, and the General Manager.

(2) The Financial Results of the mine.
- (a) From 1st July, 1940, to 30th June, 1943—A Period of Profit Making.
- (b) From 1st July, 1943, to 30th June, 1952—A Period of Consistent Losses.
- (c) The Profitable Year ended 30th June, 1953.

(3) The Effect on Government Finance.

(4) Analysis of the Factors Affecting the Financial Results.
- (a) Production Factors.
- (b) Expense Factors.
- (c) Price Factors.

(5) The Standard of Efficiency of the mine.
- (a) Output per Manshift.
- (b) Total Manshifts Lost.
  - (i.) Absenteeism.
  - (ii.) Sickness and Compensation.
  - Industrial Disputes.
  - (iv.) Other Causes.
- (c) Labour Turnover.

(6) The Economic Position.

(7) Conclusions and Comments.

Term II B (1).

Reasons given for Mechanization.

(a) BY THE MINISTER FOR MINES.

The Press statement issued by the Hon. W. Power, M.L.A., Minister for Mines, on 19th July, 1951, in reference to the appointment of a General Manager of the State Coal Mines (Annexure No. 19—Term II A) indicated that the Government was anxious to proceed with an approved proposal to mechanize the State Coal Mine in order to ensure that sufficient coal would be produced to meet the increasing demands of North Queensland and to enable that part of the State to develop its natural resources still further. The Minister made it clear that, because of the isolation of the coal mine and the resulting labour shortages, adequate coal could be obtained only by mechanization. He made further reference to the consequent improvement of working conditions for employees that would follow the virtual elimination of all arduous labour.

(b) BY THE UNDER SECRETARY, DEPARTMENT OF MINES, AND THE GENERAL MANAGER.

In the memorandum dated 14th December, 1951, by the Under Secretary and the General Manager, Mr. A. Lightfoot, addressed to the Minister for Mines (Annexure No. 27—Term II A), reference was made to substantial financial losses which had been incurred in operating the mine in recent years. This was traced back to declining production and two of the principal responsible factors were indicated as being—

(a) The attitude of employees in limiting and restricting production with the resultant low tonnage per employee, and

(b) The shortage of experienced labour which was due partly to the attitude of the employees and partly to the isolated location of Collinsville.

The consequence of this declining production was stated in this memorandum to the Minister as having the effect of requiring that large tonnages of coal for North Queensland had to be brought from Blair Athol and Callide. It was noted also that further large tonnages of coal would be required for additional projected industries in Townsville as well as for the coke works at Bowen.

In placing these matters before the Minister, the General Manager summarised the major reasons for mechanization and it is now proposed to examine these in more detail so as to ascertain the validity of these conclusions which, after all, were those advanced to the Minister for Mines as the justification for spending £500,000. These matters are examined under the following headings :-

1. The Financial Results of the Mine.
2. The Effect on Government Finance.
3. The Standard of Efficiency of the Mine.
4. The Past Economic Position.

Term II B (2).

The Financial Results of the Mine.

(a) FROM 1sT JULY, 1940, TO 30TH JUNE, 1943—A PERIOD OF PROFIT MAKING.

The profits earned in these years were respectively £10,666, £12,132, £15,838. Whilst these profits show an increase of 50 per cent. over the three-year period, the sales actually went up in a greater proportion—£167,516, £216,884, £306,847. The relevant tonnages sold were :-

	Tons.
1940-41	197,455
1941-42	231,932
1942-43	304,703

During this period, therefore, the profits were maintained and somewhat increased by this large percentage increase in the output of coal. The increased output was largely but not solely due to the increased number of miners available as there was, increasingly, more Saturday work operated. Taking an approximate average of these three periods, there were 144 contract miners during the year ended 30th June, 1941, 153 during the 1942 year and 197 for the year ended 30th June, 1943. The output per contract miner per shift over these three periods was, as an approximate average—

	Tons.
1940-41 ..	6.74
1941-42 ..	.. 6.78
1942-43 ..	.. 6.75

The cost in mining extra coal could be more than proportionate, and this no doubt played some part in the fact that an increase of £140,000 in turnover (approximately 83 per cent.) produced only £5,172 more in net profit (approximately 48 per cent.). Rigid wartime price controls, however, would have prevented increased prices even to cover increased costs, and increased profits would therefore be largely caused only by increased production and sales. The value of this period is largely to be found in the fact that it was a three years' profit-making period which preceded nine years of continuous losses.

STATE COAL MINE, COLLINSVILLE.

PROFIT AND Loss ACCOUNTS.

	1940-41.	1941-42.	1942-43.		1940-41.	1941-42.	1942-43.
	£	£	£		£	£	£
To Mine Working..	129,794	163,075	235,738	By Sales ..	167,516	216,884	305,847
„ Repairs and „ Renewals	5,200	6,569	7,718	„ Sundry	30	50	..
Royalty ..	9,873	11,596	15,235	„ Net Loss ..	..	..	..
„ Interest ..	2,471	2,151	1,997				
„ Depreciation ..	3,914	4,349	5,713				
„ General Expenses	5,628	17,062	24,608				
„ Net Profit ..	10,666	12,132	15,838				
	£167,546	£216,934	£306,847		£167,546	£216,934	£306,847

(*b*) FROM 1sT JULY, 1943, TO 30TH JUNE, 1952-A PERIOD OF CONSISTENT LOSSES.

In 1943-44 results slumped very considerably. From a profit of £15,838 in 1942-43 a net loss of £33,609 was incurred in 1943-44-a difference of virtually £50,000 in the two years. It is not easy at this distance to be completely certain of the factors which contributed to this serious difference. The figures do, however, give a strong lead. The essential fact was that the sales dropped by £47,000 whilst the expenses increased by about £3,000. It should be noted that, again with rigid price fixing operating during this period, the selling prices probably could (and in any case, would) not alter and therefore the difference in turnover would have been governed by output. Probably the most significant factor was that the number of contract miners fell very considerably during the period-from 197 in 1942-43 to 168 in 1943-44 as some of the wartime transferred contract miners commenced to return to their home towns. Furthermore, this was a period of industrial unrest and the output per contract miner dropped from the previous average of 6.75 tons per shift to 5.87, 3.04, 4.45, and 6.62 for the respective four quarters of the year-an average, say, of 4.99 tons.

It is highly probable, therefore, that the four major factors which contributed most to this adverse difference of £50,000 and the resultant loss of £33,609 were :-

(a) A considerable proportionate reduction in the number of contract miners during 1943-44.

(b) A substantial reduction on the production per contract miner per shift.

(c) The much slower reduction in expenses to follow the falling turnover pattern. (This is a very common accompaniment of falling turnover.)

(d) The probable increases of some expenses not reflected in increasing prices, which later were still stabilised under price controls.

The year 1944-45 showed that this trend, rather than being reversed, somewhat strengthened, as a loss of £39,924 was sustained. At £244,729 the turnover was £15,000 less than for the preceding period. There were conflicting factors in operation here. The average number of miners fell from 168 to 157-a fall which would, in any case, have caused a corresponding reduction in turnover. The output per contract miner per shift, however, rose substantially, the advent of horse wheeling in this period giving higher outputs than had previously been achieved, viz., from 4.99 tons to 6.86 tons, which, however, represented only a fractional increase over the 1940 to 1943 period. The expenses dropped merely £9,000 and, as the reduction in wages, due to fewer men, would have accounted for more than this, it is obvious that wage rates and other expenses grew despite the fall in turnover.

The year 1945-46 showed a substantial improvement in financial results, the previous year's loss being halved from £39,924 to £20,418. The turnover dropped from £244,729 to £175,063 which was a substantial fall, considering that the average number of men operating on contract mining dropped from 157 to 131, say, 17 per cent. The output per contract miner per shift was reasonably steady (6.86 down to 6.81 tons) but it is apparent from an analysis of the accounts that a firm hand was beginning to be taken in pruning expenses, because as against the fall in turnover of 28 per cent., the expenses dropped 33 per cent.-quite a good result, showing that an attempt was being made to catch up the delay in previous pruning, though wages for 131 men instead of 157 would obviously have had a major effect. It was the fall in expenses which largely accounted for the comparatively better result.

PROFIT AND LOSS ACCOUNTS.

[illegible]	[illegible]	[illegible]	248,828
[illegible]	[illegible]	[illegible]	41
[illegible]	[illegible]	[illegible]	284,670
[illegible]	[illegible]	[illegible]	41

The year 1946-47 introduced two largely new elements into the examination. The first was the increasingly rising cost level which became apparent in the early post-war period and which ha continued since. The second was the all-important price of coal obtained by the mine. Because of the inter-dependence of these two factors, no consideration of the financial results of the mine, particularly from this period onwards, can be satisfactorily made without taking these factors very fully into consideration. The year ended 30th June, 1947, showed a very acceptable reduction in the net loss—from £20,418 in the previous year to £4,574. For the first time since 1st July, 1943, the loss was brought into manageable proportions and the trend was sufficiently good to indicate that profitable trading times might have returned. Turnover went from £175,063 to £205,369. The number of contract miners remained virtually the same (131 in the former, 132 in the latter period). The output per contract miner per shift remained stationary (6.81 and 6.82 tons). For the first time for many years, however, price increases for coal sold were obtained by the mine, these being granted by the Commonwealth Coal Commissioner, and were designed to cover increased costs. During the year under review, however, these increases would probably have covered rises in costs which had occurred mainly in the previous year-1945-46. The expenses during 1946-47 seem to have been well controlled.

The year 1947-48 was a little disappointing, inasmuch as the favourable trend was somewhat reversed, and the net loss increased to £7,262 despite an increase in turnover from £205,369 to £229,241. The relevant tonnages were 172,061 and 183,864 tons. There was again only a small fall in the number of contract miners (132 to 130) and this was also true of the output per contract miner per shift (6.82 to 6.79 tons). Costs, however, continued to increase though a number of coal price increases given during this period helped to offset these.

The year 1948-49 showed a small fall in the loss from £7,262 to £5,157, this being somewhat disappointing in view of an increase in tonnage from 172,061 tons to 186,605 tons and an increase in turnover from £229,241 to £276,840. The number of contract miners fell from 130 to 125. The output per contract miner per shift worked showed an important improvement and this was the beginning of an upward movement which was largely in evidence until mechanization. There was, however, considerable loss of time through strikes in this period and this, of course, lowered the total figures. Costs in Australia generally were commencing to increase more rapidly and Collinsville was no exception.

The year 1949-50 produced a very serious set-back, as the loss in this year (06,224) was, with one exception, the highest since 1940. The most significant factor was a drop in the value of sales to an extent of nearly 23 per cent. (from £276,840 to £209,588) with a drop in working expenses of no more than 122 per cent. (from £284,874 to £248,828). The drop in sales was undoubtedly largely caused by a most significant fall in the number of contract miners, from, say, 125 to 91. The tonnage produced showed a drop as against the previous year from 186,605 tons to 126,862 tons. This fall was somewhat offset by higher output per contract miner per shift from 7.1 to 7.8 tons. Some price increases were given in this period, but it is significant that the prices given to the State Mine lagged to an important extent as against those of Bowen Consolidated. More will be said of this comparative price factor later.

The year 1950-51 showed a substantial reduction in the loss for the previous period—from £36,224 to £25,908—but the result was still very far from either being satisfactory or indicating promise of an approaching profitable result. The rise in turnover helped by rising coal prices was from £209,588 to £233,916. The importance of such price rises can be understood when it is realised that there was a further very substantial fall in the number of contract miners from 91 to 70 and coal produced from 126,862 tons to 116,385. Considering the great reduction in coal production in the previous year, this further reduction, small though it was, was particularly discouraging. Even the output per contract miner per shift fell from 7.8 to 7.55—not surprising in view of the staff turnover. The major price increase was authorised on 8th January, 1951, so that the period under review obtained the benefit for half the year. It is quite apparent, however, that there was still an important lag, both in the granting of price rises and in comparable prices with Bowen Consolidated.

The year 1951-52 showed a very substantial and acceptable reduction in the loss, and it was again, like 1948-49, reduced to manageable proportions (from £25,908 to £4,635). The output for this year increased by approximately 7,000 tons (from 116,385 tons to 123,127), but the sales value of output increased from £233,916 to £318,482 obviously showing the reflection of higher prices. The increase in output for this period was attained by a few more miners than in the previous period (70 to 75), but reflected more working days and higher output per contract miner per shift (7.55 increased to 7-88). The expenses for the period increased by 25 per cent. but the price increases given during this period were substantial and prices were now completely in line with those granted to Bowen Consolidated. This brings us to the end of the second period.

(c) THE PROFITABLE YEAR ENDED 30TH JUNE, 1953.

The year ended 30th June, 1953, showed an improvement in output as compared with the previous period—from 123,128 tons to 152,017 tons—approximately 23 per cent. As compared with 1951-52, the expenses for the 1952-53 year increased by 33 per cent., from £329,691 to £436,548—a matter of £107,000. This means, therefore, that there was an increase in output of 29,000 tons and an increase in expenses of £107,000. For the first time since 1942-43—ten years—the mine showed a profit--£10,017 as against the loss for 1951-52 of £4,635. The turnover went up £118,000—a rise of approximately 27 per cent.—from £318,482 to £436,058, due to better production and better prices obtained for the year ended 30th June, 1953, as against 1952.

The following table sets out this position and analyses why the 1951-52 loss of £4,635 was turned into a profit of £10,017.

	1953.
	£
Increase in tonnage, 29,000 @ £2 Ils. 9d, say ..	75,000
Increase in price, 152,000 @ 5s. 8d. (£2 17s. 5d., 1953, against £2 Ils. 9d., 1952)	43,000
	118,000
Less increased expenses ..	107,000
Difference in coal receipts	11,000
Plus Difference in sundry receipts (1953 £10,500, 1952, £6,600) ..	3,900
Difference in results	£14,900

1953 Profit £10,017 plus 1952 Loss, £4,635.

In view of all these factors, it is not possible to arrive at any other conclusion than that the profit of £10,017 as against the loss in the previous period of £4,635 was due to higher output and substantial price increases offset by higher costs through substantial increases in expenses. It should also be remembered that this period had to stand some dislocation due to mechanization, which was to commence some five months after the end of the financial year. Part of the increased production was facilitated by an increase in contract miners from 75 to 82 (9 per cent.) but this did not account in full for the increase in production of 29,000 tons (22 per cent.)

STATE COAL MINE, COLLINSVILLE.

PROFIT AND LOSS ACCOUNTS-1952-53.

	£		£
To Mine Working	326,343	By Sales ..	436,058
„ Repairs and Renewals ..	41,499	„ Sundry Receipts	10,507
„ Royalty	3,800	„ Net Loss ..	
„ Interest	14,829		
„ Depreciation	15,105		
„ General Expenses ..	34,972		
„ Loss on Overseas Shipment			
„ Net Profit	10,017		
	£446,565		£446,565

It will thus be seen that the financial results as depicted by the Profit and Loss Accounts to 30th June, 1952, fully justified the conclusion that the mine should be mechanized. The profit obtained in 1953 came after the decision was made to mechanize, but, even if the profit had been made earlier, the decision would still have been justified on the results over the years. Detailed Profit and Loss Accounts and Balance Sheets covering the years from let July, 1948, to 30th June, 1955, are to be found as *Annexure No.* 32. A graph of the profits and losses during this period is shown herein. 41

.Annexure No. 32.

Term **II B (3).**

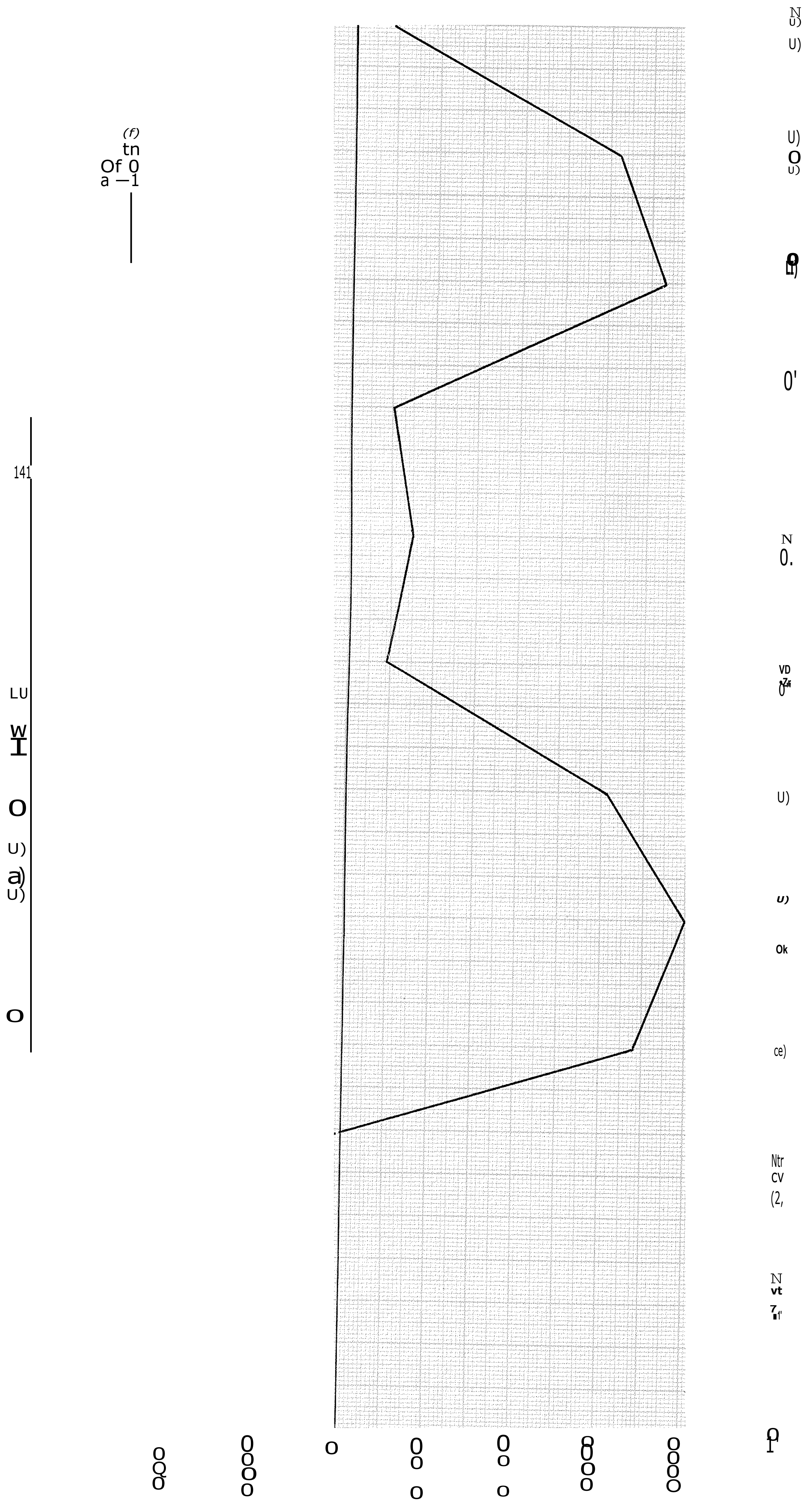
The Effect on Government Finance.

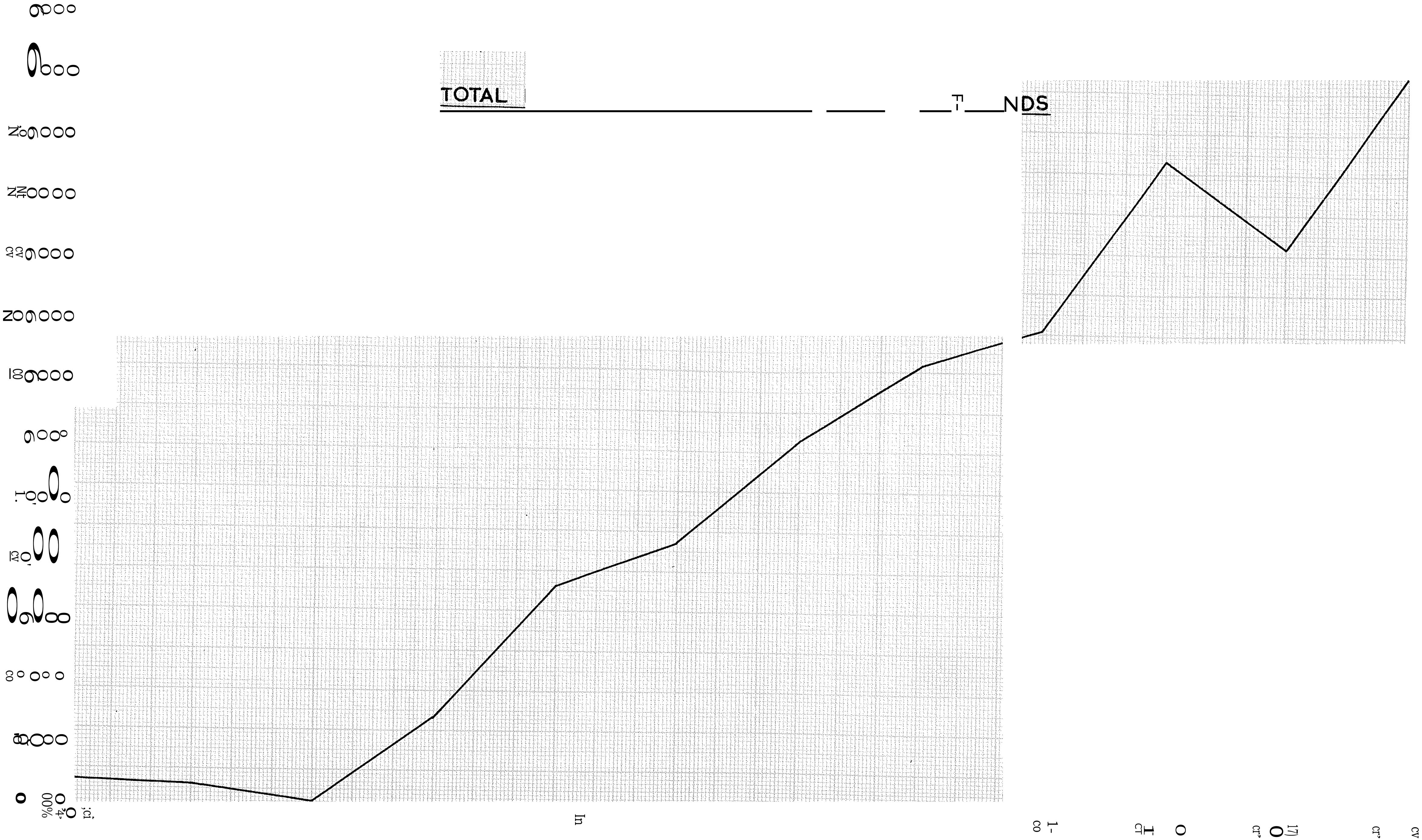
Expenditure such as was necessary to commence and keep the mine established has been met from Treasury Loans, a Treasury Trust, and a further Treasury Trust (Post War Reconstruction).

The movements in the various Treasury and Trust Funds from 1941 until the advent of mechanization in 1952 were as follows :-

— —	Treasury.	Trust Accounts.	Advances Postwar Reconstruction and Development Fund.	Total.	Consolidated Revenue Payments.
	£	£	£	£	£
1941 ..	43,294	6,459	..	49,753	1,223 Drilling for seams
1942 ..	44,124	4,211	..	48,335	2,787
1943 ..	44,542	*Cr.* 1,940	..	42,602	13,500 Huts for miners
1944	46,542	24,669	..	71,211	
1945 ..	53,542	60,555	..	114,097	273 Huts for miners
1946 ..	79,717	49,458	..	129,176	
1947 ..	110,987	52,471	..	163,458	
1948 ..	129,323	59,008	..	188,331	..
1949 ..	140,522	63,345	..	203,867	
1950 ..	166,765	90,239	..	257,004	
1951 ..	198,540	28,906	..	227,446	70,000 Grant
1952 ..	238,538	47,594		286,132	25,000
1953 ..	613,921	14,335	95,830	724,086	..

Graphed these figures appear as-




TOTAL
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Thus, it will be seen that, at 30th June, 1948, these advances totalled in all £188,381. They grew steadily and at the end of 1952, because of the recurring losses (to which reference has already been made), they would have reached a total of £381,132 were it not for two grants from Consolidated Revenue-one of £70,000 in 1951 and a second of £25,000 in 1952.

At the time of mechanization and under the production and pricing conditions operating at the time, no relief from this position was in sight, and it was probable that additional demands on Consolidated Revenue were looming.

The year 1953, it will be remembered, was a profitable year and therefore the large increase in the indebtedness was solely due to the provision of funds for mechanization. A sum of £440,000 had been allocated and in the year 1953 the indebtedness increased by just this amount.

Term II B (4).

Analysis of the Factors Affecting the Financial Results.

The three major factors involved in any consideration of the financial results of the mine, at least over later years, can be considered in relation to-

(a) Production Factors.

(b) Expense Factors.

(c) Price Factors.

It is now proposed to examine each of these.

(a) PRODUCTION FACTORS.

The total tons and sales value of coal produced since 1941 are shown hereunder :-

Year.	Tons Coal Produced.	Sales Value.
	Tons.	
1941	197,455	167,516
1942	231,932	216,884
1943	304,703	306,847
1944	251,803	259,890
1945	241,219	244,729
1946	172,597	175,063
1947	183,864	205,369
1948	172,061	229,241
1949	186,605	276,840
1950	126,862	209,588
1951	116,385	233,916
1952	123,128	318,482
1953	152,016	436,058

These figures are graphically shown herein-

It is quite obvious that, with the exception of 1953, there has been a progressive deterioration M the tonnage of coal produced. In seeking reasons for the progressive deterioration, probably the most important cause was the steady decrease in the number of contract miners. Production obviously comes in the first instance from them. The single factor which can offset any reduction in their numbers is a substantial increase in their production. With the operation (limited or otherwise) of some darg factors, the only real way in which production per man could have been increased would have been by improved methods. Some increase in the tons per man shift was in evidence with the introduction of horse-wheeling and power borers. Each was important in itself but, of course, not nearly sufficient to offset the serious and constant fall in contract miners.

The correlation between the number of contract miners and the tons of coal produced is best seen from the following table :-

Year.	Number of Contract Miners. (a).	Tonnage Produced.	Tons per Contract Miner.
1941	144	197,455	1,516
1942	153	231,932	1,371
1943	197	304,702	1,546
1944	168	251,803	1,500
1945	157	241,219	1,537
1946	131	172,597	1,317
1947	132	183,864	1,393
1948	130	172,061	1,300
1949	125	186,605	1,493
1950	91	126,862	1,391
1951	70	116,385	1,662
1952	75	123,128	1,642
1953	82	152,016	1,853

(a) These are approximate figures and averages but are sufficiently accurate for the judgments required.

To some extent, it is necessary to add to these figures a consideration of Saturday work and idle time.

	Days Worked. Week Days.	Days Worked. Saturdays.	Days Idle. Week Days.
1948 .	200	37	41
1949 .	195	5	44
1950	2311		12-i
1951 .	219		24
1952 .	230		12
1953 .	233		13

It is not, however, difficult to detect the periods of introduction of horse wheeling and power borers but, in addition, the figures highlight the importance of the introduction of such aids to productivity. The first power borer was installed on the 10th January, 1951, and all power borers were operating by 24th March, 1952. The results speak for themselves. This promotes the thought that if, for example, power borers had been obtained and placed in operation in 1948 and the results obtained in, say, 1951 and 1952 had been secured in the earlier years, the increases in production on even a 1,600 tons per contract miner basis would have been-

1948	208,000	an increase of	36,000 tons.
1949	200,000	an increase of	13,400 tons.
1950	145,600	an increase of	19,000 tons.

Providing prices had been the same as were received, these extra tonnages would have yielded increased revenue to the approximate extent of-

	£
1948	49,500
1949	20,100
1950	36,700.

This additional revenue would almost certainly have secured large profits in 1948 and 1949 and a very substantial reduction in the loss in 1950. Indeed these results would have been further improved if the resultant tonnage had been increased beyond the 1,600 tons figure, as in fact they were in 1951 and 1952 and considerably so in 1953. There is little doubt that if the tonnage obtained by the use of power borers could have been obtained from the year 1948, the combined profit and loss results for the period from 1948 to the beginning of mechanization would have shown a very handsome and acceptable overall profit and the investment when examined from all angles would have presented a much more favourable picture to the Government. The one important qualification must be added that any judgment of this kind would be dependent upon the mine receiving the same prices as it did in fact receive. If price increases had been refused because results were favourable, obviously the results we have projected would have been affected.

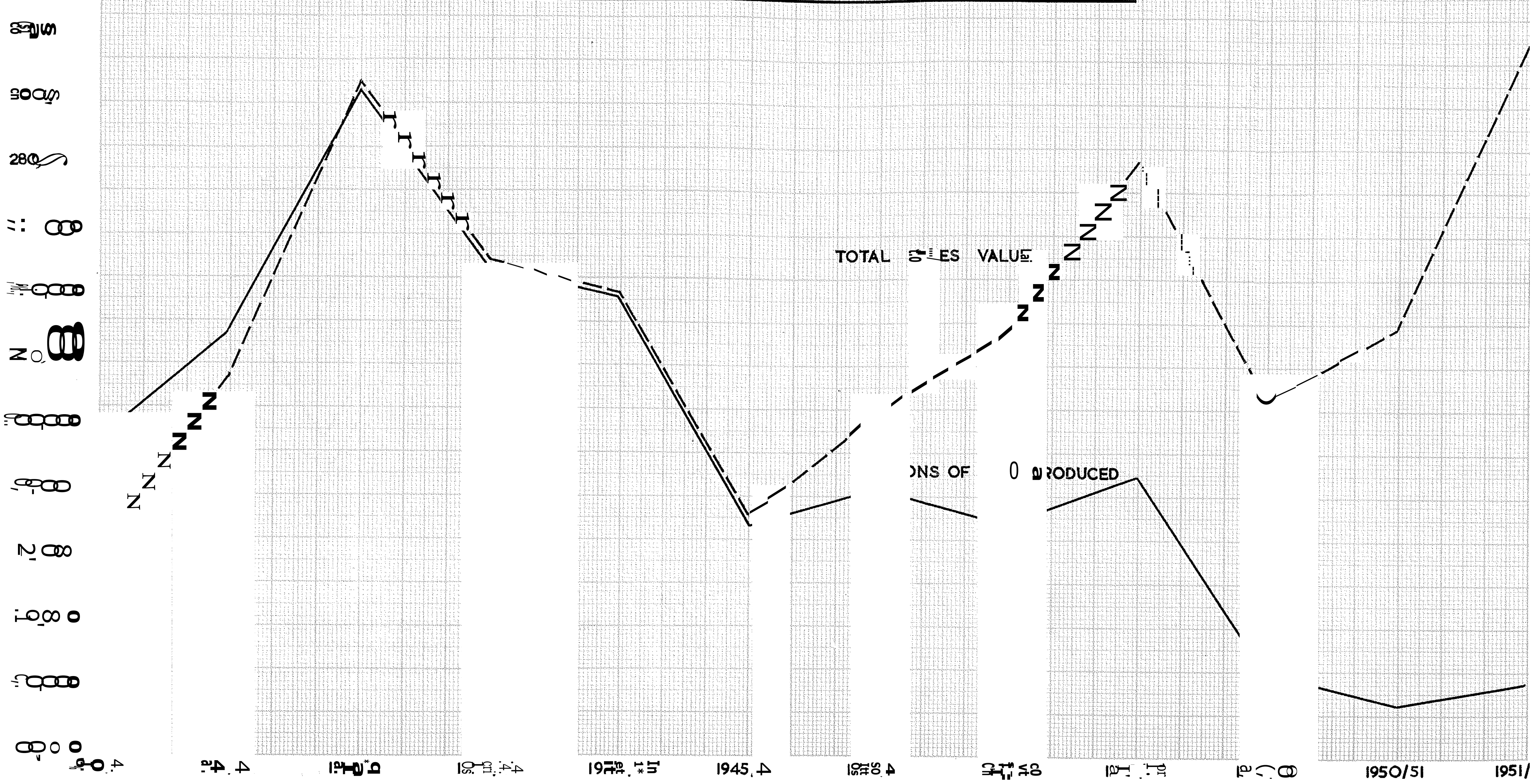
It was little wonder that the Crowley-Woolley report strongly recommended the adoption of power borers. If these assumptions are justified (and it is believed their validity can be sustained) some emphasis is thrown upon the reasons why the power borers were not provided much earlier. Bowen Consolidated had had them some years earlier.

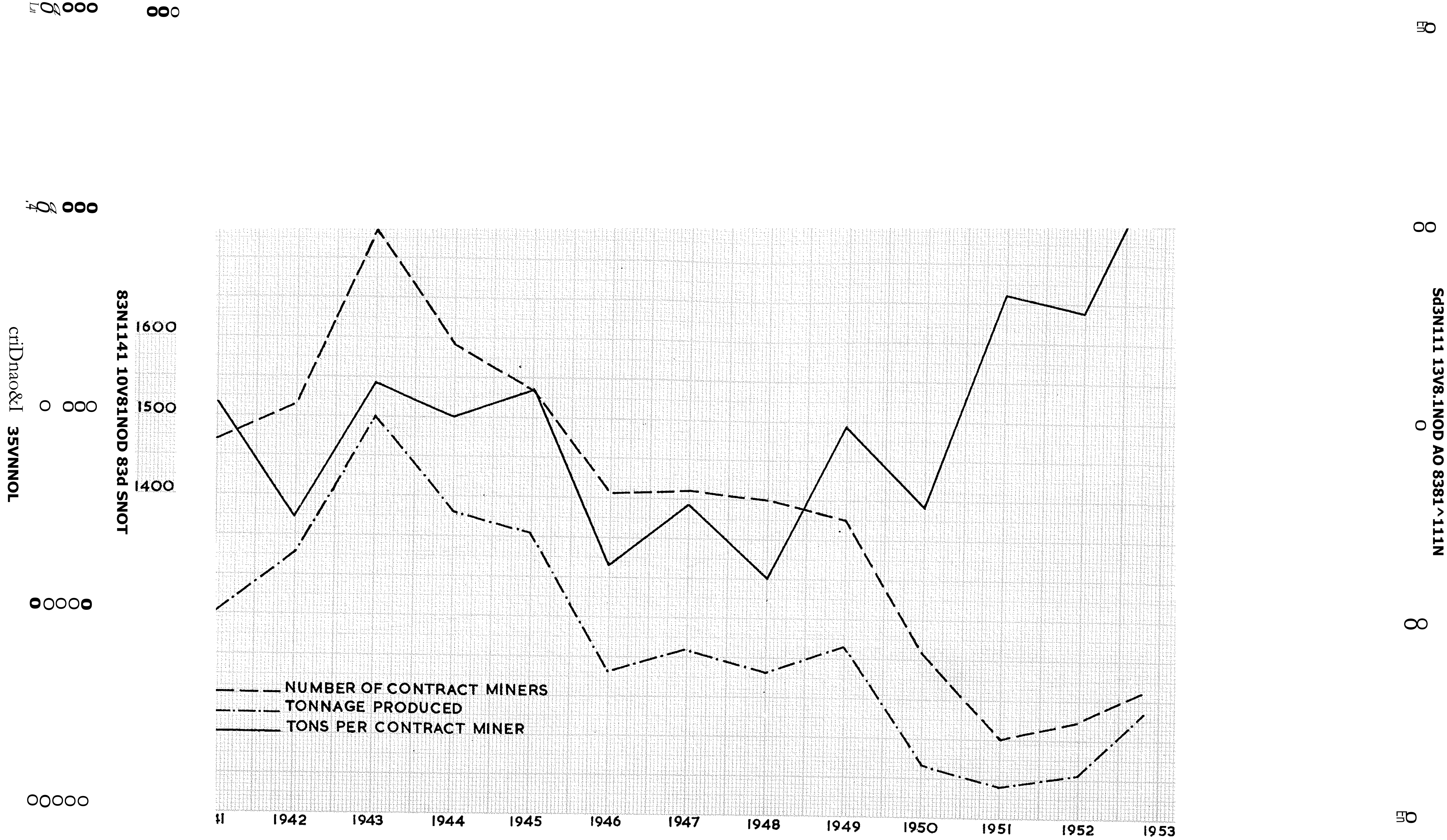
The evidence strongly suggests that the miners through their Federation pressed for some considerable time for power borers and, whilst there was some difficulty in their procurement, this method of turning losses into profits was much more in the hands of the Management and perhaps the Department of Mines than it was in the hands of the men. Without discounting, therefore, the barriers to production for which the men were responsible (and which are dealt with in Term II C.), it is important to note that here is a definite case where all probabilities seem to suggest that it was lack of action for which the men could not be held responsible which played a major part in the continuance of losses over a period when perhaps profits may well have been realised. Nevertheless, the reduction of contract miners was probably the biggest single cause of losses. An indication of the amount of coal lost by decreasing numbers of contract miners can be gained from the following table which is based on 200, 175, and 150 contract miners at the average annual tonnage per miner actually obtained-

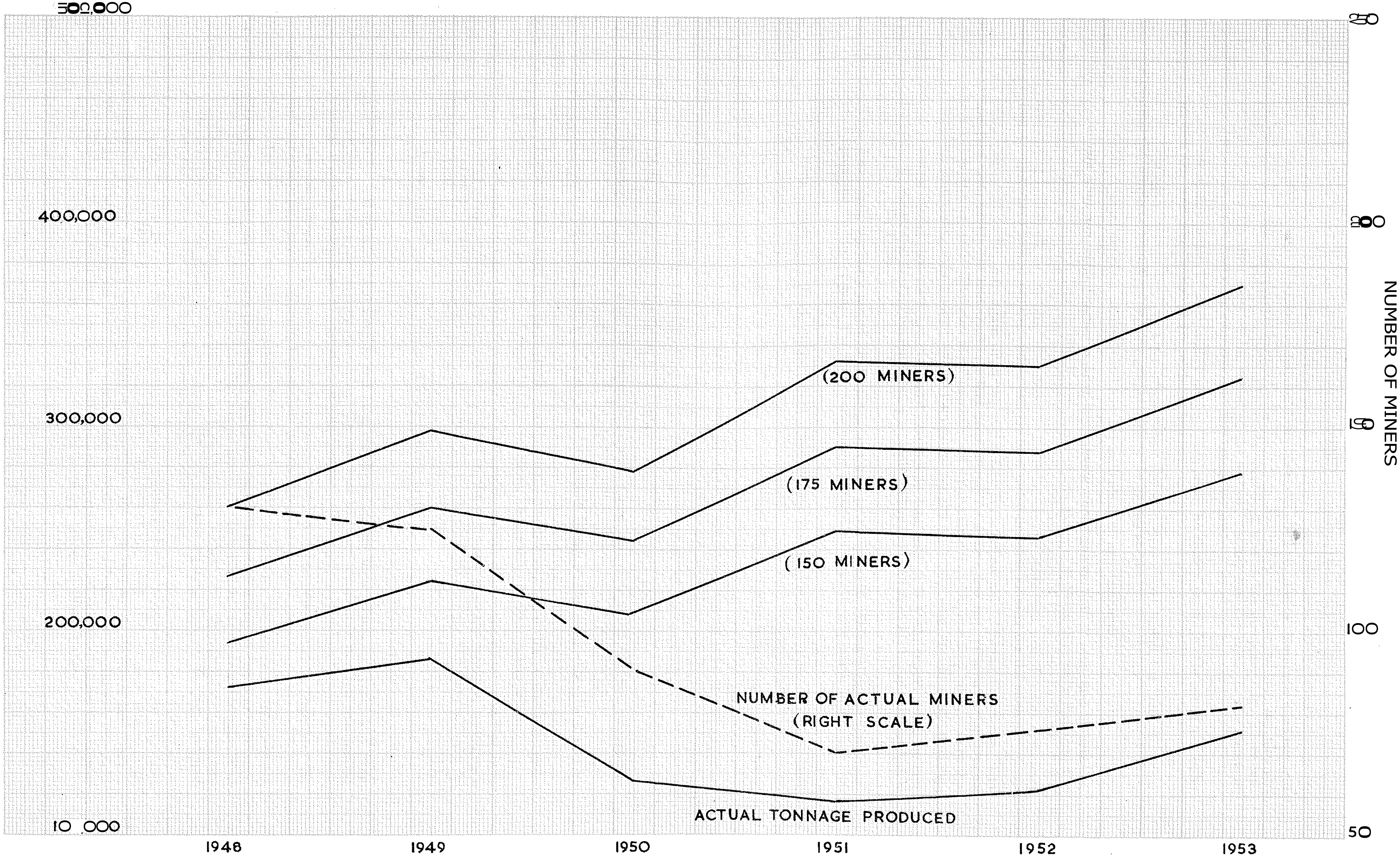
Year.	Number of Contract Miners.	Annual Tonnage per Miner.	Actual Total Tonnage Produced.	Total Tonnage for- 150 Contract Miners.	Total Tonnage for- 175 Contract Miners.	Total Tonnage for- 200 Contract Miners.
	(actual)					
1948	130	1,300	172,061	195,000	227,500	260,000
1949	125	1,493	186,605	223,950	261,275	298,600
1950	91	1,391	126,862	208,650	243,425	278,200
1951	70	1,662	116,385	249,300	290,850	332,400
1952	75	1,642	123,128	246,300	287,350	328,400
1953	82	1,853	152,016	277,950	324,275	370,600

These figures are shown graphically herein-

TONS OF COAL PRODUCED AT TOTAL SALES VALUE




1600
1500
1400
NUMBER OF CONTRACT MINERS
TONNAGE PRODUCED
TONS PER CONTRACT MINER
1942
1943
1944
1945
1946
1947
1948
1949
1950
1951
1952
1953



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The increased wages and other costs involved in the larger complement of men would, of course, have to be taken into account, but it nevertheless seems beyond doubt that any of the tonnages obtained from 150, 175, or 200 contract miners would have produced high profits-again assuming the actual level of prices.

No suggestion was made during the evidence that the Miners' Federation had deliberately pursued a policy of restricting the number of contract miners, but only their production. The only two other factors which could in any way be deemed relevant to this important question of constantly declining production, would be firstly the suggestion that the attitude of the Miners' Federation was such as to discourage people from remaining at the mine and, secondly, that barriers were placed in the way of Management for the transfer of surface men underground and in this way restricting the number of contract miners. (This latter question is referred to later.)

It seems logical to deduce therefore that, assuming the price pattern stayed exactly as it did operate, the results of the mine would have been very much more favourable if-

(a) The serious fall in the number of contract miners could have been either avoided or at least kept within much more reasonable proportions ;

(b) The total annual output per contract miner could have been lifted earlier to the figure it later reached with, for example, power borers.

The conclusion is, we think, inevitable that these two factors were immeasurably more in the hands of Management than in the hands of the Miners' Federation, though we readily acknowledge that action by Management may well have been difficult. The rewards would, however, have been high and a policy of obtaining miners even under attractive conditions and rewards may well have given a completely different financial result.

(b) EXPENSE FACTORS.

If it is assumed that no improvement upon the production factors could or would have been forthcoming, the second line of enquiry into the losses being sustained would relate to expense.

The following table sets out the various expense figures since 1948 :-

Year.	Mine Working.	Repairs and Renewals.	Insurances.	Royalty.	General Expenses.	Interest.	Depreciation.	Total.
	£	£	£	£	£	£	£	£
1948	179,454	20,166	6,419	6,906	10,296	6,914	8,043	238,198
1949	211,135	24,880	9,951	4,665	18,485	7,436	8,322	284,874
1950	174,919	21,738	13,009	3,172	16,739	8,850	10,401	248,828
1951	188,032	26,596	6,520	2,910	17,846	10,397	11,579	263,880
1952	235,457	27,151	9,640	3,078	26,669	9,975	14,721	329,691
1953	326,348	43,240	75 (a)	3,800	33,151	14,829	15,105	436,548

(a) From 1953 onwards Insurance treated differently.

The growth of expenses is readily apparent from this statement but its true significance can only be realised when it is remembered that, during the time when these expenses were mounting rapidly, the production of coal (with one exception-the 1953 year) was steadily declining. This factor is significant even though the greater part of the period under review was characterised by fairly rapid Australia-wide inflationary factors from which the Collinsville Mine could not hope to escape.

It is, of course, difficult to decide categorically whether Repairs and Renewals or General Expenses or any other expense item increased too much, but some further light is thrown upon the subject through a study of these expenses reduced to a cost per ton produced basis. These figures are set out hereunder :-

Year.	Mine Working.	Repairs and Renewals.	Insurances.	Royalty.	General Expenses.	Interest.	Deprecia- tion.	Total.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
1948	20 10.32	2 4.13	0 8.95	0 9.63	1 2.36	0 9.64	0 11.22	27 8.25
1949 ..	22 7.55	2 8.00	1 0.8	0 6.00	1 11.77	0 9.57	0 10.70	30 6.39
1950	27 6.92	3 5.12	2 0.61	0 6.00	2 7.67	1 4.74	1 7.58	39 2.64
1951	32 3.74	4 6.85	1 1.44	0 6.00	3 0.8	1 9.44	1 11.88	45 4.15
1952	38 2.95	4 4.92	1 6.8	0 6.00	4 9.83	1 7.44	2 4.69	53 6.63
1953	42 10.59	5 8.27	0 0.12	0 6.00	4 4.34	1 11.41	1 11.85	57 4.58

One of the adverse features of such a table is that variations in tonnage produced have an inordinate effect upon the cost per ton. Nevertheless, the items which have grown much more than proportionately are easily located.

It is very difficult to make definite judgments in relation to the possibilities which have existed for expense reduction. It is, however, unlikely that they could have been reduced nearly sufficiently to have ensured a profit under the existing conditions, including production and prices (except by the transfer of surface labour which is considered later in relation to the efficiency of the mine). Whilst it would still be a good exercise for Management to prune all expenses most carefully, distinction must be made so that expenses cut are not those which would have the effect of increasing problems and reducing production. The probability is that it would be a wise investment to allow expenses to increase providing this increased expense would ensure greater and better production and a higher general standard of efficiency.

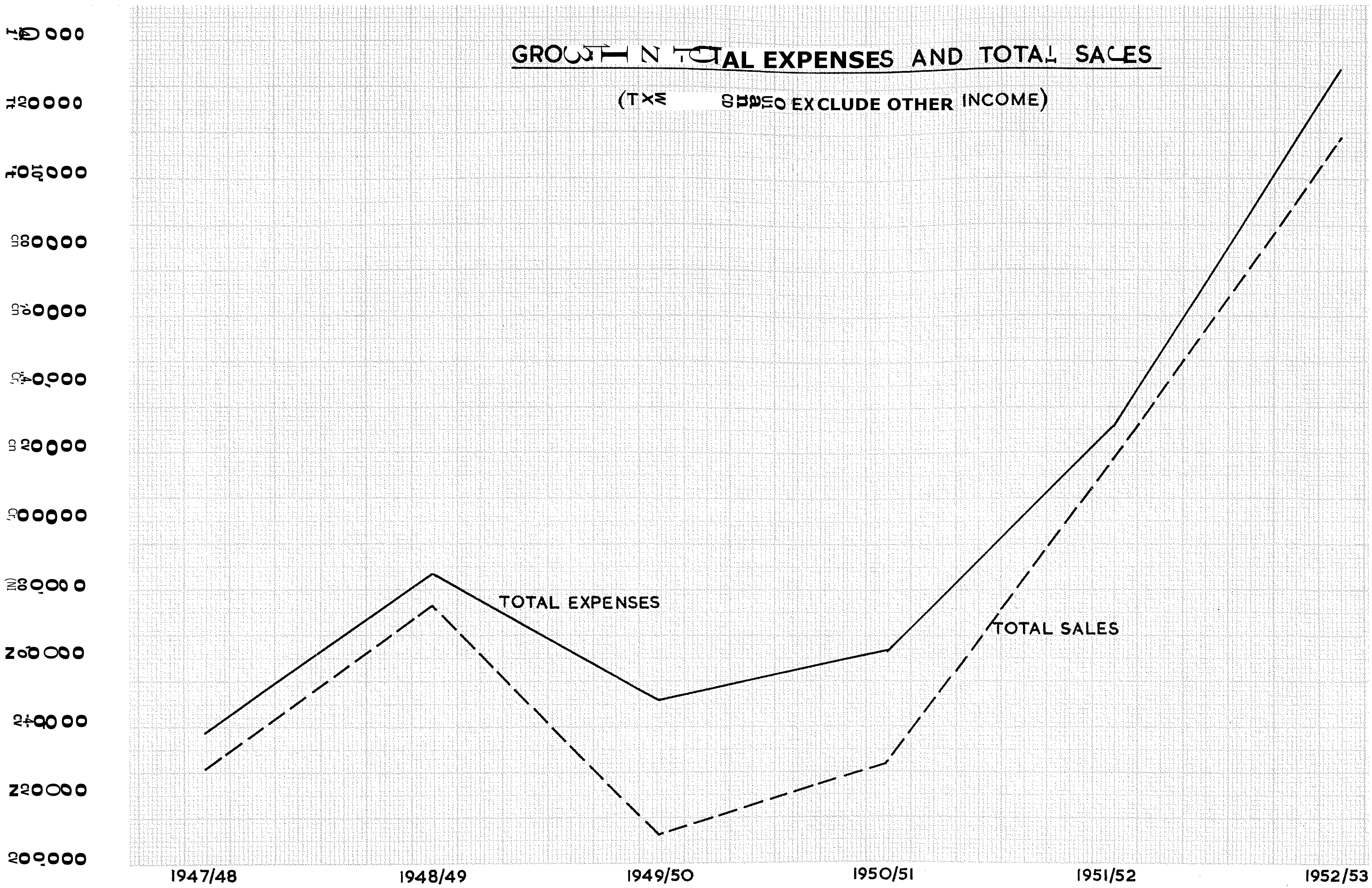
(c) PRICE FACTORS.

The success of any mine is equally dependent upon the price it receives for its product as it is on production and the cost to produce.

Prices received by the Collinsville State Coal Mine have always been controlled and an understanding of the method of that control is inseparable from any examination of the financial results and position.

The Secretary of the Queensland Coal Board (Mr. E. McCarthy) in a statement on 7th July, 1955, supplied to the Commission information regarding the fixation of coal prices, and this is quoted hereunder in some detail because of the importance of the subject-

> " The authority of the Queensland Coal Board to determine the selling prices of coal was transferred to the Board on 20th October, 1949. Immediately prior to that date this function was exercised by the State Price Fixing Commissioner, and before him for some years by the Commonwealth Coal Commissioner. There is no specific power in the Coal Industry (Control) Acts empowering the Board to fix selling prices for coal produced from State-owned mines, but the Board is informed that for some time past the Department of Mines has applied to State mines the price fluctuations determined for privately-owned mines in the respective districts.
>
> The price fixation policy adopted by the Board is broadly as follows :-
>
> (1) The fixation of district pithead prices for all coal produced in specified areas where two or more collieries operate ; and the fixation of specific prices for individual collieries operating in an isolated area.
>
> (2) The prices fixed are determined on the average district cost of production as disclosed by the financial accounts of the collieries, plus a profit margin.
>
> For the above purpose financial accounts of all privately-owned mines in the State have to be submitted to the Board by the proprietors.
>
> As regards the profit margin, the Board has set no fixed amount, but considers that a profit margin of less than 2s. per ton for districts is an uneconomical one.
>
> (3) All increases in costs brought about by increases in awards and other statutory charges taking place during the year are assessed on the basis of the average extra cost over each district, and a price increase to recoup them given.
>
> It is believed that the fixation of district selling prices based upon average district costs of production does, in itself, impose a requirement for the maintenance of efficiency at collieries, as in order to make a profit on the district price fixed, a colliery proprietor must keep his production costs below such price, and the lower he can keep costs the greater his profits become. It is thus felt that the incentive to make profits on a fixed district price tends to require the application of efficiency by the operator of a colliery.
>
> Specific instances which might be quoted where the price fixation policy of the Board has stressed the necessity for efficiency are :-
>
> (a) Various references have been made to the Board from time to time by colliery proprietors that they should be allowed a price increase above the fixed district price, as their profit margin falls below the average district profit. The Board has refused all such applications, pointing out that the onus is upon the proprietors themselves to improve their financial position by increased efficiency.
>
> (b) On the Blair Athol Field, one of the proprietors, because of low output and other production disabilities associated with his methods of operation, was earning a very low-profit margin. The Board, after a review of the position, determined new district prices under which the operator concerned, in order to make a fair profit, was required to step his output up to 800 tons per day on the average and also to introduce greater efficiency into his methods of working the cut.
>
> (c) At the Tannymorel Colliery the introduction by the proprietor of more efficient methods of operation enabled the Board to reduce prices by 6s. per ton and to pass this benefit on to consumers while still returning a reasonable profit to the owner.


GROWTH IN TOTAL EXPENSES AND TOTAL SALES
EXCLUDE OTHER INCOME)
TOTAL EXPENSES
TOTAL SALES
1947/48
1948/49
1949/50
1950/51
1951/52
1952/53

He Bowen, District Prices.

The Board has obtained from various sources details of the selling prices of coal operating at the State Mine, Collinsville, and at the privately-owned mine on the Bowen Field from 1943 to date, and these details, together with brief reasons for fluctuations, are set out in the schedule attached hereto. I think it is summed up in the schedule. It will be noted from this schedule that whereas until October, 1948, the State Mine prices were similar to those of the Consolidated Mine, from that date until January, 1951, the State Mine prices lagged behind those of the private mine, the difference at one period being as high as 5s. 8d. per ton.

As stated above,Ithe Board's specific power to fix selling prices applies only to the privately-owned mine, but in January, 1951, the Board, acting on instructions by the then Minister for Mines, investigated the matter of prices on the Bowen Field and recommended the adoption of uniform district prices which would be fixed by the Board for the Consolidated Mine and adopted by the Mines Department for the State Mine.

The prices recommended by the Board were arrived at after an examination of the costs of both mines and were based upon the average production costs over both plus a profit margin of 2s. per ton. These uniform district prices, which also adjusted previous differentials and anomalies and which resulted in increases from 3s. 6d. to 7s. 6d. per ton at the State Mine and from Is. ld. to 5s. ld. at the Consolidated Mine, came into operation as from 8th January, 1951.

Since that date no combined review of the financial accounts of the private mine and the State Mine has been made by the Board for the purpose of increasing the Bowen District selling prices.

However, during the period between 8th January, 1951, and 10th January, 1955, the prices of coal in the Bowen District were increased by amounts assessed by the Board to cover increased costs, mainly those of a statutory nature, as they became effective. These increases, the Board is informed, were also applied by the Mines Department, thus maintaining the district prices. However, the Board is also informed that the Department of Mines allows a discount of 5 per cent. on sales of coal to the Railway Department."

From the foregoing, these very significant factors appear-

1. The Queensland Coal Board had and has no jurisdiction over the fixation of prices for coal produced by the State Mine, but in January, 1951, the Board, acting on instructions by the then Minister for Mines, investigated the matter of prices on the Bowen Field and recommended the adoption of uniform district prices, which would be fixed by the Board for the Consolidated Mine and adopted by the Mines Department for the State Mine.

2. The prices fixed for the coal produced by the State Mine at Collinsville were (and are) determined on the average district cost of production, as disclosed by the financial accounts of the two collieries, plus a profit margin.

3. The two collieries in the Collinsville area are the Collinsville State Coal Mine and Bowen Consolidated Mine and presumably it would be the average of the costs of these two mines that would determine the price for each.

4. The Queensland Coal Board considers a profit margin of less than 2s. per ton for districts an uneconomical one.

5. All increases in costs, brought about by increases in awards and other statutory charges taking place during the year, are assessed on the basis of the average extra cost over each district and a price increase to recoup them is given to each mine within the district.

6. The Queensland Coal Board believes that the fixation of district selling prices based upon average district costs of production puts a premium upon efficiency as the lower the production cost the greater the profit.

7. The Schedule of Prices (set out later) indicates the position regarding price rises for both the Bowen mines and shows that, whereas until October, 1948, the State Mine prices were similar to those of Bowen Consolidated, from that date until January, 1951, the State Mine prices lagged behind those of Bowen Consolidated, the difference at one period being as high as 5s. 8d. per ton.

8. The prices recommended by the Board on 8th January, 1951, were based upon an examination of the costs of both mines and fixed at a price which included 2s. profit in addition to the average production costs. They resulted in increases from 3s. 6d. to 7s. 6d. per ton at the State Mine and from ls. id. to 5s. ld. at the Consolidated Mine.

9. Since that date, no combined review of the financial accounts of either the private mine or the State Mine has been made by the Board for the purpose of increasing the Bowen district selling prices.

10. Since 8th January, 1951, the prices of coal in the Bowen district were increased by amounts assessed by the Board to cover increased costs, mainly of a statutory nature, as these became effective.

11. The Mines Department also applied these increases, thus maintaining the district prices.

12. The Department of Mines allows a discount of 5 per cent. on sales of coal to the Railways Department.

13. Between October, 1948 and January, 1951, the State Mine prices fell below those operating at the Consolidated Mine as follows :—

Period.	State Mine Price compared with Bowen Consolidated Price.	Approximate Tonnage Produced by State Mine.
	s. d.	
1-11-48 to 7-11-48	—1 7	23,242
8-11-48 to 30-11-48	—2 5	15,438
1-12-48 to 31-5- 49	—0 1	82,594
1-6-49 to 21-7-49..	+0 4	10,873
22-7-49 to 13-11-49	—1 2	41,767
14-11-49 to 31-12-49	—5 8	15,448
1-1-50 to 30-6-50..	—2 11	69.651
1-7-50 to 7-1-51 ..	—2 5	61,238

(Extracted from evidence by E. McCarthy—page 4674).

14. The price for open-cut coal delivered by Bowen Consolidated is 15s. ld. per ton below that fixed for underground coal.

In approaching the problem of the effect upon the financial results of the State Mine played by prices and pricing procedures, it is suggested that the first step is to ascertain what additional amounts would have been necessary each year in order to allow the mine to break even. These results are best obtained by a listing of the cost of production on the one hand and the average selling price on the other. These are as follows :—

Year.	of Production.	Average Selling Price.	—
	E s. d.	£ s. d.	s. d.
1941 ..	0 15 11		..
1942	0 17 8	0 18 8	Profit 1 0
1943	0 19 1	1 0 2	Profit 1 1
1944	1 3 4	1 0 7(?)	Loss 2 9
1945	1 3 7	1 0 4	Loss 3 3
1946	1 2 8	1 0 3	Loss 2 5
1947	1 2 10	1 2 4	Loss 0 6
1948	1 7 6	1 6 7	Loss 0 11
1949	1 10 3	1 9 8	Loss 0 7
1950	1 18 9	1 13 0	Loss 5 9
1951	2 4 8	2 0 2	Loss 4 6
1952	2 12 4	2 11 9	Loss 0 7
1953	2 16 0	2 17 5	Profit 1 5

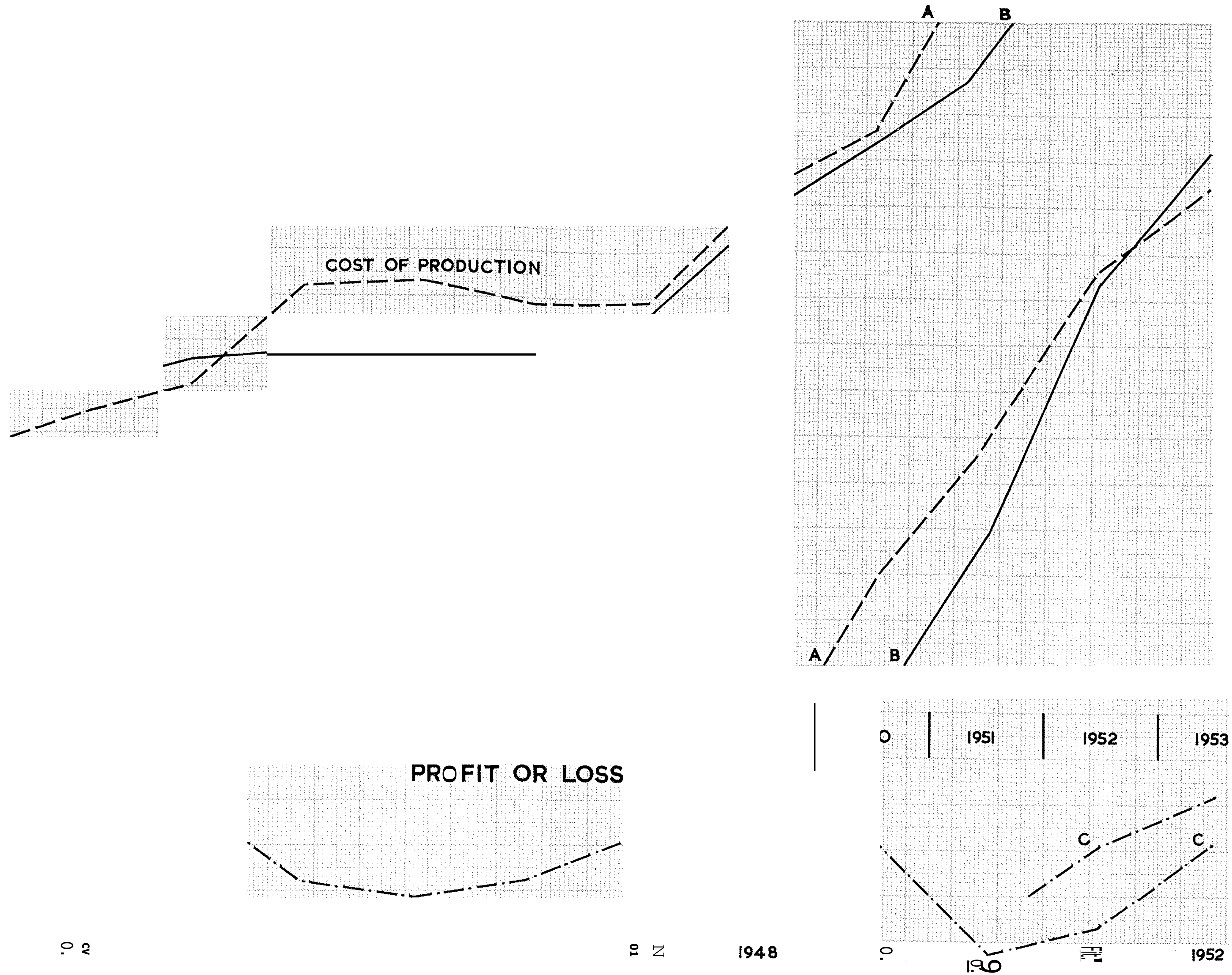
These figures are shown graphically herein.

The losses sustained by the mine over a period of years are thus, it is believed, seen in better perspective. It must be remembered that the State Mine prices substantially lagged behind those of Bowen Consolidated in the years 1949, 1950 and 1951. If the State Mine had received even the same prices as those given to Bowen Consolidated during those years, the loss in 1949 would have been almost eliminated and those of 1950 and 1951 greatly reduced.

(We were informed that, as from 10th January, 1955, a special price adjustment was made *" in the interests of Bowen Consolidated Mines, 3s. 3d. per ton being added for this purpose."* On the surface, at least, it appears that no aspect of average entered into this adjudication though admittedly the large losses being sustained by the State Mine would have made this procedure ludicrous. Nevertheless, it does indicate that the averaging procedure most certainly breaks down under some conditions. Indeed, we have not been able to trace how the averaging procedure between the two mines was able to operate at any time and it is very doubtful whether it will be found practicable at least until Bowen Consolidated is fully mechanized—if then.)

As far as the State Mine is concerned, it appears to obtain an increase only if, as, and when, Bowen Consolidated gets one. It is at least questionable as to whether this is a desirable procedure.

The problem, however, goes much deeper than that. The policy of the Queensland Coal Board in arriving at a price was to take the results for the previous year and, in the light of the cost of production for that year, adjust the selling price for the then current year accordingly. This had the effect of the mine almost always running at a loss in a period of rising costs. The reverse would be true if costs were continually falling, but no such happening was at all likely, nor did it at any time occur.



COST OF PRODUCTION
PROFIT OR LOSS
A
B
C
1948
1951
1952
1953

The importance of this is best seen by an analysis of the results which would have transpired if the price of the following year had been operating in the previous year. These projected results are given since 1948 as under :-

Year.	Price.	Result for Year.	Price Following Year.	Projected Result.	
					Profit
	£ s. d.		£ s. d.	£	£
1948	1 6 7	Loss 7,262	1 9 8	plus 26,526	19,264
1949	1 9 8	Loss 5,157	1 13 0	plus 31.101	25,944
1950	1 13 0	Loss 36,224	2 0 2	plus 45,459	9,235
1951	2 0 2	Loss 25,908	2 11 9	plus 67,410	41,502
1952	2 11 9	Loss 4,635	2 17 5	plus 34,886	30,251

It may well be argued as to whether it is justifiable to adopt such a procedure because part at least of the increase in price would result from increases granted to offset some extra charges (such as wage increases) as they occur. This is a valid objection and it would, therefore, be necessary to analyse the price increases to ascertain what proportion would come within this category. Nevertheless, the increased amount resulting from these calculations is so great as to show up in no uncertain fashion how outstandingly important the question of a valid price is when considering and assessing financial results. Indeed, no clear financial picture is possible without it. In the five years shown-1948 to 1952 inclusive-the results showed a total loss of £79,186 as against, after the price adjustment indicated, a profit of £126,196-truly a remarkable margin within which to allow for price rises given *at the time* higher costs were incurred.

Nor is this the only factor involved. Mr. McCarthy was asked whether interest was an allowable item in calculating the cost of production. He replied that it was not allowed. In this, the Queensland Coal Board has many precedents (as, for example, the Ministry of Munitions, during World War II.), but with the State Mine, Collinsville, it is important to note the effect of such a procedure. In such cases, the 2s. profit allowed by the Coal Board (and represented by it as being a minimum) would be assumed to cover profit and interest. if more of the capital was borrowed, the amount to be retained as profit would be less. If a company supplied all the capital, there would be no interest charge to be deducted from the 2s. profit.

Assuming, therefore, that, excluding interest, a profit of 2s. per ton was actually made, the question of whether an actual net profit or loss would appear in the State Mine accounts would depend upon whether the 2s. profit was sufficient to cover the interest charge. The State Mine accounts adjusted to include interest as part of profit would appear as under :-

Year.	Actual Result.	Interest.	Result Without Interest.	Profit at 2s. per ton Produced.	Difference.
	£	£	£	£	£
1941 ..	Profit 10,666	2,471	Profit 13,137	19,745	-6,608
1942 ..	Profit 12,132	2,151	Profit 14,283	23,193	-8,910
1943 ..	Profit 15,838	1,997	Profit 17,835	30,470	-12,635
1944	Loss 33,609	1,761	Loss 31,848	25,180	-57,028
1945 ..	Loss 39,924	3,538	Loss 36,386	24,122	-60,508
1946 ..	Loss 20,418	4,816	Loss 15,602	17,260	-32,862
1947 ..	Loss 4,574	5,560	Profit 986	18,386	-17,400
1948 ..	Loss 7,262	6,914	Loss 348	17,206	-17,554
1949	Loss 5,157	7,436	Profit 2,279	18,660	-16,381
1950 ..	Loss 36,224	8,850	Loss 27,374	12,686	-40,060
1951 ..	Loss 25,908	10,397	Loss 15,511	11,638	-27,149
1952 ..	Loss 4,635	9,975	Profit 5,340	12,312	-6,972
1953 ..	Profit 10,017	14,829	Profit 24,846	15,201	-9,645

No consideration of the price factor, however, is of value without some analysis of the costs and results of the Bowen Consolidated Mine, firstly because this and the State Mine are joined for the purpose of arriving at the price payable, and secondly because, in the evidence, reference was frequently made to the fact that the State Mine results contrasted very unfavourably with those of Bowen Consolidated. A comparison of the financial results of these two mines is therefore shown hereunder (an efficiency comparison is dealt with later).

—	1941.	1942.	1943.	1944.	1945.	1946.	1947.
	£	£	£	£	£	£	£
State Mine ..	P. 10,666	P. 12,132	P. 15,838	L. 33,609	L. 39,924	L. 20,418	L. 4,574
Bowen Consolidated ..	P. 3,259	P. 1,769	P. 8,079	P. 7,526	P. 1,541	L. 1,648	P. 1,564

—	1948.	1949.	1950.	1951.	1952.	1953.
	£	£	£	£	£	£
State Mine	L. 7,262	L. 5,157	L. 36,224	L. 25,908	L. 4,635	P. 10,017
Bowen Consolidated	P. 3,600	P. 338	P. 508	P. 14,813	L. 11,605	P. 870

State Mine .. .. Total for 13 years-£129,058 Loss.
Bowen Consolidated.. Total for 13 years-E30,614 Profit.

According to the accounts of the two mines, it would appear that Bowen Consolidated made a profit on eleven occasions and a loss on two, whilst the State Mine figures were a profit on four and a loss on nine occasions.

The Bowen Consolidated accounts, however, include some items which require adjustment as, for example, the fact that a Government subsidy was received on four occasions. Before a true picture can be obtained, therefore, certain items should be adjusted. In the case of the State Mine, Interest (which may or may not appear in the Bowen Consolidated accounts but which is not separately shown and is unlikely to be treated in the same way as in the State Mine accounts) and in the case of Bowen Consolidated, provision for Income Tax, Government Subsidy, and Surplus on Sale of Investments, all require adjustment. (Directors' Fees and Dividends and Sundries are left in as they are small and any apportionment may be difficult).

Adjusting these, the results are :—

—	1941.	1942.	1943.	1944.	1945.	1946.	1947.
	£	£	£	£	£	£	£
State Mine ..	P. 13,137	P. 14,283	P. 17,835	L. 31,848	L. 36,386	L. 15,602	P. 986
Bowen Consolidated ..	P. 3,259	P. 1,769	P. 8,079	P. 7,526	P. 1,541	L. 1,648	P. 1,564

—	1948.	1949.	1950.	1951.	1952.	1953.
	£	£	£	£	£	£
State Mine	L. 348	P. 2,279	L. 27,374	L. 15,511	P. 5,340	P. 24,846
Bowen Consolidated	P. 1,969	L. 7,329	L. 3,522	P. 14,813	L. 5,605	P. 870

State Mine .. Total for 13 years—£48,363 Loss.
Bowen Consolidated.. Total for 13 years—£23,286 Profit.

It is obvious that the Collinsville State Mine comparative position is improved greatly by the three prosperous years of 1941, 1942, and 1943. A comparison of the six years' trading to 1953 does not give nearly so favourable a position to the State Mine :—

	As Accounts Show.	After Adjustment (Interest, &c.)
Collinsville State Mine ..	Loss 69,169	Loss 10,768
Bowen Consolidated Mine	Profit 8,524	Profit 1,196

It is suggested that the longer period gives the more valid comparison.

A further factor, however, should be taken into account in attempting a comparison between these two mines. Reference has already been made to the fact that coal prices for the State Mine lagged as against those for Bowen Consolidated. The amount represented by such difference in prices should, therefore, be added to the State Mine results (or deducted from Bowen Consolidated).

These amounts would be :—

Year ended 30th June, 1949—Approximately £4,000.

Year ended 30th June, 1950—Approximately £17,000.

Year ended 30th June, 1951—Approximately £7,400.

Adding these figures to the amounts for six years to 1953 previously quoted, the results would be :—

Collinsville State Mine—Loss £40,769.

Bowen Consolidated Mine—Profit £8,524.

After adjustment of the two sets of accounts (including interest for the State Mine), the position would be :—

Collinsville State Mine—Profit £17,632.

Bowen Consolidated Mine—Profit £1,196.

It should be very carefully noted that these figures are conjectural only and are not designed to show that the State Mine yielded better results than Bowen Consolidated (as it did not) but rather to indicate that the Profit and Loss Accounts of the two mines have been prepared on somewhat different bases and to cater for different positions. After adjustment, any comparison of amounts shown by the two different sets of Profit and Loss Accounts could vary considerably.

Before proceeding to other matters, one further analysis is necessary. Reference was made by Mr. E. McCarthy to the discount of 5 per cent. given by the State Mine on all coal used by the Railways. Figures showing these deliveries are not available for the whole period but it is quite evident that, if the discount was given over the years from 1941, the discount of 5 per cent. allowed to the Railways by the Mine has amounted to a considerable sum and should really be taken into account in any endeavour to arrive at the true Profit and Loss position of the State Mine. It may perhaps be argued that it was not unreasonable for a customer as big and as consistent as the Railways to be entitled to some special discount. It should be remembered, however, that the Railways were in any case buying the coal at considerably cheaper prices than would have operated if they had had to buy Callide or Blair Athol coal and transport same to North Queensland. We are not indicating that the discount should not be given but we do suggest that, in any assessment of the financial results of the Mine, the discount must be taken into account.

It must be remembered that the aim of the Queensland Coal Board was to adopt a pricing policy sufficient to give a profit of 2s. per ton.

At the outset, it should be remembered that a discount of 5 per cent. to the Railways, at least from 1951 onwards, would have represented 2s. per ton which would wipe out on coal supplied to the Railways the 2s. profit to which reference was made by the Secretary of the Queensland Coal Board.

In 1951-52 and 1952-53, the Railways purchased 38,660 tons and 45,710 tons of coal respectively from the State Coal Mine at Collinsville. The average selling prices for these two years were, say, £2 1 ls. 9d. and £2 17s. 5d. If we allow prices of, say, £2 10s. and £2 15s. respectively, 5 per cent. discount would amount to 2s. 6d. and 2s. 9d. per ton. In total, the amount of the discount thus allowed to the Railways on the tonnage purchased was £4,330 and £6,285—a total of £10,615, which, in any comparison, should be added to profits (or deducted from losses). Again, this figure of £10,615 is for two years only. If this represented an average figure for a period of, say, 10 years, an amount of £50,000 would be involved.

Before drawing any conclusions from the foregoing, however, it seems desirable to ascertain how the actual results achieved by the Bowen Consolidated Mine compare with the figure of 2s. per ton nominated by the Queensland Coal Board. The following picture emerges :—

Year.	Production.	Actual Result as above.		Profit at 2s. per ton.	Difference.	
			£	£		£
1949 ..	62,647	Loss	7,329	6,265	Plus	13,594
1950 ..	67,121	Loss	3,522	6,712	Plus	10,234
1951 ..	86,307	Profit	14,813	8,630	Minus	6,183
1952 ..	86,763	Loss	5,605	8,676	Plus	14,281
1953	85,677	Profit	870	8,567	Plus	7,697

It is quite apparent from these figures that the price allowed to Bowen Consolidated Mine has not been sufficient at any time from 1949 to 1953 inclusive, with the exception of 1951, to give to that mine even the minimum amount of 2s. per ton nominated by the Queensland Coal Board. Indeed, the amount by which the Bowen Consolidated results fell short of the 2s. per ton reached the rather surprising total of £40,852 in a matter of five years. If, therefore, the price of Bowen Consolidated coal had been increased to a figure sufficient to show 2s. per ton profit margin, it is safe to say that the State Mine would, on these prices, have shown a most handsome financial result.

In all the comparisons between the State Mine and Bowen Consolidated, two things must be borne in mind :-

1. The State Mine was a larger producer than Bowen Consolidated and could, therefore, normally be expected to produce a greater return on the presumably greater capital involved.

2. No information was available to us as to the selling prices charged by Bowen Consolidated for coal it supplied to its own associated company. This factor could affect all bases of comparison but there may be some justification for the belief that in relation to coal supplied to Mount Isa Mines, the coal would presumably not be over-valued.

In relation to price factors, the following conclusions seem to be justified :-

UP TO THE YEAR ENDED 30TH JUNE, 1953-

1. The results shown do not give any real indication of the profit or loss position of the mine. All that can be said is that, *on the prices charged,* the results were as shown.

2. The actual results were worsened (in some years considerably) by the lower prices, presumably given as a matter of policy, particularly to the Railways and the Bowen Coke Works.

3. Apart from these factors, however, the general prices charged by the mine as, in later years, allowed by the Department of Mines, seemed to be somewhat unrealistic and indeed hard to reconcile with the pricing terms and procedures laid down by the Queensland Coal Board. (In this, the Department simply followed the lead given by the Queensland Coal Board, and it is the figure calculated by the latter in relation to the average price for the Bowen District, and which was applied to the Bowen Consolidated Mine, which is difficult to follow.)

4. In view of all these factors, some of which could be fairly readily rectified if higher policy factors were consistent with such a course, *as far as the period up to 30th June,* 1953, *is concerned,* there seems little justification for any statement that the mine was unprofitable and much less for any suggestion that the mine should, in the public interest, be closed down because of the losses sustained by the mine.

1. It is quite apparent that the results shown in the State Coal Mine Profit and Loss Accounts do not give any real indication of the profit or loss position of the mine, particularly in the later years. All that can be said is that *on the prices charged,* the results were as shown.

2. It is abundantly clear that pricing arrangements from 1948 to 1951 lagged behind those given to the neighbouring mine of Bowen Consolidated. Furthermore, the State Coal Mine never at any time received any of the subsidies received by Bowen Consolidated.

3. It is difficult to reconcile the pricing method nominated by the Queensland Coal Board with the actual results achieved either by Bowen Consolidated or the Collinsville State Mine because the results from neither seem to fit the outlined pattern.

4. In addition, the State Coal Mine was expected to, and did in fact, very materially subsidise both the Railways and the Bowen Coke Works and had it not done so, the mine would have earned substantial profits.

It seems to us that these conclusions necessitate four further comments :-

1. In our foregoing analysis, we do not under any circumstances criticise either the Queensland Coal Board or the Government. In the case of the former, we know and appreciate the difficulties of any price formula, particularly in dealing with a commodity such as coal with its infinite variety of conditions, qualities and situations. In the case of the latter, it would be a matter of higher policy as to what discounts or subsidies it gave and we do not in any way question these.

2. It is our duty, however, to ascertain the results achieved by the State Coal Mine in order that we may adjudicate in relation to the Terms of Reference and therefore we must take into account the effects of these various matters upon the results achieved and the finances of the mine.

3. It is in the light of all of these factors and the foregoing analysis we have made that we express the conclusion that the results shown in the Profit and Loss Accounts do not give any real indication of the results achieved by the mine. On the prices charged, the results are as indicated, but

(a) The mine would probably have been profitable without the subsidies to which reference has already been made ;

(b) As far as can be ascertained from the somewhat meagre details available in relation to Bowen Consolidated, the comparative results achieved by the State Coal Mine do not appear in any very unfavourable light.

4. Despite this, however, the fact that the State Coal Mine would have shown profits by any of the adjustments made does not necessarily say that the results could be considered as satisfactory. It is not the same to say that a mine is profitable as that its results are satisfactory. In the first place, our only comparison so far has been with the Bowen Consolidated Mine whose results may themselves be either satisfactory or unsatisfactory and which itself may be either efficient or inefficient. Secondly, if many opportunities existed at the State Coal Mine to make substantial increases in profits and these were not availed of, the mere making of a profit would not be satisfactory and certainly may not be a guide to the efficiency or inefficiency of the mine.

Term II B (5).

The Standard of Efficiency of the Mine.

Despite all other factors, it is a reasonable conclusion that constantly reducing production was apparently the biggest single factor in the unsatisfactory financial results of the mine, and it therefore becomes necessary to arrive at the reasons for the lower production to ascertain whether those reasons were likely to be overcome by mechanization. This leads logically to an attempt to assess the general efficiency of the mine, the degree of idle time, absenteeism and labour turnover, if possible on a comparative basis.

Because of the very nature of coal mining, no ready-made plan to assess efficiency exists. Whilst statistics can help somewhat, they are by no means an entirely reliable guide, because what appears to be a poorer result statistically on the part of one mine might, in actual fact, represent a very much more worthy result than a higher figure in another mine. Nevertheless, statistics are very valuable for certain purposes, and some valid conclusions can undoubtedly be drawn. An attempt is made in the following cases to analyse the various statistics, and, where a reasonable inference seems justified, it is stated as such.

The three major factors which prevent arithmetically correct conclusions by comparison with other mines are, firstly, the size of the mine (it is of little use comparing 150,000 tons annual production with 5,000 tons) ; secondly, the conditions operating in the mine which may vary from very easy to extremely difficult and hazardous ; and, thirdly, the method of working the mine, which may vary from hand mining, without even power borers or horse wheeling, to complete mechanization.

In this connection it should be noted that the State Mine is the largest underground mine in Queensland. As has been indicated, the coal seam is excellent and conditions for contract mining reasonably good.

It is somewhat fortunate that, next to the State Mine, the largest production from an underground mine is that of Bowen Consolidated. (Two others which are very close-Blackheath and Box Flat Extended-comprise what are virtually a series of mines in each).

It is proposed to examine this question of efficiency from the following standpoints-

(a) Output per manshift.

(b) Total manshifts lost : Idle time.

(c) Labour turnover.

In the main, concentration will be made upon later periods.

(a) OUTPUT PER MANSHIFT.

The output per manshift *at the coal face* in the various coalmining districts of Queensland for the various half-yearly periods from 30th June, 1950, to 31st December, 1952, shows, that the Bowen district is easily the best and is, in fact, nearly 40 per cent. higher than the average for all underground mines.

A completely different picture is, however, established in the *overall output* per manshift, because here Bowen district is considerably below the average for underground mines and whereas that average is stable, the Bowen District shows an unfortunate deterioration.

The following Schedule shows the relevant figures at the coal face and the overall figures as to output per manshift, from 30th June, 1950, to 30th June, 1953 :-

	At Coal Face.						Overall.					
	July-Dec., 1950.	Jan.-June, 1951.	July-Dec., 1951.	Jan.-June, 1952.	July-Dec., 1952.	Jan.-June, 1953.	July-Dec., 1950.	Jan.-June, 1951.	July-Dec., 1951.	Jan.-June, 1952.	July-Dec., 1952.	Jan.-June, 1953.
West Moreton District ..	6.33	6.24	6.47	6.41	6.35	6.37	2.70	2.67	2.84	2.79	2.75	2.79
Darling Downs District ..	5.64	5.53	5.92	5.95	6.09	5.46	3.07	2.86	3.02	3.08	3.04	2.80
Maryborough District ..	5.12	5.11	5.42	5.13	5.04	4.81	2.30	2.39	2.56	2.33	2.35	2.30
Rockhampton District ..	6.57	6.28	6.35	6.39	6.57	7.27	2.48	2.30	2.29	2.19	2.19	2.13
Chillagoe District	5.07	4.96	5.35	5.30	4.92	4.98	1.03	1.08	1.27	1.32	1.13	0.93
Bowen District-												
Collinsville State Mine	7.88	8.06	8.44	8.41	8.87	8.84	1.83	1.78	1.84	1.92	2.15	1.89
Bowen Consolidated	8.23	8.08	9.04	7.48	8.34	9.24	2.52	2.26	2.58	1.94	2.24	2.32

An analysis of the two Bowen mines shows that, of the six periods to 30th June, 1953, the output per manshift at the coal face shows little undue difference between the two mines. On two of the six occasions, the State Mine had the better figure, and on the other four, Bowen Consolidated. The average for the six periods to 30th June, 1953, was, in the case of the State Mine, 8.42 tons as against Bowen Consolidated 8.40 tons.

When the overall output per manshift is studied, however, a completely different picture emerges. In no case in the six periods was the State Mine figure higher than that of Bowen Consolidated, and the respective averages were-1.90 tons for the State Mine, and 2.31 tons for Bowen Consolidated.

Even a cursory study of these figures should have disclosed that there was an undue reduction from the possibly acceptable output per manshift at the coal face to the certainly unacceptable overall output per manshift. Indeed, the split-up of the employment figures at the State Mine into the categories of-

(a) At the coal face,

(b) Underground,

(c) Surface, and

(d) Administrative and clerical,

should have indicated very quickly to the Management what the position was.

Any examination of the production per employee per half year from 30th June, 1950, to 30th June, 1953, yields the same result, as these results are obtained from the same sets of figures. These are shown in *Annexure No. 33.* Annexure No. 33.

It is admitted that the surface workers at the State Mine could be expected to be greater than at Consolidated. In the first place, the State Mine looks after the town's electricity ; secondly, it carries on a certain amount of outside work. In the years 1947-48 to 1951-52, for example, the work performed at the workshops at the State Coal Mine for other State undertakings, or for private organisations or individuals, is shown hereunder :-

	1947-48.	1948-49.	1949-50.	1950-51.	1951-52.
	£	£	£	£	£
Total Wages paid workshop staff	9,380	11,345	11,369	12,543	13,211
Wages charges for " outside " work	682	967	1,265	520	1,924
Percentage	7.2%	8.5%	11.1%	4.1%	14.5%

Wages paid for private work as compared with total workshop wages were, for the years 1952-53 and 1953-54 :—

	1952-53.	1953-54.
	£ 8. d.	£ 8. d.
Total Workshop Wages ..	16,117 0 0	14,857 0 0
Wages on outside work (not including the added percentage)	1,337 13 6	920 14 7
Percentage	8.3%	6.2%

Lest it be felt that comparison between the State Mine and Bowen Consolidated is too restricted, we give hereunder the relative figures in relation to other Queensland districts :-

OUTPUT PER MANSHIFT AT INDIVIDUAL QUEENSLAND COLLIERIES.

Name of Colliery.	AT COAL FACE.						OVERALL.					
	July-Dec., 1950.	Jan.-June, 1951.	July-Dec., 1951.	Jan.-June, 1952.	July-Dec., 1952.	Jan.-June, 1953.	July-Dec., 1950.	Jan.-June, 1951.	July-Dec., 1951.	Jan.-June. 1952.	July-Dec., 1952.	Jan.-June. 1953.
West Moreton District ..	6.33	6.24	6.47	6.41	6.35	6.37	2.70	2.67	2.84	2.79	2.75	2.79
Darling Downs District ..	5.64	5.53	5.92	5.95	6.09	5.46	3.07	2.86	3.02	3.08	3.04	2.80
1/LaiThorough District ..	5.12	5.11	5.42	5.13	5.04	4.81	2.30	2.39	2.56	2.33	2.35	2.30
Rockhampton District ..	6.57	6.28	6.35	6.39	6.57	7.27	2.48	2.30	2.29	2.19	2.19	2.13
Bowen District	8.03	8.07	8.70	8.04	8.68	8.98	2.08	1.95	2.11	1.93	2.18	2.02
Collinsville State ..	7.88	8.06	8.44	8.41	8.87	8.84	1.83	1.78	1.84	1.92	2.15	1.89
Bowen Consolidated ..	8.23	8.08	9.04	7.48	8.34	9.24	2.52	2.26	2.58	1.94	2.24	2.32
Chillagoe District ..	5.07	4.96	5.35	5.30	4.92	4.98	1.03	1.08	1.27	1.32	1.13	0.93
Underground Mines	6.26	6.16	6.44	6.31	6.36	6.34	2.53	2.47	2.62	2.55	2.56	2.52
Callide District ..							15.09	18.98	24.60	21.78	20.83	22.64
Clermont District..							7.67	8.74	8.99	9.18	7.82	7.69
Open-cut Mines ..							8.98	10.60	12.77	12.08	11.54	10.93
Queensland							2.91	2.98	3.33	3.21	3.24	3.07

Thus the same picture presents itself. Both of the Bowen mines give virtually the best figures in the State for Production at the Coal Face and then both suffer very considerably in any comparison of Overall Production, with the State Coal Mine in the main considerably worse than Bowen Consolidated.

The conclusion is inescapable-either any efficiency at the coal face is completely lost in overall inefficiency or there is a different classification at the Bowen mines. Obviously the reason is in the disproportionate number of men at the face as against men underground and at the surface (particularly the latter). If a reduction in the number of surface labourers could have been effected, a considerable saving would have resulted.

It may be argued that it was difficult to dismiss employees and this may, at least at first glance, be true and certainly could carry weight in relation to any mechanization period. This contention, however, simply underlines a second method which was to turn some of the surface labourers into contract miners. This could in itself have greatly increased production and would no doubt have had a profound and beneficial effect upon the financial results-possibly in itself turning losses into profits. The importance of this factor is seen in the following figures :—

Half-year to-	Men at Face Contract Miners.	Other Under-ground.	Surface.	Adminis-trative Officers.
30-6-48	110	99	101	16
31-12-48	140	128	110	17
30-6-49	126	127	118	18
31-12-49	72	84	95	19
30-6-50	91	112	112	20
31-12-50	79	94	105	19
30-6-51	74	96	106	19
31-12-51	69	87	102	18
30-6-52 ..	76	97	98	18
31-12-52	83	100	107	19
30-6-53	80	106	107	20

From this it will be seen that, from 30th June, 1949, to 31st December, 1951, there was a very marked deterioration in the number of contract miners. Underground workers also were reduced, though not at all to the same extent. In the main, any reduction in the surface workers was small indeed. This could and doubtless did have a serious effect upon profits.

The following shows the movements in labour turnover-

—	Number at beginning of period.	Retired.	Dismissed.	Resigned.	Deceased.	Total.	New applicants.	Number at end of period. (a)
30-6-49	405	..	..	76	..	76	43	372
30-6-50	372	1		148	1	149	97	320
30-6-51	320	3	10	122	2	137	111	294
30-6-52	294	4	2	87	1	94	111	311
30-6-53	311	3	..	37	1	41	85	342 *(b)*

(a) These figures differ somewhat from the break up of personnel just previously quoted. We understand, however, that the former is more in relation to an average number, whilst this table shows the number at a particular date. The discrepancies do not invalidate any of the conclusions.

(b) This actually adds to 355, but presumably there were an extra 13 resignations.

These figures seem effectively to dispose of any contention that adjustments in the surface labour could not be made. If there was any intention whatsoever of redressing and adjusting the surface labour, surely this could have been done by engaging fewer people and making the transfers. The amount of resignations ensured a ready-made programme for adjustment. Indeed the serious deterioration in the number of contract miners and the consequent almost disastrous effect upon production should have provided all the incentive necessary to make sure that adjustments were made.

It was argued at one stage that there would have been difficulty in arranging for men from the surface to take up contract mining and indeed there was a dispute in relation to one such transfer The Secretary of the Union, Mr. J. Nisbet, maintained, however, that there was only difficulty in such transfers where the man held a medical certificate stating that he must work on the surface. Even if this understates the difficulty, recurring losses seemed to suggest stronger and more constructive action than was taken.

If it be assumed that, as against the 140 contract miners at 31st December, 1948, a desirable complement of surface labourers was 110 (and this may itself have been much too low) the effect upon the financial results of a fall in contract miners to 80 with surface labourers of 107, as at 30th June, 1953, can well be imagined.

The underground position showed an " other underground " staff of 128 as against the 140 contract miners at the end of 1948—about 90 per cent. At the 30th June, 1953, there were 106 underground workers, as compared with 80 contract miners, which means that the percentage rose to about 132 per cent.

This position bordered upon the ludicrous. For example, at 31st December, 1951, the position shows that little more than one in four people at the mine was engaged as a contract miner. In December, 1948, it had been about one in two-and-a-half.

In our view, one of the most important factors in securing profit from the mine is the ratio between contract miners, underground workers and surface workers. Unless this is kept right, there is no profitable structure on which to build. We find it hard to understand this could not be clearly seen by both the past General Manager and the present Manager, but particularly in the case of the former, it seemed to get scant treatment in his evidence—such scant treatment, in fact, that we gained the impression either that sufficient emphasis and importance was never at any time placed on the matter and/or that no real attempt was made to cope with the problem.

The conclusion is inescapable that production obviously commences at the coal face and without such production profits cannot even start, but, if profits are to remain, there must be a complete acceptance of the fact that profits won in the mine will not be allowed to be lost on the surface. Judged from these standpoints, the results of the mine were inefficient and unsatisfactory, particularly as the evidence does not, in our opinion, support the view that action taken was commensurate with a fully recognised gravity of the position or the opportunities that could result from meeting and overcoming it.

(b) TOTAL MANSHIFTS LOST : IDLE TIME.

Whilst the production figures are the major factor in the investigation of efficiency, it is in the nature of a corollary to examine the number and cause of manshifts lost because these can have a most material effect upon production and perhaps account for unsatisfactory figures.

The following are the major causes accounting for lost manshifts :-

Absenteeism

Men away on Compensation

Sickness

Long Service Leave

Annual Leave

National Service Training

Permitted Absences

Union Business

Industrial Disputes

Special Reasons.

In the following pages will be found statistics showing the manshifts lost for given reasons during half-yearly periods from 1st January, 1950, to 30th June, 1954, and relating to all underground mines in Queensland. These figures are important, not only in themselves, but also in view of the claim of the past General Manager that the attitude of the men is by far the worst he has ever seen, and, in fact, is such as to preclude any possibility of the successful operation of the mine.

It is a moot point as to whether it could be expected that these claims would manifest themselves in some of the causes of lost manshifts.

In line with the figures shown, it is proposed to examine these briefly and draw final comments in relation to them.

The manhours lost on the different fields semi to call for comparison by way of percentages. These are given hereunder :-

PERCENTAGES OF LOST MANFIOURS

Field.	30-6-50.	31-12-50.	30-6-51.	31-12-51.	30-6-52.	31-12-52.	30-6-53.
State Mine	13.47	13.75	18.27	11.90	15.60	8.95	17.08
Bowen Consolidated	14.70	8.07	15.10	6.51	8.60	6.26	9.84
Chillagoe	14.70	14.40	20.75	12.07	8.75	14.88	10.22
Rockhampton	11.27	10.60	14.94	10.53	7.76	7.75	22.99
Maryborough	12.10	15.10	15.38	11.23	12.04	13.49	12.70
Darling Downs	12.70	13.20	17.20	21.28	12.11	11.66	12.86
West Moreton	1210	12.70	15.09	11.55	11.18	11.54	13.95

The two somewhat surprising factors emerging from these figures are, firstly, that the two Bowen mines are virtually at opposite ends of the list and, secondly, the surprisingly low average of the Bowen Consolidated Mine.

The State Mine figures, whilst proportionately high, are not unduly out of line with any except Bowen Consolidated. They suffer considerably by comparison with the latter. Before drawing conclusions, however, it becomes necessary to analyse the various contributing causes to the total lost manhours.

(i.) ABSENTEEISM.

The figures for the three and a-half years, and the average thereof, are :-

PERCENTAGES.

Field.	30-6-50.	31-12-50.	30-6-51.	31-12-51.	30-6-52.	31-12-52.	30-6-53.	Average.
Bowen-								
State Mine	6.17	4.31	4.34	3.42	3.17	3.16	7.74	4.62
Consolidated ..	4.00	4.46	5.09	3.68	2.13	1.79	3.41	3.51
Chillagoe	5.0	5.7	915	5.80	4.65	4.79	4.44	5.65
Rockhampton ..	2.99	3.7	3.77	2.95	2.35	1.84	2.97	2.94
Maryborough ..	2.1	31	2.14	2.79	2.86	2.51	5.12	2.95
Darling Downs ..	4.9	4.2	310	2.04	2.62	2.31	4.53	3.39
West Moreton ..	3.1	3.3	2.63	314	3.25	3.01	5.50	3.42

The State Mine at Collinsville is therefore second on the list, but the figures are not greatly disproportionate. They seem to suggest that, whilst the State Mine was worse than the average, it was not unduly so, particularly as the last six-monthly period showed a sharp increase, and thus added to the average. This was a six-monthly period of preparation for and the beginning of mechanization, and this meant quite an amount of overtime. As a result there was more likelihood of absenteeism, as the pay penalty was not so great.

In addition, because of the amount of overtime, the fatigue factor would be greater, and this may well translate itself into extra absenteeism. Nevertheless, whilst important, the figures are not greatly out of line with the average, and, whilst the absenteeism problem was always serious, it was not by any means out of hand.

(H.) SICKNESS AND COMPENSATION.

The figures are :-

PERCENTAGES.

Field.	30-6-50.	31-12-50.	30-6-51.	31-12-51.	30-6-52.	31-12-52.	30-6-53.	Average.
Bowen-								
State Mine ..	6.05	6.41	4.74	4.52	4.94	4.68	5.47	5.26
Consolidated ..	2.80	2.40	2.36	2.28	2.99	3.38	3.25	2.78
Chillagoe •. ..	8.4	5.19	4.09	3.46	3.94	4.25	3.89	4.75
Rockhampton ..	4.9	4.9	3.93	5.5	4.83	4.90	6.03	5.00
Maryborough ..	5.9	7.2	5.71	7.39	6.10	8.55	6.61	6.78
Darling Downs ..	5.7	6.7	6.16	6.08	5.75	6.51	5.23	6.02
West Moreton ..	5.4	5.7	4.67	5.48	4.66	5.63	5.36	5.23

The two important factors here are, firstly, that the State Mine is near enough to average, but sickness and compensation at Bowen Consolidated is surprisingly low. Secondly, the figures seem to follow the same pattern as those for absenteeism. It may well be that the explanation is the same in both cases. In any case, the State Mine is not out of line with any other field except Bowen Consolidated.

(ill) INDUSTRIAL DISPUTES.

The following are the figures :-

PERCENTAGES OF LOST MANHOURS.

Field.	30-6-50.	31-12-50.	30-6-51.	31-12-51.	30-6-52.	31-12-52.	30-6-53.	Average.
Bowen-								
State Mine ..	1.24	3.03	7.72	0.81	7.49	1.11	3.26	3.52
Consolidated ..	0.70	0.58	6.62	0.55	2.81	1.09	2.29	1.98
Chillagoe	..	1.8	6.62	0.98	0.08	5.03	1.78	2.33
Rockhampton ..	0.67	0.4	6.01	1.29	..	0.40	13.68	3.21
Maryborough ..	0.6	2.2	6.84	0.74	1.49	1.49	..	1.62
Darling Downs ..	0.6	1.4	7.84	12.94	3.43	2.03	2.70	4.42
West Moreton ..	1.7	2.9	6.99	2.81	3.08	2.65	2.67	3.26

It will be seen from the foregoing that the State Mine is more or less the average, but there is still a decided difference between it and Bowen Consolidated. The State Mine's figures are considerably adversely affected because of stoppages in the six months ended 30th June, 1951, and the same period in 1952.

It seems a valid conclusion that the reason for the higher overall percentage of lost manhours in the case of the State Mine at Collinsville, at least up to 30th June, 1953, is not to be found chiefly in any undue industrial disputes.

(iv.) OTHER CAUSES.

The figures are :-

PERCENTAGES.

Field.	30-6-50.	31-12-50.	30-6-51.	31-12-51.	30-6-52.	31-12-52.	30-6-53.	Average.
Bowen-								
State Mine ..	0.01	..	1.47	3.15	..	..	0.61	0.75
Consolidated ..	7.20	0.63	1.03	..	0.67		0.89	1.49
Chillagoe	F3	1.0	0.89	1.83	0.08	6.81	0.11	0.86
Rockhampton ..	2.71	F6	1.23	0.79	0.58	0.61	0.31	1.12
Maryborough ..	3.5	2.6	0.69	0.31	1.59	0.94	0.97	1.51
Darling Downs ..	1.5	0.09	0.10	0.22	0.31	0.81	0.40	0.49
West Moreton ..	1.9	0.8	0.80	0.12	0.19	0.25	0.42	0.64

There is nothing adverse in the State Mine figures in this regard. It can perhaps be added that the higher figure for Bowen Consolidated was largely due to one high period. In any case, all the figures are small enough to be virtually disregarded as yielding valuable insight into operating conditions.

(c) LABOUR TURNOVER.

Some reference has already been made to this factor as a possible solution of the surface labour problem.

Actually no figures from other mines were submitted to us, but on appearance the labour turnover at the State Mine does not appear out of line. The percentages of resignations for the various years since 30th June, 1949, are :-

30th June, 1949 ..	19 per cent.
30th June, 1950 ..	42 per cent.
30th June, 1951 ..	38 per cent.
30th June, 1952 ..	33 per cent.
30th June, 1953 ..	9 per cent.

These figures do not suggest that there was great disquiet on the part of the men regarding mechanization. Indeed they suggest quite the opposite. Thus, labour turnover should not have played an unduly important part in low production.

Conclusions.

As a pointer to efficiency, therefore, the figures in relation to manshifts lost do not give any clear indication that the efficiency on the State Mine suffers very considerably as compared with other fields. Three conclusions, however, can be drawn.

The first is that there is an important difference between the two mines in the Bowen Field to the detriment of the State Mine, but this is largely due to higher absenteeism and sickness and compensation, there seemingly being a close correlation between these two causes. This matter could perhaps be pursued further by Management.

The second conclusion is that industrial disputes did not mean undue manshifts lost, and furthermore the experience in this connection was such as to encourage one to believe that, irrespective of other factors in industrial relations, the State Mine men were not losing time in strikes. It is interesting to note in this connection that the same easing trend in relation to strikes and industrial disputes is also evident in a decreasing number of pit-top meetings in the later periods.

The third factor is that, in any future consideration as to whether the mine should continue or not, the record of manshifts lost does not deviate from the average nearly sufficiently to entitle it to consideration as a factor in urging discontinuance.

Term II C (6).

The Economic Position.

Irrespective of the domestic results secured year by year by the State Mine, and apart altogether from what adjustments could be well made to the published figures in order to arrive at a realistic appraisal of the results achieved, there can be little doubt that, on the evidence submitted, the State Mine has endeavoured to fulfil a very real and important need in North Queensland, and upon a basis of economics has, in our view, completely justified its existence.

We do not propose tracing the economic aid given by the mine over a period of years. We do feel, however, that it is necessary for us to examine, say, the last three years and ascertain what this position has been

Mr. McCarthy's statements in connection with the economic profit to North Queensland coming from State Mine deliveries and the possibility of the Railways handling the extra freight are important in the issues we are considering, and they are quoted hereunder.

This series of questions was put to Mr. McCarthy :—

> " So that we can get it quite clearly in evidence, you have already indicated that the landed price at Townsville in the case of this average Townsville consumer which you nominated—the landed price at Townsville of Callide coal would be £7 16s. 10d. and Blair Athol £9 4s. Od. while the Bowen underground price would be £5 7s. 8d. Now, I take it that, leaving other factors out of account, if there are other factors, and we will come to that in a minute, it would be feasible to say that if the State Mine had produced 150,000 tons in a year, which had gone to this Townsville consumer, the economic advantage to North Queensland could be arrived at by taking the number of tons-150,000 tons—and multiplying by, shall we say, £2 9s. 2d., in the case of Callide—if this arithmetic is correct—and £3 16s. 4d. in the case of Blair Athol ? If they were the differentials and the tonnage supplied to Townsville, say, 150,000 tons—assuming that the arithmetic was right—if that sum came to £360,000 in the case of Callide coal and £560,000 in the case of Blair Athol, would you say that we would be justified in assuming that this mine had made an economic contribution to North Queensland in that year to the extent of this, say, £360,000 and £560,000, according to whether Callide or Blair Athol coal had been used ? Now, is that a fair statement, leaving out the actual arithmetic of the statement ? Is that a fair statement that we might make ? "

Mr. McCarthy replied :-

" In my opinion, it is a reasonable assumption that the consumers of North Queensland have been saved that amount of money. There are certain factors that are associated with it and a large proportion of that extra cost is entailed in railway freight. It is not all money that is being paid for the coal, and in turn that has always created a matter of difficulty on the part of the Railway Department-that hauling coal from the Central Division. But putting those factors aside, I think it would be reasonable to say that the ecomonic position of North Queensland would be improved to the extent of the sum that you arrive at."

Further questions were then asked :-

" I did exclude those factors, but I did want to come back to them afterwards. There would be some increased freight available to the Railway Department. It would have to be assessed in relation to profit or losses in arriving at any real figures ? Yes, I think that must be taken into consideration.

Now, I don't want you to commit yourself in relation to this, because you mentioned it yesterday, but as a matter of principle with which you may agree in arriving at any economic position there, we would have to take into account any difference in calorific value so far as Callide in particular was concerned ? I did refer to that yesterday. That is a factor which must be considered.

We would find, if we wanted comparison on those figures, that we would have to arrive at calorific values in respect of substitute coals to arrive at the position ? That is so.

Would you like to comment on the question as to whether, if you feel the Collinsville Mine was not operating, the Railways could handle the extra coal which would have to come from the south ? I am of the opinion that they would have great difficulty in handling it."

It is now proposed to analyse the position to ascertain in more detail the part which the State Coal Mine has played in the provision of coal for North Queensland uses.

In the first place, the outputs of the two mines in the Bowen District for the years 1951-52 and 1952-53 were as under :-

	1951-52.	1952-53.
	Tons.	Tons.
State Mine	122,430	151,526
Bowen Consolidated	86,763	85,677

In those years, coal consumed in North Queensland was as follows :-

	1951-52.	1952-53.
	Tons.	Tons.
Railways	136,633	139,743
Electricity	67,964	77,368
Mining Projects	54,869	56,332
Meat and Bacon	32,773	25,093
Coke Works ..	38,606	48,634
Sugar Mills ..	17,200	18,813
Colliery Consumption	14,203	14,333
Gas Works ..	12,739	12,004
Shipping Coal ..	10,707	9,051

In these years the buyers of Collinsville State Mine coal were as follows :-

	1951-52.	1952-53.
	Tons.	Tons.
State Coke Works	41,935	48,550
Railway Department	38,660	45,711
Electric Authorities	11,700	23,398
Meat Works	12,648	13,847
Boiler cons.	7,095	8,775
Sugar Mills	6,959	7,109

The totals for these years, including miscellaneous sundries not listed, were 123,128 tons and 152,017 tons.

For four calendar years, the actual usage of coal by North Queensland coal consumers was as follows :-

Year.	Tons.
1950 ..	366,053
1951 ..	392,433
1952	408,652
1953 ..	413,340

For the same period, the production of northern coal, that is, coal produced on the mines in the Bowen and Mount Mulligan Fields, was as follows :—

Year.	Tons.		Tons.
1950	238,885	' Giving a frshortage of—	127,168
1951	237,965		154,468
1952	256,597		152,055
1953	249,035		164,305

The Secretary of the Queensland Coal Board, in giving these figures in a memorandum, went on to say :-

"These figures indicate that over the years there has been a consistent (although varying) upward trend in consumption while fluctuations up and down have taken place in production and at all times production has failed by substantial tonnages to meet consumption demands which, in fact, have been somewhat higher than the consumption figures shown above by reasons of the demands for Northern coal by consumers outside the Northern Division, e.g., Mackay Power House and the Power Alcohol Distillery at Sarina.

" This continuing shortage between production and demand has been met by a substantial drawing from the mines in the Central Division, particularly Blair Athol, Callide and Bluff, and by importations of gas coal from New South Wales. The burden of purchasing these outside coals with their attendant higher landed costs has fallen in the main upon the Railway Department, the Townsville Regional Electricity Board, Meat Works, Sugar Mills, and Gas Works."

The landed costs of various slack coals to a typical Townsville concern were given to the Commission by Mr. McCarthy as :—

—	Pithead Price per ton.	Rail Freight per ton.	Landed Price per ton.
	£ s. d.	£ s. d.	£ s. d.
Bowen Underground ..	3 5 1	2 2 7	5 7 8
Bowen Opencut	2 10 0	2 2 7	4 12 7
Blair Athol	1 8 9	7 15 3	9 4 0
Callide	1 1 10	6 15 0	7 16 10

Taking into account the amount of coal supplied by the State Mine to the Railways over the two years of 1951-52 and 1952-53, the respective costs to the Railway Department of the State Mine coal delivered at Townsville as against the same tonnages of coal delivered by Blair Athol and Callide were estimated as being :—

	1951-52.	1952-53.
State Mine	208,000	247,000
Blair Athol	345,000	420,000
Callide	300,000	355,000

The coal tonnages received by other main North Queensland consumers of State Mine coal were

	1951-52.	1952-53.
	Tons.	Tons.
Coke Works	41,934	48,550
Sugar Mills ..	6,959	7,109
Meat Works ..	12,648	13,847
Electric Authorities	11,700	23,398
	73,241	92,904

The value of this coal to other consumers, as against these same tonnages of coal delivered by Blair Athol and Callide, could be estimated as :—

	1951-52.	1952-53.
	£	
State Mine	395,000	600,000
Blair Athol	674,000	855,000
Callide	571,000	725,000

The difference in costs to the consumers—Railways, Coke Works, Sugar Mills, Meat Works, and Electricity Authorities, as against the same quantity of coal purchased from Blair Athol would, on these estimates, be :—

	1951-52.	1952-53.
	£	£
Cost if purchased from Blair Athol	1,019,000	1,275,000
Cost from State Mine ..	607,000	747,000
Saving as against Blair Athol ..	412,000	528,000

The difference in cost had this coal been purchased from Callide would be :—

	1951-52.	1952-53.
	£	£
Cost if purchased from Callide	871,000	1,080,000
Cost from State Mine ..	607,000	747,000
Saving as against Callide	264,000	333,000

The Commission was informed, however, that one ton of coal from the State Mine is equal in calorific value to 1i tons of coal from Callide. This difference in cost of State Mine coal, as against Callide coal, would therefore be :-

1951-52.	1952-53.
£352,000	£444,000

Before any conclusion is drawn from the foregoing figures, two other factors are of importance. The first is that included in all the foregoing figures would be a very big freight content, much bigger, of course, in the case of Blair Athol and Callide than from the State Mine, as can be seen from the Pithead and Destination figures shown above. This would mean revenue for the Railways, at least to the extent that they could carry the coal.

The second factor is that no account has been taken of the five per cent. discount allowed by the Collinsville State Mine on coal used by the Railways, and supplied by them. As compared with the foregoing figures expressing difference, these discounts would in any case be small.

It follows, therefore, that, without taking into account any other years, where presumably something of the same sort would have occurred as in the years 1952 and 1953, the State Mine rendered a most valuable economic service to North Queensland coal consumers. No doubt over a period, the difference between what these North Queensland consumers have paid for the State Mine coal, as against what they would have had to pay for any southern mined coal, must have run into millions of pounds.

At least until the end of 1953, the national economic contribution of the State Mine was therefore such, in our opinion, as to justify its existence completely, irrespective of the losses made by the mine. Even the losses of the last two years, however, are insignificant as compared with the Collinsville State Mine's economic contribution to North Queensland, though obviously this factor represents no justification nor supports any complacency for such losses.

It would not be too much to expect that any losses which were incurred by the mine in the past years, owned as it has been by the Queensland Government, could in many ways be looked as a subsidy to North Queensland coal consumers, and therefore of benefit to the State. This statement, too, must not be taken to mean that losses do not matter, nor that they should be condoned, nor that efficiency under such circumstances is of no account. Far from it. Nevertheless, there is a great deal to be said for the fact that up to two years ago a very slight increase in price would have meant no losses, and the mine would still have been making a splendid contribution to North Queensland.

Here again, we do not suggest that anyone was at fault in not giving an extra price to cover losses, even under circumstances such as were in operation. We believe that no judgment in this regard is called for by us. It is not a matter for us, as to whether it is Government policy to show losses at the mine in order to help North Queensland coal consumers—irrespective one way or the other in respect of efficiency or lack of it. What we do wish to point out, however, is that, at least until 1953, the losses of the mine were so insignificant as compared with the economic contribution by the mine that under no circumstances could such losses be urged as a reason for closing down the mine. The mine losses would stop, but a very much greater economic loss would follow.

Perhaps the best way to look at the matter would be that a first economic profit contributed by the mine, as against foreign coal, was supplemented by what was virtually a further subsidy to the extent of the trading loss so borne by the mine. It is admitted that, with extra efficiency, the losses may have been avoided, and this could well be the justification for not seeking to take advantage of the economic contribution made by the mine to the extent of increasing prices to cover losses. In any case, as has been shown, coal pricing arrangements appear largely to have been dictated by the cost of production of Bowen Consolidated.

Thus the economic contribution by the State Coal Mine completely warranted its existence in the past. If, however, there was any lingering doubt about this, it will surely be eliminated by the fact that the Queensland Coal Board considered it unlikely that the Railways would have been able to transport the coal required by North Queensland consumers, from Blair Athol and Callide, if no coal had been available from the State Mine at Collinsville.

Again, it must be borne in mind that, as far as railway freights are concerned, it would take 13 tons of Callide coal to give the same calorific value as one ton of State Mine coal, thus increasing the total tonnage of Callide coal to be handled by one-third.

There is, however, one further factor. With the falling production from the State Coal Mine and the growing North Queensland requirements, the quantity of coal which had to be procured from the south (at much increased prices and with heavy taxing of railway facilities) was rapidly becoming a great problem. If, therefore, production could be increased by mechanization, the whole logic and economy of North Queensland would support such a move.

Term **II** B (7).

Conclusions and Comments.

We are now able to give our conclusions regarding the four reasons given for mechanization.

1.. The Financial Results of the Mine were, according to Profit and Loss figures, unsatisfactory. The main reasons for this were :-

(a) Constantly falling production.

(b) Lags in price adjustments.

(c) Too many surface labourers.

(d) A somewhat higher than average figure of lost manshifts.

(This is not a complete list and specifically leaves out any question of a poor work effort on the part of the miners as this factor is fully considered in a later reference.)

2. Of these, the constantly falling production was the most serious because there seemed to be no end to it. The logical method of attacking the trouble was by mechanizing the mine.

3. In relation to the effect on Government Finance, mechanization would be expensive but if it reduced or eliminated the drain on Consolidated Revenue, it was quite justified.

4. Whilst the standard of efficiency of the mine might appear to be satisfactory on a comparative basis, there appeared to be strong reasons for the conclusions that, under the natural conditions operating at the mine, it should be immensely better.

5. The economic position in North Queensland was such as to make it logical, most desirable, and even essential that, so far from production falling, it should be substantially increased, and mechanization was consequently the best and proper course to adopt.

6. We therefore confirm that all of the evidence supports the Minister for Mines in the reasons he gave for proceeding with mechanization.

7. Furthermore, as the result of a thorough study of these reasons, it is our view beyond doubt that the Government's action in proceeding with mechanization was the correct one at the time and showed a realistic appraisal of current conditions. This conclusion is, in our view, completely valid despite anything which subsequently happened under mechanization. What did happen under mechanization forms the subject of the next Reference—II C.

Term **II** B.

Conclusions.

Our conclusions regarding the circumstances of and relating to that mechanization are :—

1. The Financial Results of the Mine were, according to Profit and Loss figures, unsatisfactory. The main reasons for this were :-

(a) Constantly falling production.

(b) Lags in price adjustments.

(c) Too many surface labourers.

(d) A somewhat higher than average figure of lost manshifts.

(This is not a complete list and specifically leaves out any question of a poor work effort on the part of the miners and this factor is fully considered in a later reference.)

2. Of these, the constantly falling production was the most serious because there seemed to be no end to it. The logical method of attacking the trouble was by mechanizing the mine.

3. In relation to the effect on Government Finance, mechanization would be expensive but if it reduced or eliminated the drain on Consolidated Revenue, it was quite justified.

4. Whilst the standard of efficiency of the mine might appear to be satisfactory on a comparative basis, there appeared to be strong reasons for the conclusion that, under the natural conditions operating at the mine, it should have been immensely better.

5. The economic position in North Queensland was such as to make it logical, most desirable and even essential that, so far from production falling, it should be substantially increased, and mechanization was consequently the best and proper course to adopt.

6. We therefore confirm that all of the evidence supports the Minister for Mines in the reasons he gave for proceeding with mechanization.

7. Furthermore, as the result of a thorough study of these reasons, it is in our view beyond doubt that the Government's action in proceeding with mechanization was the correct one at the time and showed a realistic appraisal of current conditions. This conclusion is, in our view, completely valid despite anything which subsequently happened under mechanization.

TERM II. C

THE WORKING OF THAT MINE UNDER SUCH MECHANIZATION.

1. The Objectives of Mechanization of the Mine.

2. The Results under Mechanization.
   - (a) The financial results.
     - (i.) The year ended 30th June, 1954.
     - (ii.) The year ended 30th June, 1955.
     - (iii.) Conclusion.
   - *(b)* The provision of Government funds.
     - (i.) The movement in the funds.
     - (ii.) Conclusion.
   - *(c)* The production results-
     - (i.) The two years ended 30th June, 1955.
     - (ii.) The spread of employees.
     - (iii.) Labour turnover.
     - (iv.) Manshifts lost.
     - (v.) Conclusion.

3. The Causes of the Unsatisfactory Results.
   - (a) Physical conditions.
     - (i.) Roof conditions.
     - (ii.) Excessive grades.
     - (iii.) Ventilation.
   - *(b)* Machines and equipment.
     - (i.) The type of equipment.
       - (aa)IMain Belt Conveyor.
       - *(ab)* Cutters.
       - *(ac)* Loaders.
       - *(ad)* Chain Conveyors.
     - (ii.) Review of correspondence with the equipment suppliers.
     - (iii.) The future aspect.
     - (iv.) Shuttle car.
     - (v.) Conclusions.
     - (vi.) Breakdowns of machinery.
     - (vii.) Bottlenecks.
     - (viii.) Maintenance.

(c) Union and Employees.

(i.) Union Policy.

(aa) Exercise of job control.
Dargs and work restriction.
Seniority.
Overtime and Saturday work.
Strikes and Disputes.

(ab) Reasons for Union control.
Opposition to Management.
Miners' Federation Policy.
Fear of over-production.

(ac) Methods of Union control.
In relation to its members.
In relation to Management.

(ad) Union's answer to Management's criticism.
Dargs.
Limitation of earnings.
Opposition to increased production.

(ae) Management's efforts to overcome job control.
Supervision.
Persuasion.
Bargaining.

(ii.) Communist influence.

Complaints against the men.

(aa) Loafing and lack of effort.

(ab) Hours worked.

(ac) Carelessness.

(ad) Excessive spillage.

(ae) Indiscipline.

(iv.) Effect on Mining Operations.

(aa) Installation.

(ab) Boring and shot-firing.

(ac) Timbering.

(ad) Cutting.

(ae) Loading.

(v.) Sabotage.

(vi.) Stealing.

(vii.) Conclusions.

(d) Management.

(i.) Mechanization of wrong tunnel.

(ii.) Wrong layout of sections.

(iii.) Lack of proper cycle of work.

(iv.) Lack of adequate training.

(v.) Lack of maintenance.

(vi.) Surplus employees.

(vii.) Conclusions.

4. General Conclusions regarding the Reasons for Unsatisfactory Production.

Term II C (1).

The Objectives of Mechanization of the Mine.

The four promised changes under mechanization were :-

(a) The expectation of better financial results.

(b) The discontinuance of grants from Consolidated Revenue to cover losses.

(c) The increase of production to cater for a larger proportion of North Queensland coal requirements.

(d) The elimination " of practically all arduous labour ."

It is now proposed to examine the results actually achieved to ascertain :-

Whether the promised results actually materialized.

If not, the causes of the failure.

In a statement by the Minister for Mines on 20th December, 1951 (quoted in Term II A), the expectations under mechanization were stated in detail. Hereunder will be found the statement of these anticipations together with a summary of the results achieved under mechanization.

	Statement of Mechanization by the Minister for Mines on 20th December, 1951.	Summary or results achieved under mechanization 7th November, 1953, to 13th October, 1954.
(i.)	Expenditure expected to be £420,000	Expenditure was actually £509,726
(ii.)	North Queensland coal requirements expected to increase	They did increase
(iii.)	There was a serious shortage of labour under hand mining	No shortage of labour under mechanized mining (really a surplus of some workers) but tradesmen were hard to get
(iv.)	The coal was of good quality and the reserves immense	Nothing discovered to alter this contention
(v.)	Reference was made to Mr. Lightfoot's experience	The major burdon of mechanization fell on Mr. Lightfoot and there was no evidence of shortage of experience
(vi.)	Production was expected to increase from 500 to 1,500 tons—or more if desired—daily	Production averaged 541 tons daily from 1st January, 1954, throughout mechanization
(vii.)	There would be no displacement of persons employed at that time	There was no displacement
(viii.)	Of the two tunnels, one would be mechanized and labour not required in the use of mechanized equipment would be required for reconstruction	This was done
(ix.)	Mechanized mining would commence at the beginning of 1953	It commenced on 7th November, 1953
(x.)	The State Stores Board was proceeding to place orders for equipment	It did so
(xi.)	Among the results of mechanization would be—	
	The improved development of North Queensland	As production dropped instead of increasing, the mine played no part in any improved development
	The creation of infinitely better working conditions	In the main, better working conditions operated
	More harmonious relationships	It is doubtful whether there were any improved relationships, though disputes and strikes decreased greatly
	Continuity of production	Production worsened and continuity was less
	Acceleration of mechanization by private mines	Experience at Collinsville would retard mechanization not accelerate it

it now becomes necessary to examine these results in much more detail.

Term II C (2).

The Results Under Mechanization.

(a) THE FINANCIAL RESULTS.

The operations of the mine under mechanization covered portion of two financial years—from 3rd November, 1953, to 30th June, 1954, and from 1st July, 1954, to 13th October, 1954. The year ended 30th June, 1954, showed a loss of £160,270, whilst for the year ended 30th June, 1955, the loss increased to £196,244—a total of £356,514 in losses for two years.

(i.) THE YEAR ENDED 30TH JUNE, 1954.

As mechanization commenced at the beginning of November, 1953, this period had a little more than seven months operating as a mechanized mine, with four months (July to October) under hand-mining methods.

Contrary to all expectation, a loss of £160,270 was sustained for the year-by far the worst result ever recorded. Indeed no other period ever approached such a figure. The real trouble for this period was, of course, to be found in the fact that coal produced amounted to only 124,154 tons and the value of sales £376,000.

It must be remembered that in the contract-mining portion of this period a great deal of attention was being given to mechanization and there was inevitably some dislocation with more emphasis no doubt being placed on the completion of mechanization than on keeping up the production of contract miners. In the mechanized period all kinds of difficulties were encountered, and these are the subject of intensive examination later in this Reference. Briefly, however, the following factors (amongst others) interfered considerably with production :-

(1) The changeover period from hand mining to mechanized mining.
(2) The initial complete unfamiliarity with the new machines and methods.
(3) Bad roof conditions and particularly the early serious roof fall.
(4) The particularly difficult grades and other working conditions.
(5) The troubles experienced with the machines.
(6) The attitude of the men, at least initially, to mechanization.

These factors largely accounted for a production of only 75,000 tons in practically eight months of mechanization-or 490 tons per day (approximately). Whilst the initial period of mechanization could never be expected to produce outstanding results, the adverse figures were beyond all expectations. The daily average from July to October-the hand-mining period-showed approximately 540 tons per day. Actually the lower output caused a serious drop in turnover, from £436,000 to £376,000. As would be expected in mechanization, the expenses rose very considerably-by £100,000. Higher costs could naturally be expected under mechanization but higher outputs to balance or more than balance these higher costs could also be expected. In this case the expected higher costs materialized but were not accompanied by increases in output as the accompanying statement shows in an analysis between the last full year of contract mining (year ended 30th June, 1953) and that during which mechanization commenced (year ended 30th June, 1954).

ANALYSIS OF SALES AND EXPENSES FOR 1952-53 AND 1953-54.

	1952-53.	1953-54.	Difference.
	Tons.	Tons.	Tons.
Ponnages Produced-			
Coal produced	152,016	124,154	- 27,862
Receipts-	£	£	£
Sales	436,058	376,008	- 60,050
Sundry Receipts	10,507	10,311	— 196
			-£60,246
Jxpenditure-	£	£	£
Mine working	326,343	353,812	+ 27,469
Repairs and Renewals	41,499	53,172	+ 11,673
Royalty	3,800	3,104	— 696
Interest	14,829	32,868	± 18,039
Depreciation	15,105	49,406	+ 34,301
General Expenses	34,972	35,891	± 919
			£91,705

Decreased Receipts ..	60,246
Increased Expenditure	91,705
Korean Contract ..	18,336
Deterioration between 1952-53 and 1953-54	£170,287
Profit-1952-53	10,017
Loss-1953-54	160,270
	£170,287

As far as 1953-54 was concerned, therefore-

(1) Four months of the year were on hand mining and eight months on mechanized mining.
(2) It was a time of changeover and for four months of the year, at least, inevitable extra expense would be involved.
(3) It is quite possible that some of this extra expense was no doubt charged against the current operations of the mine, and particularly in view of the fact that funds for mechanization were limited to a particular amount this is not surprising. There was no taxation problem involved.

(4) The then General Manager, Mr. A. Lightfoot, elected to change over from hand mining to mechanized mining in one action rather than in piecemeal or progressive fashion.
(5) He also had carefully chosen a plan of operation which deliberately increased costs in the first few years, so as to have lower costs in subsequent years.
(6) The newness of the operations would militate against any possibility of early success.
(7) Under the conditions operating in the State Mine and particularly in the first year of operation, there would be a lack of flexibility and the adverse effect of this was first seen in the results of the fall at A.4 (which is examined later).
(8) Conditions which would not cause concern in hand mining became extremely difficult in mechanized mining.
(9) The deterioration in conditions as to grades increased progressively until they were quite possibly at their worst at the close of the financial period-to such an extent that an independent witness, Mr. J. Fallins described these conditions as " neither flat or inclined and it would be much better if it became steeper. As it is, it can be classed as the worst class of gradient for any type of mining conditions, neither flat nor inclined."

As will be seen, interest in the year 1953-54 was £32,868 as against £14,829 in the previous year-an increase of £18,000. This was to be expected. Interest was charged at the rate of five per cent. and merely reflected the extra capital required for mechanization.

In like fashion depreciation increased to £49,406 from £15,105—a difference of £34,000. This again reflected the extra depreciation charged on the increased value of fixed assets.

It should be noted that neither Interest upon moneys received for mechanization purposes nor Depreciation upon plant values would, in this year, represent a full annual charge. It is understood that these would be approximately £40,000 and £65,000 per year. Production would normally have to increase greatly upon hand-mining output to take care of such heavy interest and depreciation charges. The fact that it did not do so, made a big loss inevitable. The prices obtained for coal produced in this period were in line with those of Bowen Consolidated, but it is significant that the only increase received by either mine during the whole year was 3d. per ton granted on 3rd August, 1953.

(ii.) THE YEAR ENDED 30TH JUNE, 1955.

This period was catastrophic. The disaster causing the death of seven miners on 13th October, 1954, was in every sense of the words, the supreme tragedy of the mine. Whilst it is highly probable that the year would in any case have shown a further substantial loss, there is little doubt that the effects of the disaster greatly magnified such loss. The three and a-half months of mechanization was followed by an hiatus period of some six to eight weeks when productive work was at a standstill. This in turn was followed by some seven months of mining largely with contract labour but with all too few contract miners (44).

The loss for the year reached the somewhat staggering figure of £196,244 and whilst all bases of comparison have very limited use, the figures for this and the previous period appear as follows :-

	1953-54.	1954-55.	Difference.
	Tons.	Tons.	Tons.
Tonnages Produc:xd-			
Coal produced	124,154	88,406	- 35,748
Receipts-	£	£	£
Sales	376,008	294,462	- 81,546
Sundry Receipts	10,311	11,145	+ 834
			-£80,712
Expenditure-	£	£	£
Mine WorkEng	353,812	299,208	- 54,604
Repairs an(1 Renewals	53,172	69,409	+ 16,237
Royalty ..	3,104	2,210	— 894
Interest ..	32,868	35,684	± 2,816
Depreciation	49,406	65,782	± 16,376
General Expenses	35,891	29,558	— 6,333
			- 26,402
Korean Coribract	18,336	..	- 18,336
			-£44,738

Decreased Receipts ..	80,712
Decreased Expenditure	44,738
Deterioration between 1953-54 and 1954-55	£35,974
Loss-1953-54	160,270
Loss-1954-55	196,244
	£35,974

STATE COAL MINE, COLLINSVILLE.

PROFIT AND LOSS ACCOUNTS.

	1953-54.	1954-55.		1953-54.	1954-55.
	£	£		£	£
To Mine Working	353,812	299,208	By Sales	376,008	294,462
,, Repairs and Renewals ..	53,172	69,409	,, Sundry Receipts	10,311	11,146
,, Royalty	3,104	2,210	,, Net Loss ..	160,270	196,244
,, Interest	32,868	35,684			
,, Depreciation ..	49,406	65,782			
,, General Expenses	35,891	29,559			
,, Loss on Overseas Shipment ..	18,336				
,, Net Profit					
	£546,589	£501,852		£546,589	£501,852

As a comparison with the previous year, the factors helping 30th June, 1954, would be—

(a) Eight months, mechanized mining for 1953-54, against four months, for 1954-55.

(b) Therefore four months, hand mining 1953-54 against eight months 1954-55.

(c) Six weeks, complete shut-down in 1954-55, against nil in 1953-54.

(d) An expected changeover from hand mining to mechanized mining in 1953-54, as against an unexpected changeover from mechanized to hand mining with few places ready in 1954-55.

(e) A reluctance on the part of mechanized miners to go back to contract mining in 1954-55 as against some initial feeling of doubt and insecurity in changing over from contract mining which they knew, to mechanized mining which they did not, but with a subsequent feeling of some assurance.

(f) A continued worsening of labour turnover throughout the period, with the very adverse feature of a bigger proportion of the best men leaving.

(g) The necessity for numbers of men to be engaged in clearing the Dip, thus making them unavailable for productive mining operations and adding undue expense.

(h) Other costs associated with the disaster.

It must be remembered that the year ended 30th June, 1955, had to bear a full year's interest and depreciation. These two items alone total for the year £100,000—virtually £20,000 more than the previous year. The reduction in turnover as against the previous year was £83,000—that is, about 22 per cent. The tonnage, 87,204 tons, however, dropped nearly 30 per cent. (from 124,154 tons) indicating an increase in price. Actually for half the year the price rise was substantial, though as usual this was given partly to cover increased costs.

The expenses for 1954-55 showed a reduction of £27,000, approximately 5 per cent. (excluding the loss on the Korean Contract). The increase in Interest and Depreciation in 1954-55 was virtually offset by the loss on overseas shipments in 1953-54.

It is perfectly obvious that a mechanized mine, working with contract miners only, would inevitably suffer very heavy losses, and the utmost that could be done would be to attempt to keep these losses at a minimum. We are in no position to say whether this was really done.

The year 1954-55 therefore represented the previous year in reverse. The first three and a-half months were succeeded by some six and a-half months of contract mining. The mechanized period during this latter financial year showed some slight but definite improvement upon the previous period consequent upon—

(1) Improving grades and other conditions.

(2) More adequate knowledge of machines and conditions.

(3) Overcoming of initial " teething troubles " of the first eight months (lack of rhythm of working, lack of preventive maintenance, &c.)

(4) Greater all-round experience, and probably—

(5) Lessening nervousness about the effect of mechanization upon jobs and conditions.

It is significant to note that the production in weeks, from 1st January, 1954, to 30th June, 1954 (thus allowing an initial period of some seven weeks), was 61,732 tons whilst from 1st July, 1954, to the date of the disaster it was 47,700 tons. As the former period represented say 115 days' production, a yearly output of 123,500 tons (covering 230 days) would have been secured. On this latter basis a yearly production would have been approximalety 140,000 tons.

That the mine still had a long way to go will be seen by production figures quoted later.

One of the most important factors to be remembered in the case of 1953-54 and 1954-55 is that the losses were of such a magnitude that the matter of price, so important in its effect upon the results of the mine under contract mining, was no longer greatly significant. Thus in the year 1953-54, with the loss at a figure of £160,270, an increase of 25s. 10d. per ton would have had to be obtained in order to " break even." In the 1954-55 year the increase would have had to be £2 4s. 2d.

As these would be virtually impossible prices, a further solution would be the provision of the extra coal to " break even." At the prices operating during the year, it would have been necessary, in 1953-54, to produce a further 53,000 tons to " break even." In the year 1954-55, the extra tonnage required to break even would be 59,000 tons. Spread over 230 working days in 1954-55, this would have required an extra production of approximately 260 tons per day. The relevant figure in 1953-54 would be approximately 230 tons per day.

(iii.) CONCLUSION.

What does follow however, is that so far from mechanization ending the trading losses of the State Coal Mine which had characterized the results for nine out of the ten years to 1953, the position became immeasurably worse and in fact became so bad that, if they had occurred irrespective of the disaster, it would in any case have been necessary to investigate the position to ascertain the causes of such losses and what steps could be taken at least to reduce them considerably but preferably of course to eliminate them.

We have no doubt that—

(a) The idle period of some six weeks or so,

(b) The cost of clearing the Dip,

(c) Other expenses arising out of the disaster, and

(d) The heavy standing charges of Interest and Depreciation,

would all have had a profound effect upon financial results. In view of the magnitude of the loss and the uncertainty of the conditions caused by the disaster, we have not attempted to pursue the matter further. The two factors which do require a complete and thorough analysis (which is pursued later in this Report) are what conditions caused such losses and can those conditions be altered to ensure profits.

(b) THE PROVISION OF GOVERNMENT FUNDS.

(i.) THE MOVEMENT IN THE FUNDS.

The movements in these funds for 1954 and 1955 (with 1953 shown as a commencing figure) were :—

Year.	Treasury.	Trust Accounts.	Advance Postwar Reconstruction Fund.	Total.
	£	£	£	£
1953	613,921	14,335	95,830	724,086
1954	697,295	55,486	95,830	848,611 (Grant 150,000)
1955	716,096	17,097	95,830	829,023 (Grant 180,000)

It will be remembered that, ignoring previous years, in 1950, the total indebtedness on the part of the State Coal Mine was £257,004. At the end of 1951, after a grant £70,000 but before the payments for mechanization really commenced, it stood at £227,446. By 1955, the total liability had grown to £829,023 which approximately equals the £509,726 spent on mechanization. The really serious factor is that in those years, £425,000 had to be given to the mine as Grants from Consolidated Revenue.

In the years 1954 and 1955, the two years when for part of the time the mine functioned as a mechanized unit, payments of £330,000 were made to recoup losses and these amounted in themselves to two thirds of the total expenditure on mechanization but they were of course, in addition to such expenditure.

(ii.) CONCLUSION.

The hope which existed therefore that the advent of mechanization would eliminate the drain on Consolidated Revenue therefore did not only fail to materialize but the position went rapidly from bad to worse, occasioned of course by the heavy trading losses under mechanization.

(c) THE PRODUCTION RESULTS.

(i.) THE Two YEARS ENDED 30TH JUNE, 1955.

Giving the year 1953 as a commencement point, the relevant production and sales figures for the years 1954 and 1955 were :—

Year.	Tons Coal Produced.	Sales Value.	Selling Price.	Cost of Production per Ton.
		£	£ s. d.	£ s. d.
1953	152,016	436,058	2 17 5	2 16 0
1954	124,154	376,008	3 0 7	4 5 0 (a)
1955	88,406	294,462	3 6 8	5 13 6

(a) Including Korean Contract losses.

The figures speak for themselves. If one of the major purposes of mechanization was to increase production, it could not but be considered for the years of 1954 and 1955 as anything but a complete failure.

Again it must be remembered that mechanization operated for only about seven months in the 1954 year and for little more than three months in 1955. However the difference of the figures as against 1953 cannot be explained away in this fashion even if it be remembered that 1953 was the best production year for a few years and the one year when production showed a marked upward swing. Nevertheless, 1954 was little better than the worst of the contract-mining years, 1951, and only equalled 1950 and 1952.

The periods of mechanized and hand mining in the two years were as follows :-

(1) A period of hand mining—from 1st July, 1953, to 7th November, 1953-93 days for a production of 49,500, i.e., 545 tons per day.

(2) A period of mechanized mining—from 7th November, 1953, to 30th June, 1954-145 days for a production of 73,500, i.e., 510 tons per day.

(3) A period of mechanized mining—from 1st July, 1954, to 13th October, 1954-79 days for a production of 47,700, i.e., 600 tons per day.

(4) A period of production idleness, following the disaster when the only coal available was in clearing the Dip, followed.

(5) A period of hand mining—from 1st January, 1955, to 30th June, 1955—say 110 days for a production of 32,357, i.e., say 300 tons per day from about 44 contract miners.

This tells a sorry tale. Before analysing the causes however we feel it advisable to indicate briefly certain aspects relating to lost time and labour turnover.

(ii.) THE SPREAD OF EMPLOYEES.

During the two years, this was as follows :—

Period.	Men at Face.	Others Under-ground.	Surface.	Adminis-trative.	Total.
1-7-53 to 3-11-53	75 Contract	113	115	21	324
3-11-53 to 30-6-54	35 Machines	120	107	22	284
1-7-54 to 13-10-54	36 Machines	107	101	21	265

These figures are approximate but indicative of the position. It will be noted that there is little improvement in the Men at Face and Men in Other Positions ratio.

(iii.) LABOUR TURNOVER.

The number of personnel was however showing an important reduction, but this could be due to the difficulty in obtaining replacements for the large number of resignations which are as shown hereunder :—

Yearly Period Ending.	Number at Beginning of Period	Retired.	Resigned.	Deceased.	Total.	New Appli-cants.	Number at End of Period.
30-6-54	342	5	72	2	79	30	293
30-6-55	293	4	95	7 (a)	106	49	236

(a) Caused by the disaster of 13th October, 1954.

These figures indicate that-

(a) Labour turnover fell in the period of preparation for mechanization.

(b) It reverted to its pre-mechanization period after the disaster and with the reversion to contract mining.

(c) New applicants were after 30th June, 1953 well below the total of separations from the mine.

(d) Unless the new applicants were experienced miners, the losing of good men would mean a drag on efficiency and considerable extra expense as a result thereof.

(iv.) MANSHIFTS LOST.

The following figures show the Percentage of Lost Manhours but only in respect of the two half years ended 31st December, 1953 and 30th June, 1954.

PERCENTAGE OF LOST MANHOURS.

Field.	Average from 30-6-50 to 30-6-53.	31-12-53.	30-6-54.
State Mine ..	14-15	15-06	12.22
Bowen Consolidated	9.87	8.59	10.11
Chillagoe	13.68	8.61	12.15
Rockhampton ..	12-26	14.08	13.53
Maryborough	13.15	14.54	13.07
Darling Downs	14.43	13.29	12.00
West Moreton	12.59	13.48	11.28

There is thus no marked difference in the Lost Manhours pattern, unless it be that the comparative position of the State Mine improved.

ABSENTEEISM.

Field.	Average from 30-6-50 to 30-6-53.	31-12-53.	30-6-54.
State Mine		6.09	5.37
Bowen Consolidated ..	3.51	2.44	2.09
Chillagoe	5.65	4.05	3.58
Rockhampton	2.94	2.67	2.98
Maryborough	2.95	4.53	4.38
Darling Downs	3.39	4.71	4.72
West Moreton	3.42	5.30	3.84

The figures at the State Mine worsened somewhat even though those of Bowen Consolidated showed notable improvement. The State Mine figures are however understandable as the men were asked to work a great deal of overtime and this almost invariably increases the rate of absenteeism. In our view therefore there is no really significant aspect in the increase in the rate and in any case nothing disclosed therein could in any way indicate any real contribution to the greatly reduced production.

SICKNESS AND COMPENSATION.

Field.	Average from 30-6-50 to 30-6-53.	31-12-53.	30-6-54.
State Mine	5.26	5.73	6.85
Bowen Consolidated	2.78	3.46	3.08
Chillagoe	4.75	4.05	4.86
Rockhampton	5.00	5.44	5.00
Maryborough	6.78	8.94	6.44
Darling Downs	6.02	6.32	4.28
West Moreton	5.23	5.81	5.41

Whilst there is a rise in rate, it does not seem to be significant. Again, extra overtime might quite easily account for the increase.

INDUSTRIAL DISPUTES.

Field.	Average from 30-6-50 to 30-6-53.	31-12-53.	30-6-54.
State Mine	3.52	2.63	
Bowen Consolidated	F98	2.59	3. 48
Chillagoe	2.33	.43	3.62
Rockhampton	3.21	5.45	1.02
Maryborough	1.62	.76	•51
Darling Downs .. .• ..	4.42	2.18	1.99
West Moreton	3.26	2.26	1•66

The fact that the State Mine showed no time lost through Industrial Disputes during the six months when mechanized mining was completely practised is somewhat surprising. It is in our view a justifiable conclusion that the men at least accepted mechanization. It will also be noted that during the period, the position at Bowen Consolidated worsened somewhat. Further reference to this aspect is made later in this Report.

OTHER CAUSES.

Field.	Period from 30-6-50 to 30-6-53.	31-12-53.	30-6-54.
State Mine	.75	•61	..
Bowen Consolidated	1.49	-10	1.46
Chillagoe	•86	.08	•09
Rockhampton	F12	.52	4.53
Maryborough	1.51	•31	1.74
Darling Downs	.49	•08	1.01
West Moreton	•64	•11	-37

It is quite evident that the pattern in Industrial Disputes is duplicated here, as again there is the significant aspect of no time lost during the six months' complete mechanized mining.

(v.) CONCLUSION.

That low production was the major cause of the financial losses is beyond dispute. However, from an analysis of all the foregoing figures it is necessary to consider some completely different factors.

Term II C (3).

The Causes of the Unsatisfactory Results.

If the causes of unsatisfactory production did not arise from lost manhours and labour turnover, it becomes necessary to seek those causes elsewhere. For this purpose, it is necessary to analyse the detailed working of the mine under mechanization in all its aspects. This involves an analysis of the mechanization aspects from 7th November, 1953, until the disaster on 13th October, 1954.

It is not surprising to find that, in the main, management blamed the men whilst the men blamed management, and they both blamed conditions and machines.

It is therefore proposed to examine these causes under the following headings :-

(a) Physical conditions.
- (i.) Roof conditions.
- (ii.) Excessive grades.
- (iii.) Ventilation.

(b) Machines and Equipment.
- (i.) The type of equipment.
  - (aa) Main Belt Conveyor.
  - (ab) Cutters.
  - (ac) Loaders.
  - *(ad)* Chain Conveyors.
- (ii.) Review of correspondence with the equipment suppliers.
  The future aspect.
- (iv.) Shuttle Car.
- (v.) Conclusions.

(vi.) Breakdowns of machinery.
(vii.) Bottlenecks.
(viii.) Maintenance.

(c) Union and Employees.
(i.) Union policy.
(aa) Exercise of job control.
Dargs and work restrictions.
Seniority.
Overtime and Saturday work.
Strikes and Disputes.
(ab) Reasons for Union control.
Opposition to Management.
Miners' Federation policy.
Fear of over-production.
(ac) Methods of Union control.
In relation to its members.
In relation to Management.
(ad) Union's answer to Management criticism.
Dargs.
Limitation of Earnings.
Opposition to increased production.
(ae) Management's efforts to overcome job cont; oi.
Supervision.
Persuasion.
Bargaining.
(ii.) Communist influence.
(iii.) Complaints against the men.
(aa) Loafing and lack of effort.
(ab) Hours worked.
(as) Carelessness.
(ad) Excessive spillage.
(ae) Indiscipline.
(iv.) Effect on Mining Operations.
(aa) Installation.
(ab) Boring and shot-firing.
(ac) Timbering.
(ad) Cutting.
(ae) Loading.
(v.) Sabotage.
(vi.) Stealing.
(vii.) Conclusions.

(d) Management.
(i.) Mechanization of Wrong Tunnel.
(ii.) Wrong Layout of Sections.
(iii.) Lack of Proper Cycle of Work.
(iv.) Lack of Adequate Training.
(v.) Lack of Maintenance.
(vi.) Surplus Employees.
(vii.) Conclusions.

4. General Conclusions Regarding the Reasons for Unsatisfactory Production.

(a) PHYSICAL CONDITIONS.

(i.) ROOF CONDITIONS.

The State Mine had experienced some roof trouble at various times during its working history. Not long before mechanization commenced, a local patch of bad roof was met in A.1 by the contract miners working there. It was only a small local fall and its effect was soon overcome.

Soon after mechanization commenced, there was a fall at the face of A.2 which did not interfere with operations because that level was practically finished. Consequently, the fall did not have to be cleaned up.

Actually, that was the first of the series of weak roof conditions which resulted from an area of bad roof of about 22 chains wide which stretched diagonally right across the mechanized section. The outbye edge ran through the fall at the face of A.2 through the A.4 intersection and right across the B side affecting the B side workings in that particular area. This area is shown in *Annexure No. 34.* This area of bad roof runs almost parallel with both the dyke and the fault and is so placed that every working place on the A side down to A.7 and on the B side down from B.4 either has had or will have to pass through it.

Annexure No. 34.

The fall experienced during mechanization occurred at the junction of A.4 and 3 West main dip and happened not long after mechanization commenced. This junction was 20 ft. wide across the tunnel and the same distance across the level. About 50 cu. yd. of stone fell. There was 4 ft. of roof coal under the stone.

This fall took 51 weeks, working two shifts a day, to clean up. The amount of time and wages involved, however, was not the really serious factor even though one loader crew was entirely off production for that period. The important and lasting effect arose from the fact that whilst the area was being cleaned up, no advance could be made in the Dip headings. This meant that instead of winning coal from places like A.4 and A.5 and B.5 and B.6, working places were restricted to those outbye the fall. This meant developing the wings instead of advancing down the Dip. Inevitably some levels were therefore driven further than the effective working lengths of the chain conveyors, causing the chain conveyors to become strained and consequent ill effects being felt in their use thereafter.

The most serious aspect from a poor production factor standpoint was that of nine places ready for production, the fall cut off five of them.

To summarize, therefore, the fall at A.4 had the following adverse results :—

(a) Wages for two shifts a day for 51 weeks had to be paid without production resulting.

(b) A loader had to be made constantly available for what was really non-productive work.

(c) The dip could not be advanced, only four out of nine places ready for production could be used, and there was the consequential restriction of the number of working places.

(d) Levels were driven further than efficient production warranted.

(e) Chain conveyors were strained and their subsequent use affected.

In giving these particulars to the Commission, Mr. Lightfoot added that, in his opinion, the fall should have been cleaned up in much less than 51- weeks.

Mr. Winstanley confirmed all of the adverse results of the fall but did not believe that the fall could have been cleared much more quickly.

Mr. Lightfoot maintained, and others supported, the view that the fall was not very bad in itself but its effects were important, nor was there a big area of bad roof encountered, and the area of bad roof disappeared fairly quickly.

Once the diagonal stretch of bad roof conditions had been plotted, it was possible to prepare for any area thus to be met, and no other happening after the nature of the fall at A.4 occurred.

Despite Mr. Lightfoot's statement that it was not a big area of bad roof and that this disappeared fairly quickly, clause 5 of the letter of the Minister for Mines to the Union (Exhibit 51) which was written on information supplied by Mr. Lightfoot, stated, inter alia, that immediately mechanization commenced, the working places encountered an area of country not previously disclosed by the wealth of geological knowledge available and a large proportion of the working places was subject to a very bad roof and extensive falls. This conflicts somewhat with Mr. Lightfoot's evidence, and we are inclined to the viewpoint that the evidence more closely corresponded with the position.

We have drawn three conclusions as to roof conditions. The first is that the only really important fall was at A.4 junction and the adverse effects of this were much greater than the extent of the fall inself would have led one to believe. It was the effects upon production which were important and not the amount of the fall.

The second conclusion is that the area of bad roof is well known and necessary action can be gauged accordingly.

Thirdly, having inspected the roof conditions operating in the mine, we are of the opinion that they cannot be classified as bad ; on the contrary, they are fairly good and we believe that roof conditions should not adversely affect production in the future.

(ii.) EXCESSIVE GRADES.

Any consideration of grades must commence with those which were known to the General Manager when he made his decision to mechanize No. 1 Tunnel. On analysing this information, the conclusion is reached that in No. 3 West Section of No. 1 Tunnel the grades were known to be fairly steep in the main dip. Inbye of No. 4 Drivehead the grades (shown in Exhibit 42) were :-

1 in 7.7 for a distance of 80 ft., then

1 in 4.7 for a distance of 160 ft., then

1 in 4.4 for a distance of 200 ft.

From the old Supply Base, which is the level on the outbye side of A.1 down to A.3, the grade was 1 in 5 for a distance of 260 ft. and this would have been known to Mr. Lightfoot before selection of plant. Reduced levels in the west of the No. 4 West level in No. 1 Tunnel parallel with the main dip in No. 3 West would also have been known, and these showed a grade of 1 in 5.

The grade from No. 4 Bore to the face of 4 West is 1 in 7, whilst from A.1 level in the 3 West main dip to Bore 15, the levels were also known and indicated an average dip of 1 in 7.

The above information available to Mr. Lightfoot together with the levels from Bore 15 and Bore IA gave an average dip of 1 in 7.2, not allowing for any fault which was presumed to exist across the Dip.

Mr. Lightfoot confirmed this in his evidence by saying that the known information disclosed average grades of about 1 in 7 or 1 in 7.2 and that the boreholes obviously would not show the true profile of the grades. He endeavoured to satisfy himself as to the behaviour of the anticipated fault (a very important factor) by inducing a fall in No. 2 Tunnel and he was then able to take into account this factor in arriving at his conclusions as to grades ahead. His average grade of 1 in 7.2 was deduced from his information as to known workings, bores, 15 and 1A and working places in No. 2 and No. 1 Tunnels.

This was, however, an average and only an average, and as Mr. Lightfoot himself put it, " My average came out rather accurately. The peaks did not." He indicated that the workings disclosed local grades steeper than those anticipated. He had figured on a maximum of 1 in 4.8 but there were isolated peaks which have been 1 in 3.6 in one or two short distances. Actually, the grades in his view and on interpretation of the plan, ran close to 1 in 5 or 1 in 6.

It is of interest to note that when tenders were originally called for plant to be used in mechanized mining, it was stipulated that the machines should be able to negotiate grades of 1 in 6. It will be remembered, however, that the original tenders were called in relation to the mechanization of No. 2 Tunnel. Some time subsequently, but before tenders were actually accepted and the plant ordered, Mr. Lightfoot changed to No. 1 Tunnel and the specification covering the plant actually ordered was altered to provide for operation of the cutters and loaders on grades of 1 in 4-8.

Mr. Lightfoot said that after mechanization commenced, the grades became somewhat steeper, at least in some instances, and indeed rapidly became the steepest that were met from the commencement of mechanization. Gradually over the period of mechanization, they commenced to ease and the easing became more apparent about June, 1954, and actually by the time Mr. Fallins made his inspection, Mr. Lightfoot maintained that they had been out of trouble for some time as far as grades were concerned.

Mr Lightfoot readily agreed that the steeper the grades, the harder the working conditions and the more maintenance was required, and this was never challenged ; indeed, it seems a commonsense conclusion. There is little doubt, too, that the worst hold-ups occurred where the grades were steepest, and as will be seen when examining the performances of the machines, exceedingly difficult grades caused endless troubles. They made it more difficult to cut, more difficult to load and much more difficult to tram. Mr. Lightfoot's opinion was completely substantiated by others. Mr. Winstanley stated that the grades, in his opinion, were very steep, particularly in the cut-throughs. He felt that the machines were used on steeper grades than those originally anticipated. With a steep grade, Mr. Winstanley said the cutter could not get right to the face and the blade could not get right into position. He had actually seen the difficulties that were encountered by the cutter because of grades, and at times the blades could not go in even 8 ft. He had also seen a loader bogged at an intersection and on account of the steepness of the grade, the loader was stationary whilst the tracks were revolving. When loading in a bord with a bad grade, the loader had a tendency to veer down. Difficulties experienced because of excessive grades were discussed with Overmen (particularly to avoid bogging), but little success was achieved in solving the problems, and it became largely a case of worrying through the difficulties until the grades improved. One of the effects of the steep grade and the consequent difficulty of tramming was that grunching was used instead of the cutter and an analysis of the work suggests a considerable number of grunched places.

Mr. Winstanley was of the opinion that poor production could be traced much more to bad grades than to any other single cause. The poor results from machines, breakdowns and bottlenecks all had some part of their origin in excessive grades.

The evidence given by Mr. Fallins in relation to the grades was carefully studied by us. Mr. Fallins made the initial comment that different circumstances operate in using mechanized equipment as against hand-mining methods. An excessive grade may not have a very adverse effect on production under hand-mining methods but could play havoc with production under mechanization. It was this central fact that prompted him to say that the more information which could be obtained in relation to grades, the better the chance of success, particularly under mechanization. So important was this that he discussed the matter with Mr. Lightfoot and suggested it was far too risky to design layouts " in the dark " as to the general behaviour of the seam.

Mr. Fallins in his inspection asked Mr. Winstanley to point out where the faces were when the mechanized plant was installed and he examined this whole area and found that the grades were 1 in 5, 1 in 4, and attained a maximum of 1 in 3.6.

Mr. Fallins then stated that the grades such as these were too steep for mobile face equipment but he understood that changes had taken place between the date of ordering and delivery due to a local disturbance, and that consequently the officials of the mine were starting at a disadvantage. Indeed, he made the statement that if such conditions were known at the time, it would have been unwise to recommend such an installation on such grades.

As indicated earlier he drew attention to the fact that conditions such as those which had been experienced could not be classed as either flat or inclined and that they would be much better if they became steeper. In his view, they were the worst class of gradient for any type of mining equipment, being neither one thing nor the other.

This evidence promoted a number of questions which were directed to Mr. Fallins. He was asked to elaborate his views on the type of equipment ordered in relation to the grades experienced. He repeated that with the grades as they were known at the time of ordering the plant, that plant was the correct type to order. He indicated that the places where the workings were at the time the plant was ordered had been pointed out to him and he felt that the installation of the machinery actually installed was justified. He further stated that in the case of Collinsville, there was information to the right, to the left and ahead of No. 2 Tunnel and there was nothing to indicate from a mining man's viewpoint that anything untoward would happen between when the plant was ordered and when it was installed.

At the time of Mr. Fallins' inspection—September, 1954—he was of the opinion that the work had advanced through what appeared to be the worst part of the conditions and the faces he saw were much improved over what they had been in the early stages. He ended by saying " I see no reasons why the existing plant cannot continue while the improved conditions apply."

Whilst Mr. Fallins had expressed the opinion that had the actual grades been correctly foretold a different type of equipment should have been ordered, he nevertheless disagreed with the suggestion that many of the troubles of the mine could be accounted for by the steep grades, because he took the view that difficulties in local conditions are inseparable from mining. He gave an example from his own experience with Broken Hill Pty Ltd. when they had to negotiate faults of 1 in 7 with machinery which was quite unsuitable for grades of that kind. He did say, however, that it was beyond doubt that the grades would make the machine operator's task more difficult.

In his letter to Mr. Lightfoot in answer to one from the latter and another from the Department of Mines regarding the machinery, Mr. Mollohan, as a representative of the Jeffrey Manufacturing Co. supplying the equipment, suggested to Mr. Lightfoot some ways of overcoming the steepness of the grades, and reference is made elsewhere to his plan of driving cut-throughs at a 45-degree angle, which would eliminate the steep grades and bring them down to about 1 in 8. He also drew attention to the fact that several cut-throughs were driven on the full rise and these and the Dip were the steepest places encountered.

Mr. Mollohan suggested in his letter that the loss of output being experienced was due to the grades and added that undoubtedly much more wear and tear on the machines could be expected on the steeper grades. He gave the instance that Caterpillar tracks on ordinary grades should give at least 12 months' service but in respect of one machine, a link had been taken out in February after three months' service. He amplified this by saying that the Collinsville State Coal Mine conditions with excessive grades and travel over pans and timber meant that the three months' service there was the equivalent of the ordinary 12 months' service elsewhere.

Conclusions.

1. There is no doubt in our minds whatsoever that the severe grades played a most important part in the reduction of production and because of the effect in so many different ways, we believe it to be the greatest single factor in production being reduced to unpayable levels. They created difficulties in cutting, in loading, in tramming, caused frustration amongst operators, strained the machines, caused breakdowns, contributed to bottlenecks, made maintenance much more costly and much more necessary, and generally increased very greatly the non-productive time. As the grades improved, so did these various factors and consequently production also improved. We believe that the steeper the grade became, more than proportional difficulties ensued. Thus a change in grade from 1 to 6 to 1 in 4.6 might create very great difficulties and greatly reduce production of coal. A change from 1 in 4.6 to 1 in 3 might promote unworkable conditions.

2. We do not agree that the grades deteriorated during the period between when the plant was ordered and when it was installed. Mr. Lightfoot contended that this was so and Mr. Fallins reported it, but his was apparently hearsay evidence and he did not indicate that he had worked it out for himself. Actually, the position was that the grades in the Main 3 West Tunnel up to A.3 were known to the General Manager before his decision was taken to mechanize that area, and we have already referred earlier to what was known by him at that time about the grades in general. From the time the plant was ordered until the plant was installed and operating, the 3 West main dip advanced by hand methods from approximately A.3 level to B.5 level—a distance of 225 ft. The difference in level at these two points (plus 88 ft. to plus 62 ft.) is 26 ft. and this gives a grade of 1 in 8.65. The difference in level for a distance of 265 ft. on the outbye side of A.3 level is plus 145 ft. to plus 88 ft.—a difference of 57 ft. in 265 ft. and, therefore, a grade of 1 in 4.65. It is not true, therefore, to say that the grades got worse during the period between the ordering of the plant and its installation. In point of fact, the grades improved. It is important to remember this when it is borne in mind that Mr. Fallins gave the worsening of the grades (when in fact they improved) as one of the justifications for ordering that type of plant. Some additional figures are also interesting. When the plant commenced operation in the main dip 3 West, the reduced level was plus 62 ft. at B.5. The reduced level near the face of the Dip at A.13 is minus 25 ft. With the difference in level of 87 ft. in a distance of 530 ft., the grade from B.5 to A.13 is 1 in 6.1. Similarly, the average grade for a distance of 495 ft. on the outbye side of B.5 is plus 145 ft. to plus 62 ft., a reduced level of 83 ft. in 495 ft., giving an average grade of 1 in 6. Those figures also highlight this factor—that the average grade in the main dip from the time mechanization started until it ceased on 13th October, 1954, was the same average grade as for a similar distance prior to mechanization starting. It seems, therefore, that the estimates of production which could be achieved from grades of 1 in 6 were either too high or, alternatively, that whilst grades of 1 in 6 could be successfully worked, there was an under-estimation of the adverse effect upon production which would result from the more excessively steep grades bound to be encountered in order to arrive at an average grade of 1 in 6, when it is now known that some grades are as good as 1 in 11. There is some doubt as to whether 1 in 6 would have allowed or did, in fact, allow satisfactory working. There is no doubt that when the grades became steeper than 1 in 6, production suffered very greatly and in the very steepest part (Mollohan mentioned 1 in 3), it was a case of get through as best one could.

3. Evidence was given by a number of witnesses that the conditions in No. 1 Tunnel were such as to make local undulations a constantly recurring feature, and if difficulty was to be experienced once the grade became worse than 1 in 6, then there would be much interference in production, for production can only operate when loaders are loading coal. A machine which spent one-quarter of its effective working time on flitting on grades of 1 in 6 could well spend more than half of its effective working time in flitting on grades of 1 in 3.6—in other words, the lost time would be accentuated and would be much more proportionate as the grade grew in difficulty.

4. The adverse effect of steep grades was shown to us so conclusively as being a most important handicap to production that we believe there will be recurring troubles and serious loss of output in the future from the same causes—as the grades improve, the output will go up, as they get worse, it will reduce. This will be true even though familiarity with the machines and extra training may help to minimise adverse effects. It seems, therefore, a justifiable inference that future success in the mechanized operations of the mine (and profitable results) can only come either if and when the grades improve or ways and means are found to overcome the worst of the difficulties experienced as the result of excessive grades. Any future scheme which can provide an improvement in the grades should constitute a major step in the improvement of results.

(iii.) VENTILATION.

Whilst evidence was given in relation to ventilation, we were not left with the impression at any time that this was a serious factor in the reduction of production. It is true that if conditions in the mine caused much discomfort, some effect upon production must have followed.

Evidence was given that at times the mine conditions were such as to necessitate a two-thirds shift. It is obvious that a two-thirds shift would reduce production to two-thirds of what it would normally be, without taking into account any extra reduction consequent upon bad conditions. The number of two-thirds day shifts, however, was insignificant and the total effect upon production, therefore, also insignificant.

Conclusion.

Ventilation was something very much more under the control of the Mine Management than was, for example, grades, and if there was any adverse effect upon production, through ventilation, it really came back to a question of management as to why it was not altered. We believe, therefore, that this factor can be ignored in relation to its effect upon production.

(b) MACHINES AND EQUIPMENT.

(i.) THE TYPE OP EQUIPMENT.

The evidence before the Commission abounds in examples of difficulties and stoppages experienced with the equipment and it is immediately apparent that, irrespective of the causes for such, here must be one of the major causes of production reaching unprofitable figures.

In general, the four complaints voiced against the equipment were :-

(a) They were not suitable for the job ;

(b) They would not do the job ;

(c) They were not up to specifications ;

(d) They broke down too often because of weaknesses ;

(e) They were faulty.

This led to the general charge by the Union and the employees that the wrong type of equipment had been purchased.

It will be remembered that the equipment consisted primarily of :-

(aa) A main conveyor belt ;

(ab) Cutting machines ;

(ac) Loaders ;

(ad) Chain conveyors ;

(ae) A shuttle car ;

together with the great mass of auxiliary equipment necessary in such an installation. It is now proposed to examine these individually.

(aa) MAIN BELT CONVEYOR.

It was admitted on all sides that a very good job had been done in the general installation and on all sides praise was given in respect of the main belt conveying system. This appeared to have been first-class equipment ably installed. It met all demands placed upon it and no word of criticism against it was voiced by the employees or anyone else.

(ab) CUTTERS.

These too met with general acceptance. There was criticism that the cutter blade did not go in the full distance but in the main the responsibility for this was placed on the operators. Nevertheless Mr. Winstanley said that in certain cases it was impossible to get the cutter blade in to the full length. The men supported this somewhat as a defence against the charge made, particularly by Mr. Lightfoot, that the cutter bar was not inserted to its full depth. In any case, the major emphasis was either on an excessively steep grade or on the human agency rather than upon any defect in the machine.

To what appears to be a more limited degree as compared with the loader, the cutter did have some difficulty in negotiating steep grades and in tramming, but this did not figure at all prominently in any of the evidence.

Particularly in view of the very difficult grades, we believe it to be a fair conclusion that the cutters did give satisfactory service.

(ac) LOADERS.

The complaints against the loaders were :-

(a) They were not suitable for the job.

Despite the articulated head and one or two other features, the loaders were not suited to the conditions experienced. For example, their overall length and other disabilities made handling them extremely difficult, particularly round an intersection. Furthermore, excessive damage to cables was almost unavoidable. The totally inadequate gearbox clearance caused endless trouble, as did also the fact that on severe grades the oiling system refused to function and the hydraulic system generally was unsatisfactory.

(b) They would not do the job.

Partly because they were not suitable, the machines had too many disabilities to do the job. For example—

They slipped on the floor and veered towards the bottom rib ;

They were always extremely difficult to handle on the bad grade pinches as they would not climb but the caterpillar tracks merely spun.

(c) They were not up to specifications.

They were supplied on the understanding that they would give satisfactory service in grades of 1 in 4.8. Whilst grades steeper than this were experienced, the loaders did not give anything like satisfactory service at 1 in, 4.8, and probably not at 1 in 6.

(d) They broke down too often.

Certainly there seemed endless trouble in breakdowns. The records put this beyond doubt and evidence given by some witnesses about " there always being mechanical trouble and never being free of it " seemed to typify the general feeling.

(e) They were faulty.

Some of the workmanship was of poor standard, as for example in welding, and consequently parts broke, such as shoes between the caterpillar idlers and brackets on hydraulic brakes. Loose studs and bolts also caused trouble.

The net effect of these various disabilities was—

Breakdowns were constantly occurring ;

Bogging became at least a weekly and often a daily feature ;

Tramming was often particularly difficult and very time-consuming ;

Uncertainty developed in handling situations ;

The most economical method often gave way to the one which had a chance of succeeding.

The result of all the foregoing was inevitably a very serious reduction in production as against what had been anticipated—a reduction which very largely in itself explains the unprofitable operations of the mine.

In addition—

The repair of cables and provision of new cables reached excessive proportions ;

Hydraulic hoses were similarly always in trouble ;

Excessive amounts of oil were used ;

Lubrication was much more difficult ;

Tensioning problems arose ;

Maintenance was much heavier.

That these troubles with these machines did occur is undoubted and not disputed by anyone. The apportionment of blame for their happening, however, was extremely controversial and could be summed up as follows : —

Mr. Lightfoot in his evidence blamed the men most vehemently and the loaders a little.

Mr. Lightfoot, in letters quoted later, greatly blamed the loaders and ignored the men.

Mr. Winstanley blamed the equipment particularly and the men somewhat.

Mr. Stansbury blamed both the men and the machines.

Mr. Fallins blamed the men much more than the machines.

Mr. Mollohan blamed the men mostly but also the Management, but took steps to alter or adjust certain defects.

The Overmen blamed the machines and, on odd occasions, the Management.

The Men blamed the machines in particular but also the Management.

It must immediately be added, however, that, where blame is given to the equipment, almost invariably a rider is added by all parties to the effect that all the difficulties were greatly accentuated by the excessively steep grades.

There appears to be little doubt that the grades magnified some of the difficulties. The machines were apparently very difficult to handle on the steep grades and, whilst it was denied, the men seemed unanimous in their opinion that the machines did slip on the floor and veer towards the bottom rib. Even Mr. Lightfoot admitted that in one very severe grade the caterpillar would not climb but the caterpillar tracks would merely spin. On that occasion a winch was obtained to help the machine.

The difficulty of handling the machines contributed to one of the major causes for complaint—the excessive bogging which was encountered. The men maintained that this bogging caused a great deal of lost time and therefore lost production. This is beyond doubt. Sometimes the bogging was so serious that a loader might be out of action for days.

Frequent difficulty of tramming round an intersection was experienced and problems of this kind were given by the employees as one of the major reasons why so many cables were damaged or destroyed. The cable problem was serious—so serious in fact that from time to time cable repairs were virtually on a hand-to-mouth basis.

There was strong evidence that a great deal of trouble arose in connection with the hoses, and indeed stronger hoses had to be procured in order to stand up to the strain imposed upon them.

In the main, however, the foregoing problems did arise out of the conditions and it is perhaps a justifiable assumption that, had the conditions been better and the grades not so steep, many of them would not have occurred.

As far as the machines themselves were concerned, the caterpillar tracks did give some difficulty and it was necessary on two or three occasions to take links out. Effective maintenance could well have minimised difficulties of this kind.

Most of the criticism of the loaders, however, concentrated around the overhanging gearbox. The clearance certainly did not appear to be sufficient to enable the grades which were encountered to be negotiated without a great deal of difficulty. There seemed to be general acceptance that the clearance was much too limited and many of the troubles which resulted in unsatisfactory production arose from situations which were primarily caused by the overhanging gearboxes.

A further weakness in the loader was that, when the grades became very steep, the oiling system refused to function satisfactorily and it became necessary to use immensely more oil. Furthermore the machine had to be stopped in order to apply fresh oil to replace that which had been wasted. Apart from the expense involved in the excess oil, this could not be done quickly.

These, then, were in the main the charges levelled against the loader, and there is a great deal of evidence to support these contentions. There is of course documentary evidence of the time lost by some of the causes, but the difficulty of making judgments in connection with the efficiency of the machines is to be found in the fact that, whereas the men most frequently blame the machines and the faults and shortcomings in them, Mr. Lightfoot, Mr. Mollohan and at least to a certain extent Mr. Fallins mainly blame the men, maintaining that many of the troubles experienced were caused by pure carelessness on the part of the men in the handling of the machines.

Mr. Winstanley, however, felt that there was justification for at least some of the statements made by the men as to the weaknesses of the loaders. He himself was satisfied, for example, that the gearbox clearance was unsatisfactory, and indeed this appears to be almost beyond dispute.

In the main, defence of the machines is to be found in the statements by Mr. Mollohan. He maintained that a great deal of the difficulty which undoubtedly was experienced by the loaders was due to—

(a) Carelessness by the men ;

(b) Lack of attention to maintenance ; and

(c) Lack of ingenuity in avoidance of steep grades by, for example, angular cut-throughs.

In relation to the first two causes Mr. Lightfoot and Mr. Mollohan were in complete agreement.

As far as the responsibility of the men for bogging the loader was concerned, for example, they both strongly contended that there were two major causes, both of which were the responsibility of the men and could have been avoided by them. The first was the excessive water which was used by the men and which rapidly set up bogging conditions which almost ensured that there would be trouble. The second factor was that the men did not worry about keeping the floors clean. It was the fact that this was not done that caused the trouble with the gearbox. Had the floors been kept clear of loose coal, the clearance of the gearbox would have been sufficient. The loose coal, however, set up a condition wherein the gearbox was likely to strike trouble and therefore all too frequently the loader was bogged.

Mr. Fallins, too, drew attention to the fact that a lot of the trouble could have been avoided had the floors been kept clean and he drew attention to the amount of loose coal scattered about.

It is rather curious, however, that the men almost unanimously maintained that it was essential to have coal on the floor, otherwise the loaders could get no grip and no progress at all could be made. In this they were supported by Mr. Stansbury and Mr. Winstanley, and the conflicting evidence in this regard is most confusing.

Both Mr. Lightfoot and Mr. Mollohan were very definite in their viewpoint that the machines could not slip and (whilst this was perhaps a little contradictory) maintained that, if they did, then it must be by human agency of a careless kind. Indeed, Mr. Lightfoot maintained that the excessive use of hoses and the inordinate number of destroyed and damaged cables were either rank carelessness on the part of the men or something worse.

They both pointed to certain favourable factors in connection with the loaders, particularly the articulated head, to show that this type had at least one or two important advantages over other types of loaders and should have made the task of the men easier.

Nevertheless there was an admission by Mr. Lightfoot, and virtually one from Mr. Mollohan, that the gearbox was a source of constant trouble. Mr. Mollohan promised to investigate the possibilities of increasing the clearance of the gearbox by 1 in. and took this matter up with his principals. There was an indication in his evidence that he did this more to placate the men rather than that he thought it was strictly required, but in our view there was in this something of a natural defence of the supplier for his machinery.

Though not as definite as either Mr. Lightfoot or Mr. Mollohan, Mr. Fallins did in the main support their contentions that there should not have been as much trouble with these loaders as was experienced, and in this he felt the men must take the major blame.

(ad) CHAIN CONVEYORS.

As against the major differences of opinion in connection with the loaders, there was almost unanimity in the contention that a great deal of trouble was experienced with the chain conveyors when they operated over 300 ft. but more divergence of opinion under that distance.

The complaints against the chain conveyors were :-

(a) They were not suitable for the job.

This contention largely arose out of the troubles experienced. In addition, however, a number of witnesses were of the opinion that shuttle cars were much more suited to the conditions experienced. The difficulty of where to lay the conveyors, of frequent crossing them with cutters and loaders; of the necessity for shuttle, tandum, and double loading, of excessive spillage, all were urged as reasons for the unsuitability of this type of conveyor for the purpose for which it was used.

(b) They would not do the job.

Where this argument was raised, it was pointed out that the capacity of the chain conveyor was three tons per minute and this meant reducing the loading capacity of the loader accordingly. In certain cases, loading at one point had to discontinued or curtailed so as to allow it to proceed at another.

(c) They were not up to specifications.

The conveyors were specified as having a loading rate of three tons per minute and would handle that tonnage up to 450 ft. It was contended that they did not stand up to this guarantee and that whilst difficulties were greatly increased as a result of longer distances, they were often unsatisfactory at shorter haulages well below the specification.

(d) They broke down too often.

As with the loaders, evidence abounds as to the truth of this statement. The breakdowns were the somewhat natural result of the difficulties in *(a), (b),* and (c) above.

(e) They were faulty.

There is strong evidence to support this. There were, for example, weaknesses in the driving units and the company took steps to remedy this. Stronger heads were needed, and tension difficulties were such as to suggest faults in design.

The net effect of these disabilities was—

Breakdowns were constantly occurring and became virtually a daily feature.

Restriction of loading onto the conveyors became commonplace.

These factors aggravated the reduction in production that commenced with the loaders. It must be remembered that breakdowns of the chain conveyors would often occur *when the loaders were able to work,* not when they were broken down.

As with the loaders, the liability for the unsatisfactory working of the chain conveyors was placed by different people in different directions, but there was a more general acceptance of misgivings about the efficiency and suitability of the chain conveyors.

Again, as with the loaders—

Mr. Lightfoot, in his evidence, blamed the men vehemently, and the machines somewhat.

Mr. Lightfoot in letters quoted later, greatly criticised the machines and ignored the men.

Mr. Winstanley blamed the machines.

Mr. Fallins blamed the men but did not regard the machines favourably.

Mr. Stansbury blamed the machines (there was a " defect in design ") and the men.

Mr. Mollohan blamed the men somewhat, but admitted weaknesses in the machines.

The Overmen blamed the machines.

The Men blamed the machines.

The difficulties experienced made themselves evident in stoppages (often caused by straining or breakages) and in overloading and spillage. It was suggested by Mr. Mollohan and Mr. Lightfoot that the overloading was either deliberate or through carelessness, but there is reason to believe that the difficulties were a somewhat natural result of using the conveyors for distances more than 300 ft.

In this connection it must be remembered that it was the fall in A.4 which largely set the seal upon distances greater than the 300 ft. The closing off of the Dip meant the undue extending of the levels. This in turn meant the extra strain upon the chain conveyors.

Apart from this factor, however, there were certain weaknesses in the driving units and indeed the Jeffrey Company took steps to remedy this. The alteration which they suggested in the drive-head unit is expected to overcome the difficulty which had been caused by the original weakness there.

Tension arrangements caused some difficulty but it is conceivable that this problem would have been eased if excessive distances had not been necessary.

It is interesting to note that several of the witnesses suggested that, instead of the chain conveyors, shuttle cars should be used. The stoppages of the chain conveyors undoubtedly contributed to lower production and it was not unnatural, therefore, to think in terms of shuttle cars which could have avoided the serious and frequent stoppages.

In the main, the consensus of opinion was against shuttle cars on the grades which were being experienced. Most of the witnesses felt that the grades were too steep for the successful operation of shuttle cars but agreed that, if the grades eased up to, say, 1 in 7, shuttle cars seemed to offer definite hopes of improvement. One of the people who advocated the use of shuttle cars, even on the grades being experienced, was Mr. Fallins. Indeed, it is probable that his opinion was more definite than that of anyone else. At best, however, the consensus of opinion was that they could be no more than an experiment if the grades did not improve.

(ii.) CORRESPONDENCE WITH THE SUPPLIERS OF THE EQUIPMENT.

No consideration of the equipment problems can possibly ignore three letters dealing with the machinery and its performance in the mine

The first, dated 6th April, 1954, was from the General Manager to Underhill Day & Co. Ltd., the Brisbane Representatives of the Jeffrey Manufacturing Company of Columbus, Ohio, U.S.A., the suppliers of the chain conveyors, loaders and cutters ; the second, dated 7th April, 1954, was from the Under Secretary, Mines Department, to Mr. R. Knode, the Overseas Manager of the Jeffrey Manufacturing Company, and the third, dated 6th May, 1954, was from Mr. Mollohan, the Australian representative of Jeffrey Manufacturing Company, under the letterhead of Perkins (Aust.) Pty. Ltd. (Exhibit No. 156).

" Department of Mines,

Brisbane, 6th April, 1954.

Dear Sirs,

JEFFREY EQUIPMENT-STATE COAL MINE, COLLINSVILLE.

We wish to advise you of the very unsatisfactory performance of the Jeffrey equipment purchased through your firm for the State Coal Mine, Collinsville.

61 *WH Chain Conveyors.*

These units are provided with a safety device by way of shear pins fitted in case-hardened bushes in the keyed-on boss of the headshaft. This boss has three such holes, obviously for the use of up to three pins as the conveyor is progressively lengthened. However, the three holes in the loose driving sprockets are all bored out of pitch with the result that only one of such can be utilised. This demands a special steel pin which is obviously too strong when the conveyor is running at short centres and too weak in most cases when the conveyor reaches 70-80 yds. We have had to bore new holes at correct pitch in each sprocket and bush them.

The arrangement by which the head-end section of these conveyors is attached to the driving unit is deplorably weak, and the tension arrangements for the driving chain are most unsatisfactory. When on short centres, it operated satisfactorily, but when the conveyor reaches 40-50 yds. even though tensioned correctly, immediately it becomes fully loaded the head-end either lifts up or is pulled sideways to such a degree that the roller chain becomes slack and hurdles around the sprocket with very severe shocks to the chain and frequent breakages of the roller chain and constant shearing of safety pins.

When the conveyors are lengthened to 80-100 yds., we are finding that this holding down and tensioning gear on the drive end is becoming badly bent and twisted, so much so as to cause considerable trouble in taking them apart for transfer to other points, and they must be straightened in the workshops before further use.

Coal Cutters.

One coal-cutting machine was found to have a bracket off the hydraulic brake shoe broken off and the welding, upon inspection, was found to be only a very light single run on the sides with no end welding whatever.

Coal Loaders.

The overhung gear boxes on these machines are so close to the floor that with the cat tracks in a slight depression they come in contact with the floor and the machine is incapable of being moved on that side. This is accentuated when flitting upon the level course, Our grades average 1 in 7 and peak to 1 in 4, and these overhang gear boxes are constantly engaging with the floor on the top side. This not only prevents efficient tramming, but is also placing considerable stress and causing wear and damage to the bottom of the gear case with loss of oil and replacements of gaskets.

This matter was taken up with Mr. Mollohan on several occasions last year and he is fully conversant with this very bad feature of the design and the loss of output thereby. He promised to investigate the possibilities of increasing the floor clearance of the gear boxes by way of an increase in the diameter of the cat-track idlers, or some other alternative. To date we have not heard from him or from any other persons of any action in this matter.

We have had two very serious incidents wherein two loaders ran away out of control on the full Dip and investigation showed that the bracket on the hydraulic brakes had broken off and the welding was found to be of the lowest possible standard. Whilst no persons were injured, timber was dislodged, the loaders were brought into disrepute, and we lost considerable output.

Several of the loaders have had the shoes between the cat-track idlers break off. One machine has had three break off on one side and two on the other side. An inspection again disclosed that the welding is of a very poor standard. To replace these is a very costly process, and we lose considerable coal due to inefficient tramming when they break off, as the machines will not flit back up the grades without these shoes.

Prior to placing the order for these loaders the point was stressed that we feared the lubrication system would not be efficient upon our grades. Mr. G. Cargal gave his personal assurance that our fears would be groundless and Mr. Underhill stated that as we had the Jeffrey Company's assurance through Mr. Cargill, then we would have no worries in this direction. However, we are now finding that the lubrication and/or hydraulic system is most unsatisfactory, particularly in the Dip places.

When working to the Dip the oil gathers in the two large gear cases and cannot gravitate back to the main tank nor be pumped back. The result is that we have an excess spillage of oil and have to resort to removing the drain plugs in the bottom of the large gear cases, recovering the oil in drum feeders, and returning it by hand to the main tanks. This is obviously resulting in unnecessary oil consumption, and loss of output and causing discontent from operators who are constantly coming in contact with excess oil.

Our oil consumption over five months for the three cutters and six loaders has averaged 30 gallons per 24-hour day, which represents a cost of £75 per week for oil alone.

In addition to the above we have found that there were many loose studs and bolts and hydraulic nipples, upon delivery of the cutters and loaders, and to tighten same also resulted in losses in output.

To summarise these matters we set them out as follows :-

(1) The head-end arrangement of the 61 WH conveyor is most unsatisfactory and the three holes in each sprocket should have been at correct pitch.

(2) The welding upon the parts mentioned discloses a deplorably low standard and gives one the opinion that no inspection is made of the gear before dispatch to customers.

(3) The overhung gear boxes with their low clearance render this type of loader unsuitable for operation upon our grades. This was stressed to the Jeffrey representatives and agents and it is the responsibility of the Jeffrey Company to effect modifications to enable them to operate efficiently.

(4) The lubrication and hydraulic system upon which assurances were requested and given has proved unsatisfactory and it is the responsibility of the Jeffrey Company to remedy this defect.

You can probably gather from the above our general dissatisfaction with this plant. Whilst our grades are steep, this was stressed at all times, and the equipment provided was stated to be designed to operate efficiently under our conditions.

This is the first mechanised colliery in this State and future sales of equipment depend largely upon our results. Whilst the results to date have been unsatisfactory, we feel that if your firm and the Jeffrey Company take the necessary steps to overcome the defects mentioned, the project can still be a successful one and will probably promote further sales of your equipment.

Yours faithfully,

(Sgd.) A. LIGHTFOOT,
General Manager."

AIR–MAIL

7th April, 1954.

L/C.

Dear Sir,

JEFFREY EQUIPMENT—STATE COAT, MINE, COLLINSVILLE, QUEENSLAND.

We enclose for your information a copy of a letter from the General Manager, State Coal Mines to Messrs. Underhill Day & Co. Ltd., in connection with the performance of the Jeffrey conveyors, cutters, and loaders purchased for use at Collinsville.

The results obtained to date have been most unsatisfactory and the performance of this plant is causing this Department grave concern. The future sales of mechanized equipment in this State depends to a large degree upon the success or otherwise at Collinsville, and we are very keen to encourage the coal operators to modernise their collieries. However, to date, chiefly due to the defects stated in the plant, our production cost has been considerably higher than that obtaining under hand-won methods.

The severe grades and other local conditions were stressed to your representatives and we were given assurances that the special features of this equipment would ensure their efficient operation.

There has been a capital outlay in the vicinity of £600,000 at this colliery, and we shall have to seriously consider the abandonment of this as a mechanized project, unless your plant is brought up to standard required, and operates with a reasonable standard of efficiency.

We shall be pleased to provide you with any information you or your agents may desire in connection with the performance of this plant, and would suggest that the total price of plant purchased from your firm in this instance should merit a very full and complete investigation into its performance.

Yours faithfully,

Under Secretary.

Mr. R. Knode,
Overseas Manager,
Jeffrey Manufacturing Co.,
Columbus,
OHIO,
U.S.A.

LM/MM

6th May, 1954.

Mr. Athol Lightfoot,
General Manager,
State Coal Mine,
Collinsville, Queensland.

Dear Athol,

Following my visit to Collinsville and our telephone conversation, I will outline what I found.

Hydraulic system on L-6000 *Loaders.*

Someone had been adjusting the relief valves and reducing valves on the low pressure side of the system. On the tramming pump where the pressure was supposed to be set at 700 lb. coming out of the relief valve and going in to the accumulator, and the pressure reducing valve was to be set at 450 lb., I found the two valves set at well over 1,200 lb. The gauge I had would only read 1,200 lb. and on five of the machines the gauge hit the top.

On the No. 6 loader I would be safe in saying there was 1,800 to 2,000 lb., and that was the cause of your gear boxes filling up with oil. The operating clutches and the brake cylinders were not designed to operate under that high pressure.

On the No. 6 loader, while I was testing it to find the trouble, I found that there was hydraulic pressure in the gear box, and the oil was coming out around a gear cover at the bottom in spurts when we operated the tram lever. I have instructed Roy Nutt the fitter on the necessary adjustments, and I see no reason why these adjustments should be tampered with.

I have reason to believe that the high pressure caused the brake bands to give way, for the brake cylinder pressure is only 450 lb. per square inch and it was set up to well over 1,200 lb. I would be safe in saying 1,500 lb. to 2,000 lb., for the 1,200 lb. gauge hit the top with a heavy force. Fitters Mills and Pickett were instructed on these settings on my first visit to the mine.

On the two machines working in the dip headings on a grade of 1 ft. in 3 ft., 1 ft. in 3-i ft. and 1 ft. in 4 ft., the gravity drain on the gear boxes will not flow back to the main gear box so that the main pump can pick it up through the perculator and return it to the main hydraulic tank. I disconnected the drain from the main gear box and connected it direct to the perculator, using two globe valves, so that the gear cases and the main transmission can be pumped back individually.

I also found that the operator was not pumping the oil back out of the transmission as often as they should, and, being too full, was running out around the truck drive shaft. The oil should be kept to the right level on the dipstick gauge by pumping it back at least once each shift or as often as necessary to maintain the proper oil level.

Controls.

I only found two machines with the controls out—one electric and one hydraulic. The two fitters who were with me when we were checking the controls did not have the proper tools to adjust these. When I left the mine all the machines were responding to the hydraulic controls. One electric handle had to be brought to the surface for welding, and one hydraulic handle had been broken off a 29 U.C. cutter and was in the shop for welding. It had been off for ten days.

I am just a bit concerned about the loaders working on the 1 ft. in 31- ft. grade. The oil in the main transmission will stay in the front of the case and if not kept pretty full may not get proper lubrication to the main gear assembly.

Crawlers.

I have found that your cat crawler trouble has mostly been self-made by not keeping the cats properly adjusted and tensioned. One of the operators told me that the cats had on several occasions folded up in between the cat skip shoe and the driving sprocket and fouled the cats. One occasion resulted in a broken cat and on another teeth were knocked off the driving sprocket. The cause of your skip shoes being knocked off was the weight of the machine riding on them instead of the idlers, as you will note the shoes are above the idlers. On one machine the fitters have taken two links out of each cat. With machines working on these grades you must expect more wear and stretch on the cats than you would on a normal grade.

I am enclosing a sketch of the cat assembly. After you have looked at it I feel sure you will agree with me on what I have said. I have also incorporated an idea on the sketch to raise the gear boxes 1 in. I suggest you try one machine and see how it works before doing the lot. You may have to raise the gathering head hydraulic cylinder brackets (reference No. 89 and 90, catalogue No. 155262-155263) if it throws it too close to the ground. I think it will be O.K. It will throw the gathering head lower and this will be an added help in some of your places.

Chain Conveyors.

I have noted that your set-up of the conveyors has not been kept up to the high standard that the first set-up was. They have been raised up, forming an arch and a grade. All conveyor friction and H.P. are figured on a live line, and No. 5–A room conveyor was so badly out of line that standing at the first crosscut you could not see the face. The flights were rubbing so hard on the side of the pan that they were flexing the side of the conveyor pan. These conditions were not found in the initial set-up.

As to the structure of the conveyor drive heads, I have written British Jeffrey Diamond about them and I am waiting their reply and recommendations. If there is anything that needs my presence at the mine I will be there to help correct the trouble when I get a report back from B.J.D.

In the early stage of the installation I suggested that you cut the first cut on a 45-degree angle so the machines could get into the coal easier, but they are loosing a lot of time tandem loading and trying to negotiate the grades with the cross cuts turned on a 90-deg. angle to the full rise of the seam.

It is the writer's opinion that a decent tonnage figure will never be reached on the present system of mining. I have drawn up a proposed plan which I am enclosing with this report and this will eliminate all tandem loading. Each loader will have two working faces which will give you 12 working faces, with crosscuts and roomnecks averaging 14 places, conveyors to be set up as outlined on sketch. One cutter will cut for 2 loaders, and loaders will not have to cross the pan lines. Conveyors to be set up on right and left ribs as shown on sketch and a ramp can be built, or the 2 conveyors can be hung to the roof where the cutter has to cross.

Driving the cross cuts on a 45-deg. angle will eliminate the steep grades ; that should bring your grades down to about 1 ft. in 8 ft., and I think this system will step up your development work. You may think there is a lot of extra conveyors to set, but it does not take long to set one down on the ground and couple it up ready to load on. They can be dragged in position with the cutter or loader.

It is my opinion that each loader should load out three to four places per shift if you can get them timbered. On this plan you can use the 29 U.C. cutter to set the bars at the face, and cut the timbering time down quite a bit.

As you know, the tandem loading is a very slow method and you have two loaders tied up doing the work of one, and they lose a lot of time getting into position, where one loader with the pan line in position can go in a face and start loading.

After you have gone over this I would appreciate hearing your comments on it.

If I can be of further help please do not hesitate to call.

Yours faithfully,
LLOYD MOLLOHAN.

P.S.—Machine men not sumping the machine up to give you a full cut. One cut I measured was 5 ft. 4 ins.

The information disclosed in the foregoing letters can be summarized as follows :-

61 WIT CONVEYORS.

FAULTY PARTS OF CONSTRUCTION.

Lightfoot's Contentions.	Mollohan's Reply.
1. Three holes in the loose driving sprockets, all bored out of pitch Only one hole could be utilised	Awaiting reply from B.J.D.
2. Tension arrangement for driving chain most unsatisfactory	Not Answered
3. Base plate at drive head too weak, allowing the head end to lift or pull sideways	Eventually agreed to replace base plates at drivehead
4. Roller Drive chain became slack and hurdled the Drive sprocket, causing severe shock and breakage of chain	Not Answered

L. 600 C. LOADERS.

NOT UP TO SPECIFICATIONS.

Lightfoot's Contentions.	Mollohan's Reply.
1. Lubrication and hydraulic system most unsatisfactory	Pressure should have been 700 lb. and 450 lb., but both values set at over 1,200 lb. No. 6 loader 1,800 to 2,000 lb. Clutches and brakes not designed for that pressure
2. Loose studs and bolts and hydraulic nipples	Not mentioned in reply

FAULTY PARTS.

1. Bracket on the hydraulic brakes broke off (Welding lowest possible standard)	High oil pressure caused brake bands to give way
2. Shoes between the cat. idlers broke off (Welding of a poor standard)	Self-made—Cats. not properly tensioned

BAD FEATURE.

Overhung gear box with low clearance render this type of loader unsuitable	Suggested alterations to raise gear box 1 in.

COAL CUTTERS.

FAULTY PARTS.

Lightfoot's Contentions.	Mollohan's Reply.
Bracket broke off hydraulic brake shoe (Only single run of welding)	Not answered

Faced with these letters, Mr. Mollohan supplemented some of this information in evidence. He was asked whether Mr. Lightfoot had expressed himself, in the early stages, as being disappointed with the performance of the machines and stated that he had not.

When it was put to him that in fact his machines were quite unsuitable for the particular mine because of the circumstances peculiar to the mine, he stated that they encountered grades unforseeable when the equipment was purchased. In any case the machines were standard and not made to fit any specific mine.

When pressed as to whether they were unsuitable for the Collinsville State Mine, considering all the circumstances, he stated that he would say that they did a good job, or a better job than any other type of equipment which could be purchased.

He stated that considering all the circumstances as they existed in Collinsville, there were no other machines available that would have done the work satisfactorily and he stated that he thought their machines would have done a satisfactory job if the mine had been, or could have been, laid out for angle working.

He was asked about the chain conveyors and as to whether with a stronger head there would have been much less trouble and he repeated that the equipment was standard and thought that there was an excess overload on the equipment which caused the trouble and that they were carrying in excess of the capacity for which they were designed.

In connection with the chain conveyors it is of interest to note that though these were to convey coal up to 450 ft. (Mr. Lightfoot in evidence page 2997) at the time of writing the letter, A.2 was up to 400 ft. and B.2 at 370 ft. Furthermore Mollohan admitted difficulties with the chain conveyors at Christmas 1953 when nothing like 300 ft. had been reached anywhere.

Probably the most significant fact about the letter from Mr. Lightfoot is the remarkable disparity between his viewpoint expressed therein and the great bulk of the evidence given by him. His constant reiteration in evidence was that the men were the paramount cause of the comparative failure of mechanization, but these letters suggest a shifting of that paramount cause from the men to the machines. Furthermore, in his evidence, Mr. Lightfoot gave a summary of the causes of the failure of the mine and mentioned these somewhat dramatically as being " bad roofs, bad grades, and bad men." The absence of the word " machines " is therefore surprising to say the least.

There is a possible partial explanation that, as the complaint as against the machines was voiced in April, a further five months was to elapse before he finally resigned as General Manager of the mine. His doubts could have been modified in this period but, as the same type of trouble continued until his services terminated, we find it hard to accept this view.

In any case, despite any conflict between Mr. Lightfoot's evidence and these letters, we consider these three letters to be very important because—

(a) In the case of the letter from Mr. Lightfoot-

(i.) It was written at the time when many of the troubles were actually being experienced and were fresh in mind and presumably represented the viewpoint at that time ;

(ii.) It was a letter written by a man who had had lengthy previous experience with mechanization and therefore had some bases of comparison ;

It dealt with specific matters and could in no sense be considered as a general complaint couched in general wording. Many of the troubles at the time revolved around grades and the statement, therefore, " whilst our grades are steep, this was stressed at all times and the equipment provided was stated to be designed to operate efficiently under our conditions," has a deep significance.

(b) In the case of the letter from the Under Secretary-

(i.) It was written by a top-ranking Government official and therefore had the stamp of being a Government-considered view of balanced judgment ;

Reference is made to the assurances given by the representatives " that the special features of this equipment would ensure their efficient operation "- made in respect of the severe grades and other local conditions stressed to the representatives of the supplying company ;

(iii.) The wording used " and we shall have to seriously consider the abandonment of this as a mechanized project unless your plant is brought up to the standard required and operates with a reasonable standard of efficiency " is extremely strong and unequivocal language.

(c) In the case of the letter from Mr. Mollohan-

(i.) The replies were directed to specific points and made no reference to the general dissatisfaction or the inherent complaint in the other two letters that the machines were not acting up to standard of specifications under which they were delivered ;

(ii.) Some of the specific complaints by Mr. Lightfoot were ignored altogether ;

Some light is thrown on the fact that Mr. Mollohan drew attention to conditions which surely ought to have been well known to the Management of the mine.

(iii.) THE FUTURE ASPECT.

We have given much thought to the evidence given in relation to the machines, because obviously at least in the main these are the units which are to be used in the future and, if they do represent the wrong type of equipment, then a very serious *future* difficulty has been raised. We believe that any consideration of this nature can safely be limited to the chain conveyors and the loaders.

Dealing with the former, it seems to us that the point has been sufficiently proved to indicate that, some, at least, of the difficulties experienced would have been avoided if chain conveyors had been limited to a carrying distance of 300 ft. On the other hand, there seemed to be a general censensus of opinion that if the grades did improve, serious consideration should be given to the shuttle cars.

The loaders are a much more doubtful proposition. There is some definite doubt in our minds as to whether these were the best type of loaders to order. In saying this, we are not urging criticism of Mr. Lightfoot because he did order them. Nevertheless, at the time of ordering there was no other equipment of this kind operating in Australia and, as it turned out subsequently, nowhere in the world where grades of the type experienced or *expected to be experienced* were taken into account.

We took note of the fact that, when Mr. Mollohan was pressed to give instances of where this type of equipment was operating on grades of this severity, he first mentioned that there was one in the United States, but upon further questioning admitted that the organisation where this machine was tried did not ultimately purchase the machine. In this regard, therefore, we are much handicapped because we are not able to give instances where this type of machine is successfully operating elsewhere. Indeed, the very fact that we cannot do so and that the evidence was that there was no other example makes us more sceptical than we would otherwise be.

We thought the following evidence to have great significance-

> " Can you tell us where they are giving satisfaction on grades of 1 in 5 ? We have one down at United States Steel. It was only down there on trial and they get quite satisfactory service there." (P. 4776).
>
> " Is that the only colliery that you know of where these loaders are operating in grades of 1 in 5 ? Yes."

On page 4779 he was asked :-

> " Apart from the experimental installation of these L600C loaders, can you tell us if Collinsville was the first colliery to be completely equipped with L600C loaders ? Yes."
>
> " Could you tell us of any mine with similar grades to Collinsville which is using L600C Jeffrey loaders ? At the moment I cannot."
>
> " You said the grade was 1 in 5 in evidence. You mentioned one mine in the States with a grade of 1 in 5 ? Yes."
>
> " That is the closest you know of that would compare with Collinsville ? Yes, but that is just for a short distance and they were out of it."
>
> " Do you know what the average grades are in Collinsville ? You have been there ? Yes, I have been there."
>
> " Can you tell us a mine that is operating with L600C's ? What is the closest grade that you have to what Collinsville has ? It would be, say, 1 in 8 to 1 in 10."

We do believe that the overhanging gear box is a serious disability and there are one or two other weaknesses though admittedly these only show up in really adverse form where the severity of the grades makes perhaps inordinate demands upon them.

In dealing with the question of grades, we pointed out that there is more than proportionate difference in the difficulties likely to be experienced when grades increase in severity after, say, 1 in 6. It may, therefore, be a justifiable assumption that these loaders would have done satisfactory work in 1 in 6, but could not cope with grades which were more severe, and the general tenor of the evidence seems to support this view. Some justification for our concern is to be found in the fact that we could not view with equanimity the probable results which would be obtained from the loaders if the grades were to continue as they have been over most of the period of mechanization. Admittedly we are sure that some extra steps could be taken to minimize some of these difficulties. For example, extra training may be given, winches and pulleys may be used, more careful planning may be adopted and a number of other remedies. Furthermore, it may be possible at least to lessen and possibly to minimize the problem of carelessness and any " don't care " attitude on the part of the men. Despite all these things, however, we believe that at least some of the problems which have been experienced in the past would recur. On the other hand, if there should be an improvement in grades so that the worst experienced would be no more than 1 in 6, and if these other suggested remedies are adopted, we think that a great improvement could confidently be looked for from the loaders.

(iv.) SHUTTLE CAR.

We cannot pass from the question of wrong equipment without mentioning the shuttle car which was purchased and which virtually has never been used. This cost in the vicinity of £15,000 and it does appear as if a mistake was made. It is at present in the A.2 level and is likely to stay there for some time, as until the second intake is completed it cannot be used for the major purpose for which it was purchased, the shifting of men and materials. Admittedly the contribution which it could make in this connection would be most worthwhile and would overcome some of the transport difficulties which the mine has experienced. At present, however, there is in it something of the " White elephant," which the men claim. We believe that this fact must be faced up to, that the expenditure of £15,000 has produced no worthwhile result at this stage, though it may do so in the not too near future.

(V.) CONCLUSIONS.

Summing up, therefore, we are of the opinion that-

1. Difficulties encountered with loaders and chain conveyors did beyond doubt contribute seriously to the low production.

2. The machines undoubtedly had certain weaknesses which contributed to breakdowns, which in turn reduced production.

3. In some respects neither the chain conveyors not the loaders stood up to the specifications which formed part of the letter of acceptance of the successful tender lodged by the supplying company.

4. Some of the responsibility for these difficulties could certainly be placed upon the men and probably some upon the Management because more could have been done to minimise the difficulties.

5. We are doubtful of the wisdom exercised in ordering loaders where the supplying company was unable to give precedents showing successful operation of that type of loader under similar conditions to those at Collinsville. Beyond this however, we would not criticise their purchase.

6. As far as the future is concerned, some of the weaknesses in the machines can be minimised by better Management supervision, by better maintenance, by more care and co-operation by the men and by machine adjustments, but we are definitely left with a feeling that, in the absence of an easing of the grades, the weaknesses of loaders will still create difficulties and cause lower unsatisfactory and probably unprofitable production.

(Vi..) BREAKDOWNS OF MACHINERY.

Consideration of this subject is inevitably bound up with considerations of the equipment itself.

Consequently the letters which passed between Mr. Lightfoot and the Under Secretary, Department of Mines, on the one hand, and the suppliers of the machines or their agents, on the other, and the reply by Mr. Mollohan on behalf of the supplying company, are relevant to this question and should be considered in connection with it.

A perusal of the Overmen's Reports seems to leave no doubt that excessive breakdowns must have been a contributing factor to low production. One of the most significant statements however was made by the witness, Baker, who gave evidence that rarely were all the machines functioning normally, and in fact he could not remember any such occasion.

As with consideration of the equipment, it seems wise to analyse these breakdowns according to the various units.

Breakdowns and stoppages occurred with all units of the equipment, the main causes and features being-

(aa) MAIN CONVEYOR BELT.

This was definitely a first-class piece of equipment, well and correctly installed and gave first-class service throughout the whole period of mechanization. Stoppages did occur and at one stage began to occur all too frequently. Investigation was made and no fault was ever discovered. Sometimes the belt recommenced as quickly and as mysteriously as it stopped and this led conclusively to the decision that the belt was stopped deliberately. Stoppages of this kind could have been—

(a) To allow something to pass across ; or

(b) With the deliberate intention of impeding production ; or

(c) From a misplaced sense of humour.

The stops were never serious and played no part in lower production of any consequence.

(ab) CUTTERS.

The cutters, too, gave satisfaction, though there were two occasions at least where there were breakdowns. In the letter by Mr. Lightfoot to Underhill Day and Co. Ltd. (already referred to) the only mention concerning the cutters was to the effect that one coal-cutting machine was found to have the hydraulic brake shoe broken off, and the welding upon inspection was found to be defective. This was a fault in the machine construction.

In common with the loaders, great difficulty was at times experienced in tramming but they did not share to any important extent in the breakdowns suffered by the loaders.

Generally, therefore, the cutters may be classed as having given satisfactory service, though this should not be taken as indicating that they were free of breakdowns, (ac) THE LOADERS.

The evidence of many witnesses supported by constant documentary evidence leaves no doubt whatsoever that breakdowns with the loaders occurred with monotonous regularity. Indeed the analysis of the problems associated with and the weaknesses in the equipment would allow of no other expectation.

The breakdowns were caused by-

Bogging,

Breakage of hoses,

Breakage of cables,

Lubrication difficulties,

and these were the result of-

Inherent weaknesses in the machines,

Severity of grades,

Lack of ability or worse on the part of the men,

Lack of training and teaching by Management.

There is a further factor which cannot be classified as a breakdown but which has a definitely adverse effect upon production-that is the delays and hold-ups in tramming. Any extra time spent on these operations has the same effect upon production as breakdowns.

Bogging was a constant feature of the mechanized working. Here is a list of boggings taken from Overmen's reports and covering merely a period from 12th January, 1954, to 3rd February, 1954-three weeks.

12-1-54. Overman W. Templeton reported-" Bogged in A.2, 31 hours."

12-1-54. Overman J. Morgan also reported on the afternoon shift of the same day-" Bogged in A.2 from day shift, got out at 11.5 p.m."

13-1-54. Overman J. Morgan reported-" Bogged in A.2 at 6 p.m. failed get loader out. Bogged in A.3 from 9 p.m. till 11.15 p.m."

14-1-54. Overman G. Templeton reported on day shift-" Loader bogged for 21 hours."

15-1-54. Overman J. Morgan reported-" Loader bogged 2 hours, A.2 and A.3."

16-1-54. Overman W. Templeton also reported-" Cutter bogged and has been released." (No time stated).

18-1-54. W. Templeton-" Half-hour in A.2 bogged."

22-1-54. W. Templeton-" Loader bogged in A.3 level at 2.30 p.m."

21-1-54. J. Morgan, Overman-" Bogged 2 hours, B.2."

22-1-54. J. Morgan-" Bogged A.3 from day shift till 7.30 p.m."

25-1-54. Overman W. Whyte reported-" Bogged 2 hours in B.2 L."

26-1-54. Overman J. Morgan-" No. 1 Loader left bogged by afternoon shift, lost 21 hours. No. 2 Loader bogged A.2, lost 3 hours."

26-1-54. Overman J. Harrison also reported-" No. 4 Loader lost two hours, stuck in B.2 cut-through."

26-1-54. Overman W. Templeton-in " Delays " reported- " No. 1, 3 hours, No. 2, 1 hour."

27-1-54. Overman W. Whyte reported-" Cutter bogged in A.3/L. 1 hour."

27-1-54. Overman W. Whyte-" Loader bogged in A.2 L. face."

28-1-54. Overman W. Templeton-" Bogged from start to stop on A.2 with No. 1 Loader."

29-1-54. Overman J. Morgan reported-" No. 2 loader left bogged by afternoon shift, lost t hour."

2-2-54. Overman J. Morgan-" No. 1 loader bogged in A.3, 1 p.m. to 1.30 p.m."

3-2-54. Overman W. Whyte-" Loader bogged in A.2 L, lost 1 hour. Cutter bogged in A.2 L, and A.3 intersection. Lost. 1 hour."

There are instances of loaders being bogged for up to a week.

Various reasons were ascribed as the causes of bogging as, for example-

Excessive water.

Spillage resulting in loose coal.

Greasy conditions with spinning wheels.

Jamming was also frequently referred to as bogging and this resulted either from-

Endeavouring to manoeuvre in too restricted an area ;

Slipping against or veering towards objects and becoming wedged.

Some water could always be found in the mine and particularly in the Dip. Furthermore, water had to be used in order to keep the dust problem within reasonable limits. Fine sprays were provided for the purpose but they were not always used as at least some, if not all, of the men preferred to use hoses. They had been forbidden to do this but the practice persisted. The use of hoses as against fine sprays greatly increased the volume of water on the floor and when this was added to loose coal often resulting from spillage, the floor hazards were greatly increased partly in relation to bogging and partly in jamming resulting from the machine slipping into objects.

Mr. Lightfoot condemned the men for using hoses though Mr. Stansbury gave no indication that he resolutely stopped their use even though he said he had often seen the men using hoses. One of the charges made was that, even for the purpose of keeping the dust down, much too much water was used and often the hoses were left running. Mr. Davis, the Deputy, on the other hand,• maintained that the hoses were not used sufficiently to keep the dust down and he maintained he had often seen the Overmen using hoses.

Spillage was constant in the mine. The chain conveyors were of a type that sometimes made it difficult to avoid spillage. We previously indicated the somewhat curious factor in this connection is that Mr. Lightfoot maintained that one of the major reasons for bogging was that the floor was not cleaned up and a pad of coal would provide a condition which would contribute to bogging. Mr. Fallins was even more definite in this regard and was critical of the state of the floor, maintaining that bogging could be largely avoided by cleaning up the coal on the floor. Mr. Stansbury (to a limited degree), the Overmen and the men were however quite unanimous that without a pad of coal, driving the loader became impossible because the wheels simply continued to spin and would not grip.

Factors such as these also were presented as being responsible for jamming. Mr. Lightfoot, maintained that carelessness caused nearly every case of jamming. Here again we believe that whilst this was the cause in some cases, other causes contributed.

One thing appears certain—in all these cases the position of the gearbox played an important part. Mr. Lightfoot stated that the clearance of the gearbox was 3 in., but Mr. Fallins measured it at 11- in. Conditions would not have to depart much from normal to encounter trouble when this vital margin was so small. Whilst the men undoubtedly were to blame in some cases and whilst additional care could have avoided others, there is little doubt that boggings and jammings were bound to occur with such an unsatisfactory clearance margin.

Breakdowns also resulted from faulty parts.

There is ample evidence that great difficulty was experienced in connection with the hydraulic hoses. When one of these burst it could take a considerable time to fix. As they burst all too frequently, serious delays resulted. Mr. Lightfoot's letter to Underhill Day and Co. did not mention hydraulic hoses, but it is rather significant that in his reply, Mr. Mollohan dealt with these. Mr. Lightfoot continually blamed the men for the excessive breakages but Mr. Mollohan maintained clearly that the cause of the trouble was that someone had interfered with the pressure in the relief valves. A pressure of up to 2,000 lb. instead of the regulation 1,200 lb. was bound to cause troubles—the gear cases becoming filled with oil and the bursting of the hoses. Certain it is that loaders were stopped all too frequently from these causes.

It subsequently appeared that after some months of mechanization it was acknowledged that the original hoses were for 1,000 lb. pressure, being single braid. Mr. Winstanley said they then substituted hoses with 5,000 lb. bursting pressure and 2,000 lb. working pressure, and he was of the opinion that the trouble was thus rectified and few further breakdowns occurred. On the other hand, Mr. Morgan, the Overman, maintained that 10 months after mechanization they were still losing time through hose troubles.

The cutting of cables was the subject of other stoppages. It was accepted that anyone may cut a cable at some time but the number cut was very much greater than any normal assessment. Here again, Mr. Lightfoot stated that it was carelessness on the part of the men that so many were cut and this could have been true. The emphasis that was placed on this factor however was not borne out by an analysis of the figures. Mr. Paterson in his address, for example, as the result of an analysis of Exhibit 18, submitted that in the 60 working days between 19th February, 1954, and 3rd May, 1954, 28 loader and 13 cutter cables were damaged, that is 41 in all. Taking the number of shifts into account and the number of loaders and cutters, he maintained this averaged less than one per week. Nor was this exceeded in the rest of the year up till 4th September, 1954. Mr. Paterson concluded that for the whole period of 43 weeks (215 working days), 143 cables were damaged, working out at 3 cables per week. This would then be less than the figure mentioned by Mr. Lightfoot as being acceptable and operating in other mines he mentioned.

There were also many stoppages because of faulty parts and excessive wear. The hydraulic system gave trouble particularly in excessive grades and in addition, the caterpillar tracks were a constant worry because the conditions operating in the mine were such that three months' wear in the State Mine was the equivalent of 12 months in other mines. Stretching of the caterpillar chains also caused a quota of stoppages.

It will thus be seen that shortcomings in the loaders, the excessively difficult conditions and probably some other factors all contributed to greatly excessive breakdowns and therefore greatly reduced production.

'(ad) CHAIN CONVEYORS.

This was the other main unit continually breaking down. The breakdowns were due to—

Inherent faults in the machines.

Unsuitability for the work.

Carelessness in loading.

Excessive distances.

As with the loaders, the Overmen's reports constantly refer to breakdowns of the chain conveyors.

Reference has already been made to the weaknesses that operated in connection with the chain conveyors and the fact that they were never satisfactory over 300 ft., even if they were up to that distance.

It is of interest to note that Mr. Lightfoot suggested that, even over 150 ft., they tensioned greatly. Mr. Stansbury maintained that the real trouble was a " defect in design." This defect was ultimately admitted by the supplying company and it agreed to send along parts which would rectify such defect. At the time of the disaster, the parts- had arrived at the mine but had not been fitted.

Mr. Fallins was critical of the part the men played in attending to the chain conveyors. He drew attention to a lack of maintence and indicated that he found the chain hurdling the sprocket. In his evidence, Mr. MacLennan, the Engineer, said he told the men to leave the chain this way because he had in turn been instructed by a representative of Underhill and Day that that was the way to do it. It could have been, of course, that this latter organisation instructed MacLennan accordingly as it was the only way at this stage to get over the admitted defect.

Mr. Mollohan was candid in his admission that the chain conveyors were giving trouble even before Christmas, 1953. They were at that time nowhere near 300 ft.

Part of the trouble with the chain conveyors undoubtedly resulted from the fact that the loaders had a capacity of six tons per minute in loose coal, whilst the chain conveyor's capacity was three tons. It was of course possible to control the loading and some flights can be removed from the gathering chain. Overloading of the chain conveyors resulted in excessive spillage.

Mr. Lightfoot maintained that, when the distance exceeded 300 ft., the chain conveyors began to give trouble in that the head piece of the conveyor itself would tend to be pulled round sideways and this springing of the head pulley automatically increased the slack in the driving chain. The driving chain with this reduced slack would then hurdle the teeth." Periodically one of the links of the chain would ride on top of the teeth and the whole chain would miss and jump one pitch, with a corresponding check impact of the whole of the conveyor. That resulted in the driving chain being broken on quite a number of occasions and also the breaking of the conveyor flight chain. It was this fault that the manufacturers agreed to remedy by providing free of cost additional base plates and tension arrangements.

Mr. J. C. Hill explained some of the difficulties experienced through overloading the chain conveyors especially if a great heap of coal came off the loader at the one time. The effect on the chain conveyor would be to tighten the chain and cause it to lift. As it lifted, it got above the height of the pans and it would be necessary to stop the conveyor at times to get the chain conveyors back onto the bottom of the pan. Overloading would also cause stress and strain and broke chain conveyors on occasions.

It should be remembered that the sequence of operations was such that the chain conveyors would only be required as and when the loaders were actually working loading coal onto them. In the majority of cases, therefore, it is likely that, in terms of lost production, it would be necessary to add the breakdown time of at least some of the loaders onto the breakdown time of the chain conveyors. At times they would perhaps break down together, but presumably not so often. Thus, if all the loaders broke down for two hours in an eight-hour shift and the chain conveyor broke down for 1 hours, the probability is that the loading of coal from that unit would stop for 31- hours.

There are, however, one or two qualifications of this. In the first place, the chain conveyors were not capable of taking coal from all the loaders at the one time and therefore the fact that a loader was broken down may not necessarily mean that the chain conveyor was not being used to capacity in its loading of coal. The second factor is that the loaders could load at a greater rate than the chain conveyors could take the load and would thus in themselves be a bottleneck in loading. This is, however, dealt with when considering the subject of bottlenecks.

(ae) CONCLUSIONS.

It will be seen from the foregoing that breakdowns played a major part in unsatisfactory production. They were the natural result of deficiencies and shortcomings in the equipment, allied to very difficult natural conditions in the mine, particularly severe grades. It is axiomatic that the only way to secure the production desired is to keep the machines operating. Every time there is a breakdown and loading cannot go on, it means in the final analysis either less profit or, as in the case of this mine, more loss.

(VI) BOTTLENECKS.

The word " bottleneck " in this connection is used in the sense of indicating a situation where either—

(a) One operation is not able to cope with the production available to it from the previous operation ; or

(b) More than one productive unit has to be used to cope with circumstances which would normally be met by the provision of one productive unit only.

Bottlenecks must of course be associated with a sequence of operations. If, for example, all in a series of operations are perfectly sequenced, when one breaks down production will not be any more than that passing through the broken down operation. Similarly, if all the operations are not perfectly sequenced, production will be measured by the lowest capacity rate.

It therefore becomes necessary for us to examine the various units making up the total equipment in their sequence of operations, and endeavour to ascertain whether one restricted the other.

(aa) MAIN CONVEYOR BELT.

This can be dismissed in a few words. It was never a bottleneck and never at any time was its capacity threatened by what was available.

(ab) CUTTERS.

Bottlenecks could occur—

If the number of places cut and ready for loading was less than the number of places for which loading capacity was available ;

Indirectly, if the cut was small and this meant additional tramming on the part of the loaders so that they could not on this account cope with the number of places cut and available for loading.

In much of the evidence given, there was a suggestion that one of the reasons for poor production was to be found in the fact that there was a darg in cutting, the inference being that there was not sufficient places cut to cope with the loading capacity of the loaders. This evidence, largely but not solely given by Mr. Lightfoot, was designed to indicate the adverse effects resulting from a cutting darg.

Mr. Paterson drew our attention to the fact that an examination of the Overmen's reports showed that, except on one or two occasions, the loaders were never held up because places had not been cut. An analysis of the reports from 12th July to 13th August gives the number of place shot ready for loading. This period was one when grades were universally bad. The figures on the night shift as shown in the Overman's reports covering this period were :-

On 12th July, 10 places shot ready for loading, and B.6 to be cleaned.

On 13th July, 12 places shot ready for loading and A.6 U to be finished.

On 14th July, 11 places shot ready for loading.

On 15th July, 8 places shot ready for loading and 2 to be finished.

On 21st July, 10 places shot ready for loading and 2 to be finished.

On 22nd July, 13 places shot ready for loading and 1 to be cleaned.

On 23rd July, 13 places shot ready for loading.

On 26th July, 10 places shot ready for loading.

On 27th July, 9 places shot ready for loading

On 28th July, 13 places shot ready for loading and 1 place to be cleaned.

On 29th July, 10 places shot ready for loading and 1 place to be cleaned.

On 30th July, 8 places shot ready for loading and 1 place to be cleaned.

On 2nd August, 10 places shot ready for loading.

On 3rd August, 11 places shot ready for loading.

On 4th August, 10 places shot ready for loading.

On 5th August, 14 places shot ready for loading.

On 6th August, 14 places shot ready for loading.

On 9th August, 16 places shot ready for loading.

On 10th August, 16 places shot ready for loading.

On 11th August, 13 places shot ready for loading.

On 12th August, 15 places shot ready for loading.

On 13th August, 13 places shot ready for loading.

These figures seem to indicate that there was no hold-up in production through a shortage of places cut, bored, and shot. Whilst this is not a long period—merely one month—nevertheless the statement is probably true of most of the period under mechanization. It does, however, focus attention upon the fact that some analysis immediately becomes necessary as to why the loaders could not cope with the loading available.

This leads to the second factor. Evidence was given, and complaints lodged by Mr. Lightfoot in particular, that the cutter blade was not inserted to its full depth and it was therefore common to find that the amount of coal cut and bored and available for loading in one place rarely reached the tonnage which could normally have been expected. The net effect of this would be that more tramming would be necessary on the part of the loaders. If a quota of 300 tons was established and only 50 tons were secured in each bord, six bords would have to be loaded and tramming would be necessary on five occasions. If, on the other hand, 75 tons were cut, tramming would be necessary on only three occasions. Many witnesses gave evidence that tramming was exceedingly difficult with grades experienced and it was quite evident that this was one of the main contributors to low production. Anything which would avoid tramming, therefore, became very important. In this way, the cutter could become a bottleneck even though on the surface it may appear that the trouble lay with the loader.

It becomes necessary, therefore, to consider how far the contention by Mr. Lightfoot, supported by Mr. Mollohan, that the cut was not deep enough and therefore the tonnage being bored not high enough, was correct.

The figures seem to indicate that the figures are somewhat patchy but, from 27th September, until the date of the disaster, the figures for the Dip were particularly good in that, in 11 days, there was only one fall of 80 tons, and all the rest were 90 tons except two which were 100. Taken at random, some earlier figures seem to suggest that the amount cut was not as low as was indicated in the evidence. It probably still left something to be desired and it is quite likely that there was considerable improvement towards the end of mechanization. Indeed, this could quite well have been one of the important factors in accounting for the increased production during the month or so before the disaster.

We are of the opinion, therefore, that the cutters did not constitute a production bottleneck.

(ac) LOADERS.

If, as has been shown, places were shot ready for loading out at the end of the night shift in excess of those that were loaded out during the production shifts, on appearance it would seem that loading was the bottleneck. If this be so, it could have been caused either by the loaders or the chain conveyors, or both. The previous analysis made in relation to the short-comings of the equipment and the breakdowns seems strongly to suggest that probably both were at fault.

As loading with the loaders is the first of the sequence of the two operations, it is necessary to note that not only may the loaders be a bottleneck as against the chain conveyors, but they could be a bottleneck in themselves.

If, for example, because of difficulties or faults within the machines or with conditions operating, it was necessary to use two loaders to do the work normally associated with one, a bottleneck would be created. Similarly, if the loading rate of one loader was considerably reduced because of conditions, again a bottleneck may be introduced. This is exactly what happened with the loaders. Because of various conditions operating, resort was had to—

Tandem loading ;
Double loading ; and
Shuttle loading.

Tandem Loading.

" Tandem loading " is a term used when two loaders are set head to tail to allow one to discharge onto the gathering end of the other, the two thus being used for the one loading operation.

The obvious effect of this is that the two loaders would be doing the normal work of one loader and the production from the two would normally be secured from one. Constant use of tandem loading would therefore halve the production.

One of the serious aspects of tandem loading is that, if one of the loaders breaks down, both are out of action, unless the second loader can be transferred eslewhere. In the State Mine, this meant the difficulty of negotiating steep grades. Consequently, we believe that both loaders would have remained out of action until the repairs on the one were effected. This is the same as doubling the breakdown time.

An analysis of the situation does show, however, that there were frequently sufficient spare units to cater for tandem loading and the second loader may therefore not have been in operation in any case.

Tandem loading was used to cover any excess distance from the production face to the conveyor chain or to the main conveyor belt. The conveyor chain was usually not erected until progress had been made up to about half-way in each level to the first break-off. This seems to suggest an important proportion of the time—possibly even up to 25 per cent., until the chain conveyor was installed. If it was 25 per cent., it may mean 25 per cent. reduction in output.

Again, in the cut-throughs, no chain conveyor was installed and under the practice of cutting most of the cut-throughs on the up grade, tandem loading was resorted to when one loader could not discharge onto the conveyor chain.

It is little wonder that Mr. Fallins struck the note he did in answer to a question directed to him-

> " Although ordinarily the number of spare loading units might appear to be excessive, in view of the grades that were actually encountered, in retrospect, does it not seem to have been quite sound to have your two loaders to the one cutter ? That is anyone's opinion and apparently it was working all right there, but it does not seem right to me to have two costly machines working in tandem. One breakdown and you lose the two outputs."

Double Loading.

The term " double loading " was used to convey an operation where a loader would gather coal, dump it, then load the same coal again and finally place it on the chain conveyor.

In many ways this could be more wasteful procedure than tandem loading, because sometimes at least a loader may not produce even at 50 per cent. of capacity if engaged on double loading.

It is true that, as with tandem loading, if there was no other work for the loader to go on with, the extra time taken may not, strictly speaking, interfere with production, but it will be remembered that cutting would appear to have been ahead of loading and there is therefore a strong probability that double loading was invariably a restricting practice. Furthermore, the number of times when loaders were out of action for some reason or other seems to suggest strongly the advisability of loaders that were able to work being used to maximum efficiency.

Shuttle Loading.

This is an operation by which a loader gathers coal and then proceeds to where the coal could be discharged onto a chain or main belt conveyor.

There were were two weaknesses in this practice—firstly, the loader was assisting production only to the extent that it discharged coal onto the conveyor and all flitting time was therefore lost, and, secondly, that as the loader could carry no more than 25 to 30 cwt. of coal in each operation, excessive flitting was unavoidable.

The Overmen's reports constantly mention one of these three types of loading but some statistics commenced by Mr. Winstanley not long before the disaster give the best picture of the extent of the practices.

(Exhibit 72) for 27th September, shows that, of the Dip, A.11 up, A.12, and B.11, all but the Dip were tandem loaded. The Dip of course was virtually tandem loaded. But, though Mr. Winstanley's figures cover only a short period, there is reason to believe that tandem, double or shuttle loading was much more common than at first appeared from the evidence.

In view of the importance of the subject, we think it advisable to quote the remaining days up to the time of the disaster when these types of loading occurred :-

September 28th—
- A.11 up 20 tons and No. 6 loader double loaded.
- A.11 down 40 tons and No. 6 loader double loaded.

September 29th—
- A.11 up 60 tons and No. 6 loader double loaded.
- A.11 down 20 tons and No. 6 loader double loaded.
- Al2 70 tons and Nos. 1 and 6 loaders double loaded.

September 30th—
- A.11 up 100 tons and Nos. 1 and 6 loaders double loaded all the shift.

October 1st—
- A.11 up No. 1 loader loaded 30 tons by double loading.
- A.12 20 tons and Nos. 1 and 6 loaded by tandem.

October 4th—
- B.11 bord 50 tons taken out and tandem loaded by Nos. 1 and 6 and partly shuttle loaded.

October 5th—
- No shuttling or double loading.

October 6th—
- B .11 No 1 tandem loaded 50 tons out and No. 6 double loaded out B.11.
- Afternoon shift-5 tons taken out, Nos. 1 and 6 took these out.

October llth-
- 80 tons out of B.11—No. 1 tandem and double loaded B.11, No. 6 tandem part of B.11

October 13th-
- 60 tons out of B.11 and two loaders, Nos. 1 and 6, tandem loaded.
- Afternoon-70 tons out of B,11 and two loaders engaged as tandem loading..

Conclusions.

We do not want to gloss over the difficulties which were facing the Management in trying to get production and even allowing for these we do feel somewhat suprised that a more determined effort was not made to minimize the effect of tandem, double, and shuttle loading. Its effect upon production could be devastating and probably was. It may, however, be argued that other methods would have been worse. We do not, however, entirely accept this because of the implied criticism in the comments by Mr. Fallins and Mr. Mollohan. On page 9 of his report, Mr. Fallins said " I suggest that the plan be continued . . . but with some alterations to overcome the shuttle loading . . ." No doubt Mr. Fallins included tandem loading in his term " shuttle loading " because, on Annexure 2 to that report, he attempts to show how tandem loading could be somewhat avoided. He says in fact : " I have given this matter a lot of consideration to overcome the shuttle loading . . . "

Mr. Mollohan was also concerned. In his letter, on page 4, he states : " It is the writer's opinion that a decent tonnage will never be obtained with this system of loading . . . " He then went on to suggest angle cutting. It is true this was rejected by the Management but it does seem to suggest that, at the time of writing the letter, Mr. Mollohan could see how badly production was being effected.

In his evidence, he again referred to the matter-

> " In my letter in May, 1954, I suggested a method of working with angular pillars which would, in my opinion, have made tramming problems easier as it would have lessened the grades and would also have eliminated some of the time taken up by tandem loading. Eliminating tandem loading would have had six loading machines on production instead of three. The loading machines would have loaded directly on the conveyors, eliminating loss of time of the loader coming in behind, getting in position to load, and saved a lot of delay that could have been put into production time. Tandem loading would be eliminated by the use of short chain conveyors into cut-throughs."

Indeed, Mollohan's letter suggested two difficulties holding up production—grades and tandem loading.

(ad) CHAIN CONVEYORS.

Much has already been said about these conveyors and there is little doubt that they were the final bottleneck in the chain.

Restriction operated in three fields.

In the first place, the capacity of the loader was up to six tons per minute in loose coal but the capacity of the chain conveyor to receive was no more than three tons per minute. This meant that the loading operation had to be whittled down to suit the intake of the chain conveyor.

Secondly, sometimes a situation developed whereby a loader could not load onto a chain conveyor because some other loader was doing so. In the Dip section, for example, the chain conveyors in A.11, A.12, and B.10 could all be loading on to the Dip chain conveyor, which would only have the same capacity as any one of them. Thus, if coal was being loaded from the Dip but there was also coal available in A.11 for loading and this was to be loaded onto the Dip chain conveyor, either the Dip or A.11 would have to cease loading until the other had completed its work. This was of course a bad bottleneck and the only available remedies were to extend the main trunk belt or use shuttle cars. The latter were, however, of course not available.

The third bottleneck occurred as the result of the condition of the chain conveyor, which scarcely stood up to specifications, and where the consequences of overloading were serious. The Management was frequently complaining that at least some of the troubles with the chain conveyors arose from the careless overloading by operators. The desire to avoid this would tend to be restrictive and further increase the bottleneck nature of the conveyor.

(as) CONCL17SIONS.

The extent to which this position actually interfered with production, and certainly the amount by which production was reduced, are hard to estimate. The seriousness of stopping one or two loaders whilst another one works or of using two loaders to do the work of one can be easily seen.

We feel sure that this contributed to an important extent to low production but we are not in a position to say just how much of these bottleneck factors could have been improved by better management.

It is important to note, however, that, apart from the minimum low production, the situation would not be such as to engender in employees any sense of urgency and importance in higher production figures.

The loading bottleneck was an important factor in curtailing production and any return to mechanization would demand most earnest efforts to see that this bottleneck aspect was reduced to minimum proportions.

(viii.) MAINTENANCE.

(aa) MAINTENANCE WAS UNSATISFACTORY.

There was no lack of evidence that the standard of maintenance of the equipment left much to be desired. In any approach to this question it must be remembered that the plant and installation had cost £500,000 and adequate attention to maintenance was fundamental.

Mr. Lightfoot was most critical of the standard of maintenance operating in the mine. Indeed, many of the troubles experienced in connection with the equipment were due in his opinion either to the fact that the men would not do any maintenance or that such as was done was unsatisfactory. He indicated that this was in line with the general attitude of the men which was one of taking no interest in the plant and, at least in the main, being indifferent to its condition. Many of the hold-ups and breakdowns, in Mr. Lightfoot's opinion, were traceable to this cause.

Mr. Stansbury supported this viewpoint and gave several examples. He indicated that hoses at least on one occasion had to be replaced because coal had become caked in the trough which carried the hose. This coal caked so badly that the trough could be cleaned only as the result of about two hours' labour. He pointed out that this could only have accumulated and reached such a stage over a period.

Mr. Stansbury also stated that not only was maintenance neglected but when something was done it often was done badly. For example, flights in the chain conveyor were installed upside down and this was quite a serious matter.

Mr. Stansbury shared Mr. Lightfoot's opinion that preventative maintenance would have avoided much of the trouble experienced with the equipment.

Mr. Fallins was probably more definite in his views on maintenance—or rather lack of maintenance—than anyone else. This would have been one of the factors that he would have been careful to examine in his inspection. He gave several instances of lack of maintenance, but particularly mentioned the chain conveyor and said that in this connection he saw " a bent flight or two here and there and it was going along in a jerky condition where it ought to be a rotary motion." He then examined the head shaft to find out why it was behaving in that particular way and found a very loose chain on the drivehead. He lost no time in remarking that the maintenance men should not have allowed the chain to be running so slack.

Mr. Fallins also felt that some at least of the breakdowns were due to lack of maintenance. " If they had a little bit of extra maintenance or had proper maintenance, you would not have so many breakdowns." (p. 1218.)

Mr. Mollohan was equally definite in his view that maintenance was poor. He drew attention to the fact that the chain conveyors in particular were not getting proper lubrication. Admittedly his comments in this regard were largely as counter to suggestions made that the chain conveyors were breaking down. His statement was positive, however : " You would be walking down the entry and you could hear one of them squealing, I would say 50 yds. before you got to it, for lack of lubrication."

The evidence leaves little doubt on the matter. Both Mr. Fallins and Mr. Mollohan drew attention to the paramount importance of maintenance. Mr. Fallins, for example, gave this very definite answer to a question :

> " In your opinion, assuming that the maintenance problem is solved, from what you know of the mine itself and what you know of the reports, what would then be the position as far as the operation of the mine is concerned ? '

His answer was-

> " No. 1, solve your maintenance problems first and have free maintenance, and if you don't get output look for something else because the only ' something else ' is between the machines and the face. If the machines are kept going it is all right ; if they are not, there is a reason."

His evidence continued-

> " Can we put it this way. Your opinion is that the maintenance problem is the No. 1 problem ? Of paramount importance.
>
> " It would be best to have that cleared up in order to ascertain whether there are any major problems ? That is my opinion."

Thus, apart from reducing or eliminating the stoppages due to this cause, Mr. Fallins drew attention to the fact that solving the maintenance problem would clear that position and other causes could then be tackled.

Mr. Mollohan indicated that, in his opinion, lack of maintenance was one of the major causes of low production and argued conversely that, in order to improve production, maintenance itself must be improved.

(ab) RESPONSIBILITY FOR LACK OF MAINTENANCE.

As previously indicated, *Mr. Lightfoot* placed the responsibility for the unsatisfactory maintenance state of affairs upon the men, maintaining that they would not do the maintenance at all or would not do it satisfactorily.

Mr. Stansbury maintained that Mr. MacLennan, the Chief Engineer, was responsible for seeing that the mechanical maintenance was kept up to standard. Indeed, Mr. Stansbury indicated that he had complained to Mr. MacLennan concerning the standard of maintenance, though this had been done verbally and not in writing.

Mr. Mollohan indicated that, when he left the mine, he was satisfied that-

> " Mr Stansbury was competent to continue to supervise the handling and maintenance of all this equipment and the fitters and electricians were properly instructed and the operators were as competent as their limited experience would allow."

We have no doubt that the men were careless and their attitude to maintenance left much to be desired. We believe that, apart from any other aspect, it was in their own interests to make sure there was adequate maintenance of machines because that would have avoided many troubles.

Nevertheless, we hold strongly to the view that the major responsibility for maintenance must lie with Management. Its responsibility is firstly to lay down the rules, regulations, and schedules for the three different types of maintenance—ordinary, preventative, and planned. Secondly, it must set up the organisational means by which this is carried out. Thirdly, it should institute checks to see that it is carried out. Fourthly, it should be prepared to take remedial action whenever it breaks down.

We do not believe that Management measured up to these responsibilities any better than the men.

We had no schedule submitted to us, not did any of the evidence give any assurance that the matter of maintenance had been systematically tackled in the way suggested. Indeed, Mr. Nutt, the mechanical fitter from the colliery, gave evidence that he took the trouble to write to America to get a maintenance manual in order that he might be more competent to deal with the maintenance of the machines. This to our mind is an indictment of Management. There was, it is true, rebuttal evidence endeavouring to indicate that maintenance manuals were available, but it does seem strange that a fitter would take the trouble to write to America for booklets which were readily available and which should have been placed in the hands of fitters by Management. Not at any time was there any reference to any schedule of preventative maintenance and we do not believe it existed or, if it did, it existed as a mere paper record.

We ourselves were somewhat surprised to find that there was no underground workshop in the mine. The nearest to this was a fitter's shop, which was by no means a good substitute. Here again, the value and type of plant was such as to warrant careful attention to the plant and an attempt to give the best possible facilities to ensure this. There was evidence that there was considerable waste of time in having to bring urgently required parts from the surface. It did appear that there was not sufficient realisation that valuable production time could be lost in this fashion, particularly as the shuttle car was not available for the transport of either men or materials.

Nor do we believe that the responsibility for carrying out any such plan was clearly drawn. Mr. Stansbury said Mr. MacLennan was responsible, but Mr. Mollohan thought it was Mr. Stansbury.

Mr. Stansbury himself gave evidence that the General Manager and himself were of the opinion that it was advisable to have a Maintenance Engineer to deal with underground maintenance and machinery. Presumably this was because Mr. MacLennan was not organising the job. They therefore called applications for the position of Engineer on two separate occasions. There was in the first case one applicant but he finally did not take the job and in the second there was a further applicant who, after taking it on, promptly turned it down again. There is little doubt that it was very difficult indeed to get men experienced in handling mechanized equipment to come to Collinsville.

This example in itself, however, is difficult to follow. It does suggest that the General Manager and Mr. Stansbury realised that maintenance was not being carried out satisfactorily and sought to remedy the position. The remedy they suggested proved, at that stage at least, impossible. There is, however, no record whatsoever that they did anything further about it. It savours too much of an attitude that " it is difficult to get men, therefore it will have to go on as it has been."

Nor is this all. We cannot believe that Management officials could have been round the mine to the extent that they were, could have seen the totally inadequate maintenance, and could simply have adopted the attitude that " the men will not do it, therefore there is nothing further we can do." We do not believe that this is an over-critical statement when equipment to the value of £500,000 is involved.

Mr. Mollohan's statement that you could hear the chain conveyors squealing some 50 yds. or so away is more of an indictment on Management than it is on the men.

In any case, the fact that Management was so worried about low production and because LS its own knowledge that lack of maintenance must contribute to this somewhat, it seems strange that the production factor in itself did not force more action.

(ac) CONCLUSIONS.

We have no doubt that proper attention to maintenance on the part of both Management and men would have had a beneficial effect on production and, conversely, lack of it reduced production.

It is to be hoped that, if and when mechanization recommences, a careful maintenance programme will operate, and an outline of our suggestions in this connection will be found in Term II D. It will require a systematic approach to the whole problem, the allocation of responsibilities and adequate signalling to indicate when the maintenance plans are not being carried out.

Mr. Fallins regarded this whole matter as of such importance that he suggested that senior officials of the mine should visit New South Wales periodically. The wording he used is interesting :

> " Yes, I make that suggestion because, in connection with a lot of this maintenance, I think a lot can be learned from the other fellow and we could probably learn something from Queensland. I say that in all sincerity. It would pay handsome dividends to send the Manager to New South Wales for a week or two, his Engineer and chief maintenance man, to see how things are done in a properly mechanized mine regarding maintenance. I think a lot of these people up here are working in the dark. It is not the fault of the individuals or the officials. They have never had any experience before and they are just going on and on."

We believe that that reply puts the matter in correct perspective. There is no suggestion by Mr. Fallins that these things should not be done because the men do not look after maintenance. Mr. Fallins recognizes, as we do, that responsibility and drive for maintenance should come from Management. That it did not do so was, in our view, the important factor in lack of maintenance playing some and possibly an important part in the reduction of coal output.

(c) UNION AND EMPLOYEES.

(i.) UNION POLICY.

Employees of the State Mine were divided in membership between four Unions. The big majority belonged to the Collinsville Branch of the Queensland Colliery Employees' Union (The Miners' Federation). Small groups belonged to the Amalgamated Engineering Union and the Electrical Trades Union. The Overmen belonged to the Colliery Staff Association.

In the main, what follows refers overwhelmingly to the Miners' Federation, but also to a much more limited degree to the A.E.U. and E.T.U.

Lengthy evidence was given regarding the effect of Union policy upon the actions of the employees at the mine and the question whether undue influence was exerted by the Union.

Mr. Lightfoot was much more extensive, much more definite, and much more severe, in his criticism of these factors than anyone else. It seems advisable, therefore, to ascertain just what he regarded as " job control." He was asked-

> " How did this job control come into effect ? Will you explain it from your own experience at Collinsville ? "

He answered-

> " The employees up there have got everything down to a standard that each man does so little that you require three men on one given cycle or about in that proportion. You will find out if they make concrete blocks they have got a darg on it and to get a certain number of blocks you have got to have a certain number of man shifts on it. The same applies with almost every other job in which you can measure their work effort and, by somebody up there studying the jobs and controlling the work effort of each man, they obviously control the number of men on the job."

This explanation accords with the meaning of the separate words " job " and " control." We believe, however, that the subject and problem of job control go much further than this.

Mr. Lightfoot made the point that the trouble was not lack of ability. It was job control-

> " As far as ability is concerned, the bulk of the men there do not lack it. All they require to make that place a success, in my opinion, is to have the yoke knocked off them, knock the shackles off them, get rid of this system of oppression and job control " (page 2427).

(This, incidentally, is somewhat contradicted by another statement of Mr. Lightfoot's on the same page—" A lot of our troubles disappeared as they became more skilled.")

Some very serious statements were also made by *Mr. Winstanley,* as the following quotations (p. 3356) indicate-

> " Ever since you have been Manager of that mine, have you had any real say in the output of the mine ? No, the output is controlled by the Union."
>
> " From start to finish it has not been you who have determined what the mine produced, it has been the union ? Yes."
>
> "As a responsible public official you have, from time to time, by exhortation, I suppose, and by advice, endeavoured to get the men to produce more ? Yes."

" So you have had the experience, I suggest to you, the unenviable experience of having in a sense to manage a mine which the Union took it upon itself to manage ? Yes, well, they controlled output, but I managed the mine, the managerial part of it."

" When anyone comes to examine the efficiency of the mine, naturally a lot of people consider in ordinary circumstances the Manager is in a position to increase output, but in Collinsville that was not the case ? You had no chance."

It was not made clear in the evidence, so it is still open to question whether these opinions operated only in relation to contract mining or also operated through hidden dargs under mechanization (p. 3391)-

" So that this fact is obvious—there is some controlling influence over these men at Collinsville which causes them to act differently to what you would expect them to act on various occasions if left to their own individual effort and control ? They might have, I cannot say."

" What do you think ? I think they are governed by the Federation."

" So that you would agree with this opinion, that the great majority of these men are thoroughly decent, honest men ? Yes."

" Regimented by some control from the union ? Yes."

When cross-examined by Mr. Paterson on this evidence however (p. 3394), the following was given :—

" When you refer to them being regimented by some control from the Miners' Federation, you are not suggesting it had anything to do with the low production during mechanization ? No. That was in regard to the darg for contract miners."

"And only in relation to that ? To the contract miner, yes."

(aa) EXERCISE OF JOB CONTROL.

Control over the employees was exercised in a number of ways : —

Darts and Work Restriction.

A fuller consideration of these factors appears elsewhere and it is sufficient for our purpose at present to mention that job control was usually effected by placing a maximum of some kind upon the work to be done or the output to be allowed. The common agency for doing this was by means of dargs, though, as will be seen, this was not the only method.

Mr. Lightfoot maintained that hidden dargs existed in connection with all operations, as the following quotations will illustrate :-

" Can you suggest any reason for a short cut ? Does it save their work at all ? No, it is one way of darging their output." (p. 3151.)

" What do you say was the cause of bad shot firing ? In my opinion that is another way of reducing output." (p. 3207.)

" What do you say are the deliberate ways of reducing output leaving out negligence, leaving out recklessness, and leaving out utter carelessness ? Where do you say there was deliberation in controlling output ? There was very definitely a darg on timber. There was, in my opinion, a darg on cutting." (p. 3207.)

" What about the loading ? Do you say there was any darg on the loading or control of the rate of loading ? . . . In regard to loading, if you do not produce the coal, well you don't have to darg the loading. But their restriction was not on loading so much as on overloading. Over the latter stages we got quite a lot of trouble from what I considered was wilful and deliberate overloading " (p. 3208.)

Mr. Lightfoot made two further points in this connection, When he was being questioned on shallow cuts, he was asked-

" Did it happen a second time ? It could have, but I don't know of any, but they had a system of passive resistance in that nobody offended twice. You were held up by a cutter to-day, a loader tomorrow, and the timber men the next day, and somebody else the next day. Everybody made it clear that there was no repetition."

The second matter was that Mr. Lightfoot was of the opinion that one good man would be affected by the tempo of the whole of the work.

Dargs also were instituted in connection with specific tasks. This case of the concrete blocks given by Mr. Lightfoot is a case in point where a specific job would be covered by an edict of the Union in terms of maximum work allowed.

Seniority.

Seniority was and is a very powerful weapon wielded by the Union. There is indeed much to be said for the somewhat humanitarian aspect which brought this rule into being. There is no doubt, however, that its operation can have a detrimental effect upon production by decreasing, and perhaps seriously decreasing, the efficiency of operations. (One of the few methods of lessening the adverse effect of seniority is by giving additional attention to training.)

One of the applications of seniority was to be found in the choice of men for mechanization. Mr. Lightfoot indicated that he was not able to choose the best men and place them on the work for which they were most suitable. They had invariably to take the men with the longest experience, irrespective of their suitability or otherwise. It must be pointed out, however, that Collinsville suffered nothing by the seniority rule which was not suffered by mines elsewhere. Seniority is a Union rule recognized by the Courts and practised everywhere.

Overtime and Saturday work.

Rigid discipline was exercised by the Union in these matters. The Union spread the overtime amongst all members, its stated purpose being to ensure that everyone would have the same opportunity for overtime. It was maintained that this procedure evened up the earnings and probably lessened fatigue.

As far as Management was concerned, however, it was prevented from giving overtime to the people that were best able to do the job and it largely had to take the men that the Union allocated to it, rather than the men best fitted for the work in hand. This would certainly not be conducive to efficiency and it is easy to understand how irksome and annoying it would be to management. This rigidity of control does not seem to have been practised elsewhere to the same extent as it was practised at Collinsville.

Strikes and Disputes.

As a weapon against Management, in the final analysis, the Miners' Federation, like other Unions, fell back upon strikes.

The Collinsville mine, with one exception—the stay-in strike—has not had a bad industrial record from a strikes and disputes angle. Its figures are not unduly bad as against other mines in Queensland and are considerably better than many in New South Wales. The figures relating to time lost because of industrial disputes have been given earlier in this report.

The stay-in strike was prolonged and was supposed to be an Australian record for a strike of this kind. Undoubtedly it created some bitter feelings at the time, but it was before mechanization.

There is little doubt that, under mechanization, the industrial disputes position improved considerably and this too is borne out by the great decrease in hours lost because of industrial troubles. Its record then bore favourable comparison with other mines in Queensland.

In the greater period of mechanization, from 7th November, 1953, to 30th June, 1954, there were three strikes but the fact that there were only a few hours lost really bring these into the category of disputes rather than strikes.

The first was the Mowbray incident, where Mowbray was caught riding on the belt and he was suspended for three days. The Union said the penalty was excessive and appealed to the Coal Reference Board, which reduced the penalty to one day. This happened on 15th December, 1953.

The second incident happened the next day and was the result of an incident which started with Hjortshoj and another employee. Hjortshoj felt that one of the cables on the loader was not safe and asked that it be checked. When he was told that the cable was safe, the electrician was asked to give the information in writing. Mr. Lightfoot, however, denies that this request was made and said that there was an electrician in attendance. When Hjortshoj and the other employee refused to proceed with the damaged cable, about which they appeared to be quite nervous, they were suspended and as a result the Union called the men out. Again this dispute only lasted a few hours.

(It is rather interesting to note in this connection that Hjortshoj, the main man involved, was referred to by Mr. Lightfoot as being a really good man.)

The third dispute arose on 28th June, 1954, when one Jaques was asked by the Management to go underground. It is claimed that Jaques had a medical certificate exempting him from underground work and the Union minutes show that the motion carried was " that we approach the Management, asking that Jaques remain on the surface, and the Union will give its policy to Management by Monday." This was rejected by the Management, so a strike was called, but here again it lasted only a few hours.

From 1st July to the date of the disaster, two further disputes arose. On 15th July, the dispute centred upon whether the men should have picked up their lamps prior to 8 o'clock, which was the custom, and be ready to go down at 8 o'clock, or whether the custom should be changed and the lamps should be picked up immediately following 8 o'clock. This dispute was settled reasonably quickly.

The final dispute was on 19th July, but there is no record giving any adequate particulars regarding this. It seemed quite unimportant.

It is rather puzzling that, at a time when industrial relations were, according to Mr. Lightfoot, at a low ebb, there should not have been more evidence of it in the number of stoppages. Mr. Lightfoot's explanation is, however, that, in his desire to obtain production, he often went as far as he could with the men but, in the interests of future production urgently needed, stopped short of making issues that had any chance of developing into prolonged strikes. Whether this be so or not, there can be no complaint with the amount of time lost on account of industrial stoppages during mechanization.

Nor does it appear that the Union was really prepared to call strikes in order to enforce their will. In some ways at least, industrial relations improved under mechanization.

(ab) REASONS FOR UNION CONTROL.

Opposition to Management.

It was part of the traditional Union role that it should oppose Management and in this its primary purpose, of course, was to see that its own bargaining power with Management was not lessened. The effect was to exercise this control in such a way as to be restrictive of production and to be a powerful weapon in bargaining. It would, therefore, raise the dargs and ease up the controls it exercised and instituted, only in exchange for certain concessions which it sought to wring from Management.

Thus the Union adopted a traditionally militant approach—an approach of opposition to Management, which later is regarded in any case as being opposed to its interests and those of its members. In that, it did not differ in any way except one from any other branch of the Union. The one difference is to be found in the extra severity and the inflexibility with which its objectives were usually pursued.

Miners' Federation Policy.

This attitude is traditionally practised more militantly by the Miners' Federation than by many other Unions.

The Miners' Federation is generally accepted as being in the main severe and inflexible, at least where it feels that its own interests or those of its members are affected. Mr. Lightfoot maintains that the Collinsville Branch was considerably worse than any other branch he knew.

Fear of Over-production.

From time to time an attempt was made to assess the result on production caused by the psychological bogey of over-production in the minds of the miners.

To appreciate this matter fully, it must be remembered that the coal-mining industry in Australia has, in common with so many places overseas, had a somewhat chequered existence. Where miners have come from overseas, apart from the many other things which they have brought with them which militate against production, there is very often the personal experience, or the experience of relatives who were miners, of being out of work for perhaps long periods. Here in Australia, the coal-mining industry generally remembers with bitterness what it regards as the evil days of 1929-30 when no work was done, at least in most of the New South Wales mines, for a period of nine months.

Where the individual miner does not remember this, the Miners' Federation undoubtedly does, and it is not surprising therefore that there is a legacy of fear engendered by spectres of over-production.

Mr. Casey sought to bring out on a number of occasions the fact that the real, though perhaps hidden, or even barely recognized, reason behind some restrictive practices was this fear of too much coal.

We found it extremely difficult to gauge the extent to which such thinking played a part in reduced production. That it played some part is, we think, beyond dispute, but that it could be classed as serious is, we think, at least doubtful.

It is true that many aspects of the darg and some restrictive practices have their origins in this fear, but we believe that the original reason has long past been superseded by other more urgent and more contemporary reasons. For example, even if a darg was originally imposed to prevent unfair distribution of skips, as time went by it could be used partly as a bargaining principle, partly to ensure equality of treatment amongst the various miners and partly to give the Miners' Federation some hold over individual members. Furthermore, it played its part in the general outlook which characterized the ever-prevalent attitude of the Management of the mine and the miners, through their Union, being completely in opposition to each other.

Whilst this is true as a general statement, we believe that the major fear in connection with over-production would raise itself at certain times when something new was contemplated and the likelihood of increased production was brought home to the men. The cogent case in connection with the State Mine is, of course, to be found in the advent of mechanization. We feel quite sure that there was a real fear in the minds of the men that mechanization would unduly increase production and some of the men might lose their jobs accordingly. This may well have been at the back of the men's minds in repeatedly asking that the Minister's verbal promise of no dismissals as the result of mechanization should be put in writing.

All these factors are tied up with this question of over-production but they have not made it any easier for us to assess the effect upon production. We think Mr. Lightfoot was to be commended in his attitude in trying to deal with this problem. The best way to tackle it was to attempt to show to the men that there were so many demands for the State Mine coal that the spectre of unemployment need cause them no concern whatsoever. We believe that he did everything possible in this regard and, if such an attempt was either unsuccessful or at best partially successful, it was no fault of his but rather because these feelings are so often ingrained in the minds of miners in particular.

The second method was by the guarantee of employment which effort was, however, in our view, spoiled by the somewhat inexplicable refusal of Management to confirm the verbal promise in writing.

Inherent in the fear of over-production was the thought that it may be necessary to dump coal and there was always then the danger of the men being put off. It should be noted, however, that the dumping of coal also had another effect that it would be bound to reduce the bargaining power of the Union as against Management because the Management would be " tougher " if it had the solid backing of the coal at grass.

This fear of the " unknown " so far as extra production was concerned, would not be the only factor in opposition to mechanization. A major technological improvement of this kind invariably sets up, in other industries as well as coal-mining, a sense of insecurity in the men, engendered by the fact that they know the old job and could earn a living by it, but this may be altered and they may find themselves in the position of not being able to do the new job and thus of being forced to suffer the consequences.

We feel that we cannot say how much effect fears of this kind had in restricting production. Undoubtedly the practices that went hand-in-hand with this fear did interfere with production, but we believe these practices would have been in operation whether there was a fear of over-production or not. To that extent the effect on production was probably slight. To the extent that thinking in terms of over-production for many years engendered a psychological attitude which increased the " against Management " viewpoint and this found its expression in other ways, it was probably an important factor.

(ac) METHODS OF UNION CONTROL.

In Relation to its Members.

The Union exercised strict control over its members and did so in all ways it considered necessary in order to preserve Union objectives and interests.

The Union was able to adopt this approach because of the rigid discipline which it exercised over its own members. If discipline was flouted by a member, the member would be—

Firstly, warned ;

Secondly, censured ;

Thirdly, fined ; and

in the last analysis there was the extremely strong threat of withdrawing a membership card, which would be the equivalent of banishing the man at least from the coal-mining industry. In every case the man would either obey the Union or leave the industry before any question of withdrawal of membership arose.

In Relation to Management.

The Union sought to preserve its own interests by dargs, overtime bans and strikes. It did so partly in order to preserve what it considered the inalienable rights of its own members and partly to put itself in the best position to bargain either to retain rights or to obtain further concessions.

(ad) UNION'S ANSWER TO MANAGEMENT'S CRITICISM.

Dargs.

The Union strongly emphasised three factors regarding dargs. It admitted that dargs were in operation in the days of hand mining. There was no secret whatsoever about that. Furthermore, they were known to Management. It also maintained that, as far as the darg on loading coal was concerned, it had been instituted in the first place in the interests of its members so as to spread fairly and evenly the number of skips available when shortages of skips developed. Undoubtedly there were shortages at times.

In 1951, for example, a report signed by Crowley and Woolley stated :-

> "Although the darg is operating at the moment, not all sections get sufficient skips to fill the darg. The shortage definitely affects the Dip section."

The darg was the subject of agreement between Management and the Union, and thus Management must have known what it was. The Union said it never instituted a darg secretly.

The second factor was that the Union maintained positively that there were no dargs under mechanization.

Thirdly, the Union pointed out that when there was a darg in operation, it never brought either persuasion or pressure to bear in order to prevent a man from filling the darg.

In his Press Statement of 5th March, 1952, the Minister for Mines (Hon. W. Power, M.L.A.) announced that, as all plans for mechanization of the State Coal Mine at Collinsville had been finalised and all material and equipment ordered, consideration had been given to certain industrial aspects which would arise when mechanized mining commenced. He added that, upon commencement of mechanized mining, all contract work and customs and practices associated with hand mining would automatically cease and all employees would be engaged on daily wages as fixed by the appropriate industrial tribunals. He said that a written guarantee by the Unions would be required that all restrictive dargs by shift men or other employees in respect of the amount of timber erected or other work performed would be completely abolished. (Exhibit 171.)

The Union maintained that this was carried out. Mr. Lightfoot in particular claimed that the dargs went on but most of them were hidden.

In answer to Management's contention that the darg was instituted to keep production low, the Union replied that the Union agreed to something in Collinsville which was not allowed virtually anywhere else in Australia—cutting on the night shift—and this they claim must greatly have helped production.

Limitation of Earnings.

The second accusation against the Union was that it tried to limit the earnings of the miners, and Mr. Lightfoot pointed to the difference between the earnings of the employees of the State Mine as against those of Bowen Consolidated. The Union's reply was that this was completely untrue. It allowed and largely wanted Saturday work and, as there was an additional 25 per cent. payment for this, its action in this regard would in itself refute Mr. Lightfoot's suggestion.

Opposition to Increased Production.

The claim by Management that the Union was simply opposed to any increase in production was answered by the Union in contending that it had for a long period under hand mining asked for the institution of horse wheeling and power borers. Management delayed their introduction but actually, when introduced, they both meant substantial increases in production. To this extent, the Union claimed, it was Management that impeded production as against the Union's desire to see production increased.

(ae) MANAGEMENT'S EFFORTS TO OVERCOME JOB CONTROL.

Mr. Lightfoot, Mr. Platt and Mr. Winstanley were all in agreement that job control by the Miner's Federation in Collinsville was such as to restrict production seriously, and indeed to some extent to take control of production out of the hands of Management and place it in the hands of the Union. Job control operating to this extent of course denotes a very serious state of affairs.

The Management tried to overcome this admittedly serious difficulty by three methods :—

Firstly it tried to increase the Supervision.

This apparently did not have the desired effect, because the Union control and discipline was too strong, and there was some evidence (barely conclusive) that Overmen were threatened physically where their discipline came against the job control by the Union. An even more serious factor than this, however, was that the Deputies in Collinsville were members of the Miner's Federation and in Mr. Lightfoot's view " as far as supervision and disciplinary purposes are concerned, you may as well not have them." Certainly such a condition denotes a serious weakness and we make reference to this matter and make a recommendation in connection with it later in this report.

Secondly it tried Persuasion.

We were impressed with the logical method adopted by Mr. Winstanley in this connection. He met the Union leaders and pointed out to them that the financial results of the mine were unsatisfactory. He indicated that the major reason for this was the restrictions placed upon production as a result of job control exercised by the Union. It is true he did not show them the accounts and it may be that, in the absence of such accounts, they did not believe his statements. Be that as it may, however, Mr. Winstanley's attitude was correct and it may well be that the warnings that he issued at that time will now have been reinforced by publication of the completely unsatisfactory financial results of the last two years.

Thirdly it tried Bargaining.

Neither of the two previous methods seemed to have much effect and the Union's attitude as expressed through the men ranged from straightout opposition to passive resistance. Management therefore felt that it may be wise to try and bargain with the Union as so to win from it concessions which would result in lifting of production in return either for some increase in fringe benefit wages or in conditions.

The complaint by Management in this regard was that it was frequently faced with the acceptance of an agreement of this kind but the spirit of the agreement was often ignored. The minimum of Management was the maximum of the Union.

Furthermore, there were constant complaints by Management that the Union retained the concession given but did not adhere to the other side of the bargain, and thus, for example, the production arrangement made by Management was seldom, if ever, kept.

We believe that the evidence did show that job control by the Union at the State Mine at Collinsville was very strong and was frequently pushed beyond the limits which could be justified for a Union in wanting to look after the welfare and benefit of its members in conscientious and accepted Union fashion. To this extent, we believe that the State Mine suffered more that the great majority of other mines manned by members of the Miners' Federation. This definitely reflected itself in lower production because, apart from the effect of such job control upon that production, it inculcated a " don't care " spirit and a lack of co-operation which in any case would prove to be a great production handicap.

We are of the opinion that there is room for much improvement on the part of the Union and we believe, too, that this is an essential factor in future success. We are sure that the Union would be wise to remember that, whilst it is justified in its contention that its first duty is to look after its members, it is not doing so if it pushes control to the stage where a mine becomes unprofitable. In the final analysis, high and unproductive costs will not make profits but, what is much more important to the Union, will also not for long keep a mine operating.

It is of interest to note that in Mr. Winstanley's opinion, the Union attitude improved in the later stages of mechanized mining.

(ii.) COMMUNIST INFLUENCE.

Reference was made in the previous section dealing with job and Miners' Federation control, to the fact that this control seemed worse in the case of Collinsville than virtually anywhere else. In Mr. Lightfoot's view, this was because—

(1) There was a small but very powerful minority which controlled the local Branch of the Miners' Federation ; and

(2) This group was in the main Communist and the effect therefore was that control was exercised by a Communist group. By having control of the Union, this group was able to have its own policy established as that of the Union.

Attention was drawn to the fact that both the current President and Secretary of the local branch of the Miners' Federation were Communists and that there were a number of others who were on the Committee who were either known to be Communists or suspected of being such.

In support of this contention, Mr. Lightfoot gave a number of instances and submitted a copy of a publication called " Vanguard " dated April, 1953 (Exhibit 33), which he maintained was a Communist publication. It contained the following :-

" *The Big Bluff.*

Mr. Lightfoot, controller of the State Mines (and Mines Dept.) for some time has been issuing an ultimatum to the miners that if they did not fill more packed skips they would lose their 8d. per ton and other concessions under the agreement.

Two fortnights running letters were sent to the branch threatening this reduction. The Management was setting an impossible target in production. The members decided that they were doing their utmost, and the terms of the agreement were being observed, it was up to the Management to make the next move and Lightfoot who wields the big stick decided that to maintain present production and to have a possible chance of filling his big order for the United States Army in Korea he had better not interfere with the 8d. and other concessions.

The Collinsville Branch must maintain solidarity in this difficult period and observe the utmost unity, pledging themselves to carry out Federation Policy.

The bathroom to be commenced in February as part of the agreement is as far away as ever. Tenders called for the erection closed on the 14th April with no-one tendering for the job. How long is the new bathroom for the mineworkers going to stand in abeyance ?

Then we have the sudden mad rush of overtime required by the Management. At times it seems that they have a quantity of money to get rid of quickly. Time is running out. The installation of mechanization is fast approaching and we mineworkers are going to bump against some real problems. We must be constantly vigilant, each member carefully noting the various aspects of the new policy of the Management, conserving our energy for the struggle which will undoubtedly come to preserve our jobs and our livelihood."

In addition to the views expressed in this publication, Mr. Lightfoot drew attention to such matters as the stay-in strike (which was proudly announced as being a record for an underground mine), the burning of an effigy of Mr. Winstanley (about which the evidence was somewhat hazy) and the retort of one Dawson, stated to be a Communist, when remonstrated with about carelessness with one of the machines, maintained that what he was doing was " loading scrap iron for Japan."

The so-called Korean Contract was another instance given. We include a letter of 5th May, 1953, written by the Collinsville Branch of the Queensland Colliery Employees' Union to the then Minister for Mines, Mr. E. J. Riordan, and a copy of the reply by the Minister under date 13th May, 1953 (Exhibit 59).

COPY.

(Exhibit 59.)

QUEENSLAND COLLIERY EMPLOYEES' UNION.

Collinsville Branch,
Collinsville,
5th May, 1953.

Mr. E. J. Riordan,
Minister for Mines,
Brisbane.

Dear Sir,

At the monthly meeting of the above Branch members were disgusted with the policy of the Government in making a secret deal to sell Collinsville coal to the United States Army in Korea.

The statements that the coal was for Japan were bad enough but it seems the Government is not prepared to confide in the workers who after all are entitled to know these facts.

Coalminers on this field do not agree with a policy which will assist to continue the war in Korea.

Yours faithfully,
(Sgd.) J. Nisbet,
Secretary.

COPY.

Department of Mines,
Brisbane, 13th May, 1953.

Dear Sir,

I am in receipt of your letter of the 5th instant expressing the disgust of your Branch members with the policy of the Government in making a secret deal to sell Collinsville coal to the United States Army.

Obviously your Branch has been misinformed probably intentionally. This Department has made no deal with the United States Army, nor was there any secrecy. The specification, price, and details of Collinsville coal likely to be available later was circularised to all likely purchasers and interested parties in Australia. Various agents attempted to obtain markets in Australia and elsewhere, without success. Ultimately many of these agents became aware that the Japanese Procurement Agency was calling tenders for coal, and at least four agencies in Queensland tendered to that Agency for Collinsville coal. One of these agents flew from Brisbane to Tokyo for that purpose but the other three had branches in Tokyo which handled tenders. Scott and English, an Australian Company, with headquarters in Sydney and branch offices in Brisbane and Tokyo, were successful in obtaining an order from the Japanese Procurement Agency, and ultimately negotiated a contract with this Department. All efforts to sell the surplus coal to Pakistan, Noumea, and elsewhere in Australia had failed.

It is interesting to note also that the tenders submitted to the Japanese Procurement Agency, without success, included four coals from New South Wales.

As to the allegations of secrecy, I have on the official file a carbon copy of the Press Statement I issued immediately Cabinet approved of the sale. In that I clearly stated that the coal was being sold to Scott & English (A'asia) Pty. Ltd. for the Japanese Procurement Agency. That Press Statement of mine was fully printed in the Brisbane *Courier-Mail* of the 25th March, 1953, and clearly debunks the silly allegation of secrecy. Furthermore, no statement has ever been made by me or Departmental Officers that the coal was to go to Japan, and the General Manager had previously discussed the matter with your President and yourself and had indicated that the Japanese Procurement Agency was the purchasing authority for the United States Army.

Yours faithfully,
(Init.) E. J. R.
Minister for Mines

The Secretary,
Queensland Colliery Employees' Union,
Collinsville Branch,
Collinsville.

B/c. A. C. Pass, Esq.,
Hon. Secretary,
Collinsville Branch, A.L.P.,
Collinsville.

Minister for Mines,
13th May, 1953.

Mr. Lightfoot argued in evidence that the objections raised by the Union to the shipping of coal to Korea were part and parcel of Communist doctrine which looked upon the Korean war as an imperialistic and aggressive war.

Actually this contract was never completed by the State Mine, though it is known to the Commission that it was actually supplied by a New South Wales colliery whose employees belonged to the Miners' Federation in New South Wales, of which the Queensland Colliery Employees' Union is part. The tone of the letter written by the Secretary of the Branch quoted above seems to suggest confirmation of Mr. Lightfoot's contention that the control at Collinsville was more harsh, more severe, and more aggressive than at least some other branches.

Nevertheless, the part which Communists played is not clear. In the first place, evidence was given by Mr. Platt and Mr. Winstanley that the Union's attitude had been somewhat similar for many years and it is therefore of interest to note that the previous President was reported as not being a Communist. This may not in itself be very significant but perusal of the Union minute books disclosed a conflicting state of affairs. Sometimes one Communist would move a motion and another would be its strongest opponent. Again, one Communist might counsel co-operation with the Management and one or more may oppose such a course. There are cases where one known to be a Communist counselled defiance of Management and another advised support. To make the confusion greater there are motions antagonistic to co-operation moved by employees who were admitted as not being Communists and who were spoken of in praiseworthy terms by Mr. Lightfoot and the opposite viewpoint in favour of co-operation was taken by a Communist or Communists.

Thus a perusal of the Union minute book does not really bear out the contention that the Union was purely run by Communists. There are several instances where a known Communist has moved a motion much more reasonable than one who was not a Communist.

In connection with the dispute over Jaques' medical certificate, the President of the Union, Mr. J. Currie, who said he was a Communist, moved that the mine remain idle, but this was lost. The alleged Communist, Mr. Dawson, moved that the miners abide by the agreement.

In the case of the dispute over the lamps, it was Mr. W. C. Templeton, not a Communist, who moved that the Management be given until Monday, presumably to allow picking up the lamps after 8 o'clock, and this motion was lost. Again it was Mr. Dawson, the alleged Communist, who moved that the miners revert to their previous practice of picking up the lamps before 8 o'clock.

These are not the only examples, and thus the minute books do not show, at least in any clear fashion, that Communists had full control of the meeting at all times.

These are, however, particular instances and it may not be logical to draw general conclusions from them. The evidence is, however, very contradictory and it is only after a careful weighing of all of this that we have come to the following conclusions :-

(1) Communist influence was most certainly to be found in the local Union—whether greater or less than other places is impossible to say ;

(2) It probably had the effect of making the Union policies more inflexible in bargaining and less amenable to reasonable co-operation ;

(3) It was probably the major cause of the strong antagonistic attitude to the Korean Contract.

We do not feel the evidence is strong enough to allow us to go beyond this. As a factor in low production, it would take its place as part of the effect of Union policy and job control. The latter undoubtedly played a part in lower production and in our view Communist policy played an influential though maybe not a controlling part in the severity of job control and militancy in pursuing objectives.

(iii.) COMPLAINTS AGAINST THE MEN.

In Mr. Lightfoot's view, the one major cause for most of the troubles at the mine was to be found in the attitude and behaviour of the men, aided, abetted, and controlled by the Union.

No better summary of his thoughts about and charges against the men could be found than in a partial letter which we were informed was part of a complete letter signed by the Minister for Mines. As indicated, our copy is part of the letter only and bears no ending or signature. It is dated 26th August, 1954, and we include it herewith because, as indicated, it summarises the charges made against the men by the General Manager, Mr. Lightfoot, who was on the point of final termination of his service with the Department of Mines.

COPY.

Department of Mines,
Brisbane, 26th August, 1954.

Dear Sir,

STATE COAL MINE, COLLINSVILLE.

In view of the attention being given to the operations of the above mine at the present time, I feel that you should be advised of the following facts :-

(1) Prior to mechanization, the system of mining was that all coal was won by the use of hand-held power boring machines, blasted from the solid by the use of explosives and hand-filled into skips by contract miners paid on a tonnage basis, whilst all other employees were paid daily rates.

(Note : Under mechanized mining all employees are paid daily rates and required to work the award hours of eight bank to bank.)

Under this system the output was reduced to 8.3 tons per miner by the application of a very restrictive darg. In similar seams, worked under similar conditions elsewhere, contract miners produce up to 12.5 tons per man, with an average of approx. 9.5 tons.

During this latter period of contract mining the Department entered into an agreement with the Collinsville Branch of the Queensland Colliery Employees' Union wherein they were paid an additional 8 pence per ton to cover all minor disabilities not actually covered by the tonnage rate. The Union agreed to fill all skips with a 6-inch top above the boards, i.e., approx. 1 ton weight. Although on a tonnage rate the Union darged this to such an extent that the average weight of skips was only approx. 18 cwt., i.e. 2 cwt. per skip below their agreed weight ; over the period of contract mining prior to mechanization the overall tons per manshift ran out at 2.1 tons compared with a figure of from 3 to 4 tons for the privately owned collieries in Queensland, most of which were working inferior seams with inferior equipment.

The contract miners ceased work under these conditions from 12.30 p.m. onwards and the work of all other day-wage employees engaged on duties other than in the powerhouse and workshops tapered off and ceased when all the contract miners' coal had been hauled and tipped.

(2) The question of mechanization at Collinsville had alternatively been used over the years by the Union as either a criticism for its non-introduction or a blatant threat that it would not be tolerated.

(3) Immediately a commencement was made to install the mechanized units the employees used every possible opportunity to embarrass the Management. For a period of several weeks there was a partial overtime embargo by the Q.C.E.U. that restricted its installation. Then the same Union imposed a total overtime embargo. Later they reverted to a partial restriction, which they refused to lift even though the Department offered to provide them with a swimming pool and install lights on their sports oval, which had previously been provided by the Department.

Some 2-3 weeks prior to the commencement of mechanized production the overtime embargo was abolished without any strings attached.

The Amalgamated Engineering Union at the most critical period of the installation engaged in a three weeks' strike.

(4) The Department, prior to mechanization commencing, drew up a most favourable agreement, wherein they offered all employees the outstanding benefits of both the Queensland State Award and the Commonwealth Award prevailing in New South Wales, and guaranteed all employees full employment at least at their rates as at the date of mechanization.

(5) Immediately mechanization commenced the working places encountered an area of country not previously disclosed by the wealth of geological and local knowledge available, and a large proportion of the working places were subjected to a very bad roof and extensive falls of roof and extremely severe grades. Although boreholes and known levels in this area showed grades of 1 in 7 local grades of up to 1 in 3.8 were encountered, which obviously have had a very severe effect upon productive results. The efficient working limit of the plant installed was rated at a peak grade of 1 in 4.8 for the loaders and cutters and 1 in 6 for the shuttle car.

Recently grades and roof conditions have improved to an average of 1 in 6 on one side of the working area, but several working places still have grades of 1 in 3.8. Nevertheless this improvement in grades and roof conditions has not produced any material improvement in output, with the exception of the week during which the resignation of the General Manager was announced. It is interesting to note that on the day of such announcement production reached the record of 846 tons.

(6) During the first week of mechanization a detonator was discovered on the return end of one of the main trunk belts. This could not have been placed there accidentally. It fortunately went around the rollers and caused no damage.

(7) During the second week of mechanization a very large lump of coal was found jammed between the return belt and the rollers and causing rapid wear and heating. This was removed by the General Manager and Mr. Check Inspector Pocock, who were travelling into the Colliery together and who fortunately detected it before any serious damage resulted.

This piece of coal could not have accidentally found its way into the place it was detected.

(8) The timbermen have instituted a darg of one set of timber, plus the ordinary minor work involved, as a darg for a crew of three men for one shift. This has been the subject of several strong objections by the Management. The present position is that, by increasing the gang to four men, they now erect two sets per day.

In other similar collieries, two men erect such timber at a rate of up to four sets per day, merely being given assistance by way of a lift with the bar, which occupies some five minutes in each case.

At several collieries the contract rate for setting similar timber is from 10s. to 32s. 6d. per set. At Collinsville it is costing approx. £9.

(9) At other collieries the cutters and borers are averaging 6-7 places per shift. At Collinsville we are averaging three places.

(10) Employees demanded that the best possible dust prevention and health standards be observed. The Minister promised that chemists and inspectors would be made available at any time considered necessary. On two occasions to date they have visited the colliery and taken samples and a third similar inspection has now been arranged, wherein the Chief Inspector of Coal Mines and Health Department Chemists commenced testing on 24th August. The Chief Inspector has reported that there is no imminent danger.

All machines are fitted with hoses, water jets and sprays. We have one employee permanently on the job of replacing and repairing hoses and pipes, and the damage to hoses and fittings has been outrageous and can only be described as wanton destruction.

The dust counts by law have to be kept below a proclaimed standard and the most recent counts were all within the permissible range.

All operators who desire them are provided with expensive respirators whether the conditions necessitate them or otherwise.

Water jets and sprays are fitted at every point where coal is discharged and the colliery workings generally are quite wet, so much so that practically every employee is in receipt of a water money allowance.

(11) Great difficulty has been encountered in having employees work their Award hours and do a fair days' work. Whilst not contained in the Award, the Department agreed to a rest pause of 10 minutes morning and evening, on the distinct proviso that employees were to relieve each other and the productive equipment was not to be stopped. The agreement incorporating this industrial gain was signed by State and Branch Union officials and accepted bythe Australasian President (Idris Williams).

However, employees have been found to be sitting around for from 20-25 minutes after reaching the faces before starting work, taking 20 minutes for rest pauses and stopping the machines for this purpose morning and afternoon, leaving the faces 15-20 minutes early at the end of the shift and leaving the colliery 15-20 minutes early.

Attempts to have them work in a reasonable manner produced stubborn resistance and strikes and led to the ultimatum recently delivered by the Department.

(12) Five locked boxes have been provided underground for special tools for the mechanized equipment and for security of the tradesmen's personal tools. In nine months we have had to provide 29 locks to replace those broken off. The loss in tools has been obviously outrageous.

(13) Eighteen special light extension ladders have been provided at a cost of £11—£16 each and most of these have been the subject of wanton destruction by running over them with loaders and cutters and shooting coal on to them.

(14) Several hundred pounds worth of axes, shovels, picks, ropes, grease guns, and pulley block chains have been provided and these are buried under coal, stolen and lost and have to be constantly replaced.

(15) Officials who have made an attempt to discipline employees are subject to violent abuse and threats.

A large number of employees have been found sneaking home up to four hours early. Officials who detected this and who docked and reported these men to the Manager have been subjected to violent abuse and threats of physical injury.

One Official was assaulted in a hotel because he was responsible for reporting an employee who was in the hotel at 9 p.m. and whose shift finished at midnight.

Three employees to date have been sacked for action as abovementioned and this has only resulted in a more bitter approach by the employees to the staff. Currie, the Collinsville Branch President, boasted to me that these were the first sackings allowed by the Union in 28 years.

(16) One employee has been recently convicted for stealing copper and brass from this colliery and dismissed.

(17) The employees loudly protest and demand the highest possible standard of safety equipment and practices from the management and recently have been giving publicity throughout Queensland to the coal dust by assertions as to their

apprehension of a coal-dust explosion. Proper sampling and analyses have been arranged by the Department whenever necessary and have proved the claims of the men to be groundless. The sincerity of these claims is shown by the fact that on 23rd August, when the Chief Inspector of Coal Mines with chemists and others were sampling and testing, no less than five of the employees were convicted that day for smoking underground and another for having smoking materials in his possession underground.

18. On the occasion of the last conference I had with Union officials regarding this mine, there were present Mr. J. Donald, M.L.A., Messrs. Idris Williams and George Neilly (President and Secretary of the Federation), Corbutt, Tucker and Millar (President, Secretary and Executive Member of the Q.C.E.U.) and Currie and Nesbit (President and Secretary of the Collinsville Branch).

Messrs. Currie and Nesbit brought to this Department with them Mr. Lloyd Roberts, M.L.A., but he did not attend the conference as both Messrs. Williams and Neilly indicated in the vestibule that if Mr. Roberts was to attend they would not. Mr. Roberts thereupon left the Department.

On several occasions whilst in Brisbane to confer with me, Messrs. Currie and Nesbit have been known to have been in conference with Mr. Roberts at Parliament House before conferring with me.

19. Other matters relevant to the unsatisfactory position and indicating the attitude of the employees are-

(i.) During the infamous and stupid stay-down strike the Mine Manager Winstanley and his wife were by direction of the Union Branch ostracised ;

(ii.) Employees generally will not accept either the necessary degree of discipline or instruction from officials, who are expected to do what the Branch or its Executive dictates or to get out ;

(iii.) Discussion and negotiation at Collinsville must, according to the Branch, take place with the Full Executive of 11 or 12, the conduct of whom has to be seen to be believed. When an official endeavours to express the management's point of view he is met with a chorus of sneers and jeers and with choice language ;

(iv.) A new modern bath and change rooms were recently completed for almost £50,000. Within a few nights the locked doors were broken open.

It now becomes necessary to examine the evidence to asscertain the basis for these trenchant charges.

(aa) LOAFING AND LACK OF EFFORT.

A great deal has already been said which would come in this category and it is therefore proposed merely to list various actions which were given in evidence as illustrating these aspects of behaviour of the men. By far the largest part of these allegations were made by Mr. Lightfoot.

The men were leaning up against something and talking and would work only when watched.

Opinions of outside experts brought to Collinsville to install mechanization equipment maintained the work effort of the men was bad.

Strikes were inevitably associated with loafing.

There was plenty of evidence on the night of the disaster that the men had not really begun to work for an hour or so after getting down the mine.

The rate of timbering was only speeded up when the men were threatened with dismissal.

There was always extreme reluctance to extend the chain conveyors.

Three lamp attendants were at one stage required when there was only enough work for one or, at the most, two.

Nisbet and other shift men were loafing on the occasion mentioned elsewhere.

An entry in Mr. Lightfoot's diary, 7th May, 1953 :—

" Work to date of good standard but evident that men work very limited hours and the daily output is small due to loafing."

MacLennan leaving the mine for morning tea caused loafing and lack of efficiency.

Diary 7th July, 1954: " Cutters and loaders not starting till 8.45 to 8.50 due to crews lounging around crib rooms."

Prasser and two men were missing. One was sitting down against the bottom rib and the other two were skylarking. They were supposed. to be on the cutter.

Mr. T. Platt, former Supervisor of State Coal Mines, was asked (p. 3449) :-

> " What sort of a work effort did you get from the men ? I was never really satisfied with the work effort I got from them. "My experience with them was that there was a lot of confused thinking. Individually the men were easy to get on with, but collectively, through their union officers, they were always inclined to seek political interference to get something for nothing, and there was a great amount of distrust, lack of faith in the people in authority."

Mr. Platt was further asked, by Mr. McCawley (p. 3565) :-

> "Now, Mr. Platt, to sum up one aspect of it, in your experience the men at Collinsville, in a large measure, have worked when they liked, how they liked and to the extent they liked ? Well, I do not know that that only applies to Collinsville. They have had benefits above those that were given by private owners.
>
> Advantages ?—Advantages.
>
> In your experience, have you ever known them to make a bargain with the Government so far as a darg was concerned and to honour that bargain ? There was always difficulty in exacting from the mine workers work that would be commensurate with the full agreement as to what had been agreed upon.
>
> That means to say, in effect, that they never did, on any occasion that you can think of now, honour their bargain in that respect ? There was always difficulty. I do not know that in every case they did not comply with what they had agreed upon.
>
> Do you know of any period in which they have filled their darg ? Well, I would not say—I mean, a period of time for instance, one day, one week, one year—they might have complied with it one day or one week. I really could not answer that.
>
> But taken over any reasonable period at least, you will admit that they have never done so ? There was always difficulty in getting output.
>
> I want you, if possible, to answer my question directly, you see. I just want to put it to you perfectly plainly, that you cannot think of any reasonable occasion on which they have honoured their agreement to produce X skips ? Well, even if they did for a period, it was not long before they found some reason for breaking away from it. I found that, if they asked for something, some concession, to create again another bad custom and practice—and the place was overrun, snowed under, with bad customs and practices—they would ask for some concession and if it was refused it was likely they would reduce the darg to seek to force it.
>
> Apart from the question of strikes, the Union can perhaps achieve very much the same result simply by decreasing the output of coal ? Would you please repeat that ?
>
> Yes. Instead of striking, the Union can achieve very much the same result by decreasing the output of coal ? Yes, that means they can place the employer in difficulty."

(ab) HOURS WORKED.

Complaints were constantly made that it was extremely difficult to get the men to work the recognized hours.

Mr. Lightfoot's diary, 7th May, 1953: All shift men and J. Nesbit found finished inbye at 2.30."

Diary 9th September, 1953: " At pit bottom found three afternoon shift employees who had not started work at 5 p.m. They stated they had no saw but there were three saws in the vicinity."

Diary 6th July, 1954: " Men left early at 3.10. Transport arrived at surface at 3.43. Overmen all leave early too."

Diary 7th July, 1954: " Transport up at 3.40 p.m."

Diary 8th July, 1954: " Transport up at 3.10 p.m."

(Mr. Lightfoot insisted that the transport run at a time to reach the surface at 3.55 and there was a dispute against making the transport run what was considered five minutes later.)

Under contract mining, the contract men ceased work from 12.30 onwards and the work of all other day-wage employees engaged on duties other than in the powerhouse and workshops tapered off and ceased when all the contract miners' coal had been hauled and tipped.

Great difficulty has been encountered in having employees work their award hours and do a fair day's work. The Department agreed to a rest pause of 10 minutes morning and afternoon (though this was not contained in the award), on the distinct understanding that employees were to relieve each other and the production equipment was not to be stopped. However, according to Mr. Lightfoot, employees have been found to be sitting around for from 20 to 25 minutes after reaching the faces before starting work, having 20 minutes for rest pauses and stopping the machines for this purpose morning and afternoon, leaving the face 15 to 20 minutes early at the end of a shift and leaving the colliery 15 to 20 minutes early.

(ac) CARELESSNESS.

Much of the trouble experienced in the mine could, in the view of Mr. Lightfoot, be traced to rank carelessness and he, in particular, gave these examples to support his viewpoint.

Poor shooting of coal by competent shot-firers.

If the Dip had been shot on the night of the disaster, the cutter would have been up against the face and coal would have fallen on it. (Buchanan said this practice was usual.)

Cutter controls were damaged in the early stages where the machine was too close to the coal being blasted.

Bogging—if precautions had been taken, many cases would not have occurred.

Excessive watering caused bad conditions.

There was a permanent excessive cutting of cables.

Damage to loaders, shovels, picks and other equipment.

Losses of picks, shovels, axes, etc. under coal.

Constantly excessive spillage.

Excessive loading onto chain conveyors.

Mr. Lightfoot's diary 7th May, 1953: " Had up to 129 stops on the main rope this week. Clippers stopping the rope for most unnecessary and frivolous reasons."

Cables—the number of cables destroyed or damaged by carelessness resulted in repaired cables being available only on a hand-to-mouth basis.

Hoses—many more hoses burst or were rendered useless than should have been the case.

(ad) EXCESSIVE SPILLAGE.

Much evidence was given regarding excessive spillage but the cause of this was subject to differences of opinion. Mr. Lightfoot maintained that it was largely carelessness in overloading, whilst the men stated that it was due to the wrong type of equipment and particularly because the loaders had a much greater capacity than the chain conveyors.

It was Mr. Stansbury's opinion that excessive spillage largely occurred when the conveyor length exceeded 300 ft. With this distance it was somewhat easy to overload it and spill quite a lot of coal.

There seems little doubt that it was essential that the loading rate from the loader had to be toned down to conform to that of the chain conveyors. This could have been done by removing some flights from the gathering chain, which are fairly easily removed. Alternatively, the loader could be edged into the heap of coal and this would enable loading to be done at a reasonable rate.

Mr. Fallins felt that the loading rate onto the chain conveyors was too fast. He watched the operation and noticed that it was leaving a triangular piece of coal between the sill and the pan due to excessive spillage. He thought that the operator should have reduced the speed of loading, though he did not believe that such operator was deliberately trying to overload.

Mr. Lightfoot was of the opinion that the real reason for spillage was that the Union desired to clean up the spillage by Saturday work. Not only would spillage ensure this but, the greater amount of spillage, the more work for more employees. He maintained that the Union pursued this factor relentlessly and they finally threatened to strike unless large numbers of men were brought in to clean up the spillage. He said that eventually he had acceded to this and did bring a certain number of employees in to clean the place up at overtime rates. Immediately this became established, however, the spillage became sufficiently frequent that men had continually to be kept on cleaning up spillage as a Saturday job.

(as) INDISCIPLINE.

There were constant complaints about the discipline of the men and this can readily be understood because the examples given of laziness, lack of effort and carelessness seem to suggest a situation of indiscipline to a high degree.

Mr. Lightfoot continually complained that the men were hard to handle and difficult to discipline. He gave one or two examples where he felt that the behaviour of the men was deplorable.

Mr. Winstanley made every endeavour to improve the behaviour of the employees and to show the steps that he took he tendered a number of exhibits, as, for example :—

No. 75—Notice to employees ;

No. 79—Manager to the Union.

No. 80—Notices of times for men to leave section ;

No. 81—Forbidding employees to travel on the main conveyor belt

No. 82—Suspending Mr. N. Mowbray for three working days for travelling on the belt ;

No. 83—To Overmen and Under Manager with regard to timbering rules and shot-firing and instructing that any men not carrying out managerial instructions or misconducting himself should be sent out of the colliery ;

No. 84—Regarding the 2/3rd shift ;

No. 85—To the Secretary of the Union regarding cutting on the night shift and loading to be continued on the afternoon shift.

We think there is little doubt that there was a much greater degree of indiscipline than there should have been and certainly more than was desirable, though it is rather curious to note the answers given by Mr. Fallins in connection with some questions on discipline :-

" During the whole of the time that you were down the mine, did you see any man refuse to carry out any order ? No.

Did you see any man who carried out his work negligently or carelessly ? No.

So far as you could see from the work of the men while you were there, the discipline was all right so far as you could see ? Yes, they gave me every assistance from the manager downwards.

Right down to the employee ? Right down to the man I was talking to.

You were quite satisfied with the discipline while you were there ? Yes."

(iv.) EFFECT ON MINING OPERATIONS.

(aa) INSTALLATION.

Mr. Lightfoot throughout his evidence drew attention to the very bad performance of the men (and also the rest of the Management with the exception of Mr. Stansbury) in the installation work preparatory to and necessary for mechanization. In addition to this evidence, there are a number of references to the same factor in the diary he submitted at the close of the evidence to the Commission.

For example on 10th July, 1953, there appears this item :-

" Inspected progress at Collinsville and had a general discussion with the Manager *re* mechanization. Very disturbed to find such lack of organisation and lack of progress with installation. Had a very serious talk with H. MacLennan, A. Winstanley Jr., Manager, and Stansbury. Laid down policy for all to push this."

Again on 9th September, 1953—

"Dealt with lack of progress on mechanization programme with Manager, U. Manager, and Engineer. Covered a review of their schedule and showed where there were glaring cases of failure. Informed them strongly of our refusal to accept this standard and that F. W. Stansbury was to be appointed Assistant Manager in charge of all mechanized operations."

This attitide to the work done characterized Mr. Lightfoot's considered attitude throughout his evidence. He was of the opinion that the work of the men was no better in connection with the installation than it was in the normal mechanized operations after mechanization had commenced.

Mr. Lightfoot in fact blamed the attitude and lack of will to work on the part of the men for the failure of the Korean contract. Mechanization was completed too late to allow the successful completion of this contract and a loss of over £18,000 was sustained in connection with it.

The men refused to agree that the installation was delayed through any fault of theirs. Indeed they pointed out that they had been agreeable to and in fact had worked abnormally long hours. It is true there was a 16-day strike by the A.E.U. and the E.T.U. but the adverse effect of this was offset by a number of other factors.

Mr Lightfoot was not supported by any others in his criticism of the installation. He did indicate however that representatives of companies supplying some of the equipment were critical of the work effort of the men. On the other hand, Mr. Stansbury spoke very highly indeed of the men who worked with him, particularly the fitters, whom he praised as being the best he had ever worked with.

His wording is quoted—

(Page 847) " So far as you are concerned, while the preparation for mechanization was going on, were your assistants good workers ? Well I would venture to say that they were equal to the best in the country."

" Was the mine mechanized in record time so far as you know ? Well it was a very big installation and really only took about a year. I would consider it is almost a record installation."

" Were your colleagues in preparing for mechanization keen energetic and enthusiastic ? There was no reason for complaint whatever."

" Did you anticipate that the mechanization was going to be an immediate success ? I was very happy."

" As soon as production started, how did you find the remainder of the men who were not actually engaged on the actual work of mechanizing the mine ? Did they share the same keenness enthusiasm and energy ? Definitely not."

Mr. Winstanley felt the work effort of the men on the installation was satisfactory.

Mr. Fallins said the installation was a first-class piece of work and was of the opinion that it had been completed in very good time.

Mr. Mollohan confirmed that the installation was a first-class job.

A rather peculiar entry appears in Mr. Lightfoot's diary under date 23rd October, 1953.

" Had very forceful talk with Manager and Under Manager. Set about organising of labour. Pushed jobs of completion of No. 4 conveyor structure and installation of gravity take-ups on Nos. 2 and 3 conveyors. Stansbury and all other staff with exception of Manager and Under Manager doing excellent jobs."

This seems quite contradictory as against so many other references. It should also be remembered that it was only two weeks before mechanized mining actually commenced.

In relation to the Korean contract, we do not believe any delays on the part of the men played any real part in the difficulties experienced in connection with this contract. Mr. Lightfoot indicated that some of the machinery was up to 21 months late and as the tenders were accepted in December 1951, some of the machinery would therefore not have arrived until September 1953. It is quite evident therefore from a perusal of the terms of the contract that there was little chance of its successful conclusion if plant was still to arrive in September.

Our conclusion regarding the installation is that it was a first-class piece of work, that it was carried through well and reasonably expeditiously and we cannot accept Mr. Lightfoot's contention that the work effort of the men greatly hampered the job and delayed it considerably.

(ab) BORING AND SHOT-FIRING.

The complaints by Management in this category were *: —*

The practices in operation were very bad.

In the Overmens' reports there is constant reference to the fact that a bord is left partly loaded out leaving the next shift to load out the balance. Mr. Lightfoot maintained this was due to bad shot-firing practice, and that this was deliberate in order to reduce output. In fact he considered the standard of boring and shot-firing inexcusably bad. This was particularly so in relation to the length of holes and the methods of shot-firing. As most of the men had been contract miners, they were skilled shot-firers and the bad practices adopted must therefore have been deliberate.

Much grunching was due to improper shot-firing.

Tops were left hanging and this was evidence of improper shot-firing. The consequence was that places were grunched because it was considered they were too dangerous to cut. This, in the view of Mr. Lightfoot was farcical because the machine could well have been used to trim down any loose tops or anything overhanging. In any case, the quite unsatisfactory results obtainable from " Messing around with little pop-shots " meant purely a waste of time.

We merely have one comment to make in this connection. It does appear that there was carelessness and a " don't care " attitude in relation to shot-firing, but we cannot help but feel that this was partly due to a lack of specific instructions and definite supervision.

(ac) TIMBERING.

A great deal of evidence in relation to timbering referred to the position prior to mechanization. It was designed to show :—

(a) That timbering had always been slow and unsatisfactory ;

(b) That there had always been a darg on timbering.

Mr. Lightfoot gave figures contrasting the results at Collinsville with those operating in some New South Wales Mines.

Management contended that this darg and these unsatisfactory practices were continued into mechanization.

Mr. Lightfoot was firm in his opinion that there was very definitely a continual darg on timbering.

He indicated that he had been in a bord on one occasion where four men had put up a set of timber about 14 ft. 6 in. high in 40 minutes yet for a long while three men used to erect one set in a day.

The men's reply to this was that that was all they were ever asked to do up to that time and in any case when they had finished, they were then placed on other work.

In July 1954, however, Mr. Winstanley took the matter up strongly, He contended that the effort was not nearly good enough and it had to be improved. In actual fact, the Under Manager had told him that the men were not playing the game and Mr. Winstanley promptly had notices of dismissal typed out in blank. This had the desired effect, the necessary sets were erected and the Under Manager was satisfied. The task set was increased to two sets for three men and the Union agreed to endeavour to erect three sets with four men.

Two further matters are of importance.

Firstly, Mr, Winstanley stated that there was nothing to prevent additional timbering gangs being engaged if required as there was surplus labour which could be allocated and these could have been used if insufficient places had been timbered. The important factors here are that timbering was never a bottleneck and that there was surplus labour.

Secondly, Mr. Winstanley appeared to be realistic and temperate in his criticism of the men, but it was his view that four timber men, without lifting jacks, should be able to erect four sets of timber per shift. Judged by this standard the men's effort, though it improved, was still poor.

(ad) CUTTING.

Management contended that there were no reasons why five places could not be cut on one shift and Mr. Lightfoot indicated that both Jaques and Nott with their respective crews had done so. Mr. Lightfoot also gave one instance of how he had once timed Jaques and his team and found that from the time they went into a level, completely bored it, cut it and withdrew their machine, it took 55 minutes. Even allowing for some more favourable aspects than would usually be encountered, this would give ample margin for a five-places-per-shift programme. Once the machine was in position to cut, in Mr. Lightfoot's view, it would take only five to seven minutes to make the cut.

Management's complaints in relation to cutting were :-

The cuts were much too shallow.

Many were measured at being about 5 ft. and even cuts by Jaques were around 6 ft. This would have the effect of—

(a) Limiting the tonnage, so that instead of, say, 80 tons of coal being available, no more than 50-60 tons could be loaded. (A schedule of loadings showed that the average tonnage per place was 65 tons, but this would have been contributed to by grunching, and shallow cuts in rise cut-throughs.)

(b) Making extra tramming necessary for the loaders when tramming was a very difficult and time-consuming operation.

(c) Making other non-productive operations take up too much time. For example, the greater part of the cleaning-up time would be the same. The bulk of the coal is usually loaded quickly at the commencement of loading. Consequently cleaning up 20 tons would take much more than one quarter of the time that would be taken in cleaning up 80 tons. The time taken up in the whole operation is never in proportion to the quantity loaded out.

The Cuts were too few—

Whereas it was reasonable to expect five cuts per place, the average showed only three. This would mean only 3/5ths of the coal planned was available for loading. When this was further discounted by shallow cuts, Mr. Lightfoot considered it was a major reason for poor production.

There was too much grunching-

Mr. Lightfoot considered it was costly and foolish to grunch in a mechanized mine. Furthermore grunching seemed to defeat the objective of easier working as one of the aims of machine cutting is to allow easier preparation of the greatest quantity of coal in one working place and the preparation of coal in a much better state for loading.

Management maintained that these things were part of a pre-arranged pattern to ensure that production was limited. They were dargs and a darg was always effective on cutting because It represented a first operation.

When it was pointed out that Nott at times only cut three places, Mr. Lightfoot maintained that that was probably because there were no other places timbered ready for him. Similarly when it was indicated that more coal was obtained from a maximum cut in the Dip than from a naximum cut in a bord, Mr. Lightfoot was of the opinion that this was because Nott was more often in the Dip.-

Mr. Mollohan supported Mr. Lightfoot in observations upon the depth of cut.

The answer by the employees to these charges was :—

It was not always possible to insert the cutter blade to the full extent. Grades played a very important part in this. Mr. Winstanley supported the men in this contention.

There was no Barg of any kind on cutting, and certainly no arrangement that only three places would be cut. The probability was that Nott's cut of three places had nothing to do with timbering, but because of difficulties that was all that could be managed. At times—as is indicated in the Overmen's reports—five places were cut in a shift by one crew. Grunching was done at the direction of the Overmen who were responsible for decisions of that kind.

We conclude with three observations :-

Firstly, as has been shown previously, cutting does not appear to have ever been a bottleneck at least in as far as places shot ready for loading at the conclusion of the night shift are concerned as appears in the Overman's reports, and it would therefore seem somewhat futile to have a darg on cutting when the loaders could not load the places cut and available.

Secondly, when taxed with what the Overmen were doing to allow the things complained about, Mr. Lightfoot said that he had continually complained to one or more of the Overmen about these matters, but they never seemed to improve. If Mr. Lightfoot's contentions were true, it is somewhat curious as to why the matter was left at complaining to Overmen. Mr. Stansbury did mention this and said that after discussion with Mr. Lightfoot they were unable to find any way out of the difficulties. Yet Mr. Stansbury in evidence said that he had not ascertained the reasons for grunching.

Thirdly, despite the claim by Management that there was a darg on cutting, it was a fact that the Union agreed to allow cutting to be done on the dog watch. True they got 25 per cent. increase in pay for it (as against a standard 12i per cent.) but as this was a most unusual concession by a Union, the claim of a darg on cutting becomes at least doubtful.

(ae) LOADING.

The evidence in connection with timbering and cutting seems strongly to suggest that these operations did not constitute bottlenecks. The emphasis naturally therefore comes back to loading. We have already examined this subject in some detail and we therefore confine our comments to certain overall observations.

The consensus of opinion seemed to be that five places on average should have been loaded out per unit (two loaders) per shift. With three units constantly operating this would have given 1,125 tons per production shift, i.e., 75 tons per place.

Mr. Mollohan claimed that this figure should have been obtained.

Mr. Lightfoot gave evidence that he had seen loading proceeding at the rate of five tons per minute as measured on the chain conveyor. Furthermore, he timed some loading out of A.3 when 100 tons was loaded in 47 minutes. These figures would give ample margin for the 1,125 tons per shift figures to be attained.

Mr. Stansbury stated that he had seen a place loaded out in 32 minutes and he could see no reason why other places could not have been loaded out in the same time.

The mine, however, never even approached these daily figures. Management advanced as the reasons for this :-

The carelessness of the men ;

Deliberate lack of effort and idleness ;

The operation of a hidden darg ;

Underloading of conveyors at first and overloading later ;

and reference to these has already been made.

The happenings which slowed up loading and for which Mr. Lightfoot blamed the men were :-

(a) Excessive bogging due to careless or deliberate use of hoses and consequent excessively wet conditions.

(b) Excessive spillage due to careless or deliberate action—the latter to ensure necessity for overtime to clean up the spillage.

(c) Excessive damage to cables due to careless or deliberate action—the latter to ensure restriction of production.

(d) Excessive damage to hoses due to carelessness or to deliberate alteration of pressures against all authority and instruction.

(e) Excessive jamming of loaders against timber and other obstacles due to carelessness or deliberate disregard of instructions in order to restrict production.

(f) Excessive time taken in tramming due to a " don't care " attitude or something worse.

(g) At first, under loading of chain conveyors causing low-loading taffies.

(h) Later, excessive over loading of chain conveyors causing stoppages and interferiv seriously with production.

hree comments are necessary :-

Mr. Lightfoot admitted that loading preformances improved as the men became more skilled.

Mr. Winstanley stated that loading performances improved as the grades improved.

The men stated that the three causes of poor loading were—

(a) The difficult grades and conditions ;

(b) The unsuitable equipment ;

(c) The lack of organised planning of work by Management.

(V.) SABOTAGE.

In his evidence, Mr. Lightfoot expressed the viewpoint that the Miners' Union and the employees were opposed to mechanization. This is the background factor involved in three charges of sabotage levelled by Mr. Lightfoot against the Union and the men.

The first was in respect of a detonator found on the belt on the second day of mechanization. Mr. Lightfoot considered that it could not have got there by accident and that there were no detonators being used at or in a place whereby it would become possible for it to get on the return belt. Nor was there any shot-firing going on at or in the vicinity by which it could have got there.

Furthermore the leads of the detonator were clean and it had not been in any shot hole. These factors led Mr. Lightfoot to the firm conviction that the incident was the result of a deliberate act and could not have been accidental.

The second example was the discovery of a large piece of coal wedged between the return belt and an idler board. There was a distinct smell of burning and had it not been discovered the matter may have become serious. In Mr. Lightfoot's view it was impossible for this to have happened except by human agency.

The third example was really a series of happenings in connection with the main belt. There was a series of mysterious stoppages of the belt for which no cause could be discovered. Mr. Stansbury and other witnesses referred to these stoppages. There were a number of emergency switches by which the belt could be stopped. The stoppage of the belt involved the stoppage of the chain conveyors and held up the whole production. Despite efforts made to discover the cause, no legitimate reason for stopping the belt was ever discovered. Mr. Stansbury stated that, on a number of occasions, he had run along the belt endeavouring to find where and why it had been stopped. He could find no explanation. In consequence of this trouble, about half the switches were removed and the stopping of the belt decreased to a large extent, and there was no real trouble thereafter.

The alternatives in the foregoing are

(a) Some or all of the happenings were deliberate acts of sabotage.

(b) Some or all were accidental.

(c) If (a), they were part of a pre-arranged plan by the Union and/or the men ; or

(d) They were the actions of one or more irresponsible individuals.

Our conclusion is that they were either accidental or the action of irresponsible individuals and no part of any concerted act of sabotage.

Mr. Lightfoot gave an example which is probably in a little different category. He indicated that, on one occasion when he was in the pit, a loader driver swung the head of his machine over and knocked down and did considerable damage to a gate-end , box and a power unit. When Mr. Lightfoot spoke to the driver of the loader, asking what he was doing, the driver replied that he was " loading scrap iron for Japan." When Mr. Lightfoot pursued the matter further, the driver explained he had pulled the wrong lever, which explanation Mr. Lightfoot said he had to accept. The damage was in the vicinity of £100.

Whilst the whole matter, and particularly the answer, is to be deplored, we doubt whether any man would be foolish enough to practise a deliberate act of sabotage in the presence of the General Manager. We believe therefore the happening was probably accidental, no matter how careless, and the answer deliberately provocative and insolent, but (though this was bad enough) no more.

(Vi..) STEALING.

These charges against the men coming under this category were :-

(a) Locked boxes, some containing property belonging to the mine and others with tools belonging to employees who worked as fitters and other types of tradesmen, were broken into and some of the contents stolen. Mr. Lightfoot maintained that, in nine months, 29 new locks were necessary to replace those broken off.

(b) Two heavy-lifting jacks completely disappeared, and there was a stong presumption they were stolen.

(c) Chromium-plated socket wrenches continually disappeared, except those in the larger sizes.

(d) Grease guns were continually stolen.

(e) An innumerable number of axes were stolen.

(f) Parts were stolen from the shuttle car—presumably these could have been used on a motor car.

(These examples of stealing were in addition to the many cases of disappearance of tools and equipment which were noted under the heading of carelessness.)

Action in connection with the foregoing took the following forms :-

(a) One person caught stealing copper wire was prosecuted and dismissed.

(b) The local sergeant of police visited the colliery on three occasions in connection with stealing.

(c) Mr. Lightfoot threatened to get a search warrant to search every employee's home. According to Mr. Lightfoot, the President of the Lodge indicated if this was done the mine would have no employees, though the President of the Lodge denied making such a statement.

(d) The A.E.U. and the E.T.U. had deputations to see whether the Colliery Management would reimburse them for stolen tools.

(e) Locked boxes were provided at the beginning of mechanization. (These were the ones which were broken open.)

The answers by the men and the Union were along the following lines :-

(a) There was no denial that stealing occurred but it was the action of individuals and not a concerted plan.

(b) Their own Union members were some of the worst sufferers.

(c) Overmen at times directed the men to open locked boxes in order to get badly needed tools.

(d) Mr. Lightfoot and Mr. Stansbury had themselves authorized the opening of locked boxes—a lock was broken on Mr. Lightfoot's instructions.

The adverse effect upon the mine took these forms :-

(a) Tools would be very much more costly than they should have been.

(b) Production would be adversely affected because the necessary tools to do the work at hand would not be available—thus production time would be wasted.

(c) Miners would hide tools so that they would know where to get them when they returned on their next shift—thus aggravating the shortage.

Our conclusions in this matter are :—

Firstly, a certain amount of stealing goes on in every mine, and it would have been surprising if it had not occurred at Collinsville.

Secondly, we are of the opinion that the practice was much worse in Collinsville than in most other places. Indeed it seemed to be particularly bad.

The fact that it took place both in relation to mine property and to tradesmen's tools seems somehow extra reprehensible.

(vii.) CONCLUSION.

These then were the charges made against the men. We believe all of them had some element of truth. We cannot, however, accept the full implications involved in the charges by Mr. Lightfoot, as we believe that these have been exaggerated.

Lightfoot obviously exaggerated, as for example when he placed practically the whole of the blame for bogging upon the men and virtually ignored the conditions.

Lightfoot contradicted himself, as for example in his statements in evidence about the machines, as compared with his letter to Underhill and Day.

Lightfoot was contradicted by statistics when he spoke of how bad was the production by the *contract 'miners* as compared with Bowen Consolidated and other Queensland mines.

Lightfoot was contradicted by the evidence of everyone else when he said the effort on the installation was bad and the installation took much too long.

Lightfoot was unrealistic when he complained bitterly about seniority which after all was part of the law of the land, being in the award.

Mr. Fallins, Mr. Winstanley, Mr. Platt and, to a lesser degree, Mr. Stansbury, seemed much fairer in their statements—less biased—less inclined to exaggeration—less axe to grind.

The tenor of Mr. Lightfoot's evidence was, at all times, that the men were major conspirators to see that the mine failed and production was kept at unpayable figures. We cannot accept that but we can accept :—

(a) That the attitude of the men was rarely helpful ;

(b) That, even in small matters, the interests of the Union were sacrosanct even if the mine failed ; and

(c) That co-operation would always go unrewarded.

Some of these were worse through lack of certain aspects of Management ability.

We shall indicate later that more co-operation from the employees is an essential if the mine is to continue. A joint effort on the part of Management and men was and will be necessary to overcome the natural problems and disabilities that existed in the mine. Unless it is forthcoming, co-operation may well become unnecessary in the disappearance of men's jobs.

(d) MANAGEMENT.

Just as Management blamed the men for lots of aspects which led to much lower production than haa been expected, so in turn the Union and the employees generally put the blame on to Management for this low production.

We have analysed the various aspects mentioned in evidence in this connection and we we think they can best be considered under the headings of-

(i). Mechanization of wrong tunnel ;

(ii.) Wrong layout of sections ;

(iii.) Lack of proper cycle of work ;

(iv.) Lack of adequate training :

(v.) Lack of maintenance ;

(vi.) Surplus employees.

It will be understood that the men in themselves confined their attention to (i.), (ii.), and (iii.), but there is implicit in the evidence criticism which can be directed under (iv.), (v.), and (vi.).

(i.) MECHANIZATION OF WRONG TUNNEL.

There seemed to be a firm conviction in the minds of the men that the primary cause of failure of the mine was that No. 1 Tunnel was mechanized instead of No. 2. In the men's minds, most of the troubles experienced led back to this factor because they did not believe that the very difficult grades and conditions of No. 1 would have been found in No. 2 Tunnel.

It becomes necessary, therefore, to examine this matter so as to assess the validity of the men's contentions. This then involves a comparison of the No. 1 and No. 2 Tunnels.

From the history of mechanization previously given, it is evident that mechanization was the culmination of at least six years of proposals and counter-proposals.

In 1947, Mr. Winstanley's scheme envisaged mechanization of No. 1 Tunnel and indeed the Powell Duffryn recommendation was also for that tunnel. When, however, the conference of interested authorities decided to drop the Powell Duffryn scheme of commencing with the Garrick Seam, Powell Duffryn changed its allegiance to No. 2 Tunnel, and in this Mr. Winstanley completely concurred. Mr. Platt had always been in favour of No. 2 Tunnel, and therefore it seems that, when Mr. Lightfoot was appointed, virtually all the papers given to him signified that the place to start mechanization was in the No. 2 Tunnel. It will be remembered however that, when the proposals were originally concurred in by Cabinet, these were to be held up until such time as a General Manager was appointed. Mr. Clark ultimately took the correct step in forwarding all papers to Mr. Lightfoot.

It would seem that, as Mr. Lightfoot had not seen the mine at the time he received these papers, his return of such papers to Mr. Clark, the Under Secretary, apparently virtually endorsing the plan for which tenders were to be called was prompted either by an acceptance of the No. 2 Tunnel as the site for mechanization, or alternatively the belief that the same equipment would be the correct equipment for No. 1 Tunnel, no matter whether he changed his allegiance to No. 1 Tunnel either at that time or subsequently.

It seems a justifiable conclusion that Mr. Lightfoot right from the time of receiving the various schemes was inclined to the No. 1 Tunnel, but he apparently kept an open mind until such time as he went to the mine in early October, 1951. Presumably what he saw there confirmed his opinion, but he maintains that he took the precaution of making sure that the equipment finally ordered would suit the No. 1 Tunnel because he discussed such matters with various New South Wales Colliery Managers.

Our opinion is that Mr. Lightfoot made up his mind to mechanize No. 1 Tunnel when he received the particulars of the various schemes from Mr. Clark, and from the time of his visit to the mine he was only concerned to see that the equipment would be suitable for the conditions in No. 1 Tunnel.

It is interesting to note (and this supports our contention) that the initial tenders called specified grades of 1 in 6, but tenders were actually lodged on grades of 1 in 4.8 and the successful tenders were accepted on that basis.

It will thus be seen that, at the time that it was decided to proceed with mechanization, Mr. Lightfoot was in favour of No. 1 Tunnel, and Mr. Winstanley, Mr. Platt, the Queensland Coal Board, and Powell Duffryn were all in favour of mechanizing No. 2 Tunnel.

It therefore becomes necessary for us to analyse more closely the reasons why these two sets of opinions were held.

As far as we can judge, Mr. Lightfoot early in his examination of the papers came to the conclusion that the area in No. 2 Tunnel below the 3 East and 3 West levels was probably the most uniform area in the holding, but he noted also that the plan showed that that area of coal was also directly ahead of the path coming down No. 1 Tunnel from No. 3 West. Furthermore it was on the rise side of the developments and on the better side of the heading if the area was worked from No. 1 Tunnel. This was important in Mr. Lightfoot's view because he had regarded that particular area as probably being the best in the Collinsville holding.

Having decided upon this area, he then examined the respective advantages and disadvantages of mechanization either from No. 1 Tunnel of from No. 2.

When considering working through the No. 2 Tunnel, he immediately felt that there was a strong disadvantage in that it would be necessary to transport the coal from the area mechanized to the pit-top at No. 2 Tunnel and across by surface transport to the pit-top at No. 1 Tunnel. This was because the coal handling and workshop facilities and pit-top equipment generally were to be found at No. 1 Tunnel pit-top. For example, the old bath house was there and it was proposed to put the new bath house there though this no doubt could have been transferred to No. 2 pit-top. The workshop, the power plant and other facilities were all at No. 1. Thus it was of no use endeavouring to handle coal at No. 2 pit-top unless some of the facilities were transferred to No. 2 pit-top or duplicated there.

The extra transport from the area in No. 2 Tunnel below the 3 East and 3 West levels would involve the additional distance of 5/8th mile if the belt were put into No. 2 Tunnel as against if it were put into No. 1.

Inside the mine itself there were other factors which operated, to Mr. Lightfoot's way of thinking, in favour of No. 1 Tunnel.

The main headings in No. 2 Tunnel were heading towards the Scottsville boundary and this would necessitate a turn-off to the left at an appropriate time before reaching such boundary. Furthermore when the two main tunnel headings reached a point close to that boundary and they were diverted to the left, it would, in order to extract further coal, be necessary to go back to the point towards which No. 3 West heading of No. 1 Tunnel was progressing.

This position would become even more acute when the remainder of the area had to be worked and, if it was decided to mechanize No. 2 Tunnel for the conveying of the coal, such coal would have to travel West, North, and East around three sides of a rectangle as compared with little more than one side which represented the distance from No. 3 West out through No. 1 Tunnel.

This was the major factor upon which Mr. Lightfoot based his opinion. Faced with similar alternatives in the No. 1 Tunnel itself, he felt that the best thing to do was to drive straight for the Scottsville boundary by the most direct route available, feeling that by doing so he would get his heavy operating costs out of the way in the first few years of mining, and as he was able to work closer to the pit head his costs would fall. We feel there was something to be said for this point of view because it was not anticipated at that stage that the results achieved under mechanization would be as poor as they were.

When Mr Lightfoot made these decisions it was understood that the fault ahead of No. 3 West was approximately 100 ft. By including the fall near the fault in 3 East level of No. 2 Tunnel, Mr. Lightfoot appeared to satisfy himself that the displacement was 32 ft. It is probable that he had already made up his mind to mechanize No. 1 Tunnel before inducing this fall, but at least it must have confirmed his own viewpoint that it was wise to mechanize No. 1. It is worthy of note that as it now appears the displacement is apparently from 14 ft. to 16 ft.

Mr. Winstanley. It will be remembered that Mr. Winstanley in 1950 was in favour of No. 2 Tunnel as the point of mechanization and his evidence in this connection is given on page 3307 and the following pages. He maintained that his plans to mechanize No. 2 were discussed with Powell Duffryn, the Coal Board, the Government Geologist, Mr. Platt, and himself and in his view the plans were in every way as efficient as those put into operation in No. 1 Tunnel.

He maintained, however, that the natural advantages in the No. 2 Tunnel were sufficiently strong to outweigh the disadvantages of distance, which seemed to be the deciding factor in the case of Mr. Lightfoot. Mr. Winstanley knew of, and recognised, the extra 5/8th mile transport, but he felt that the fact that the grades were better in No. 2 Tunnel and the presence of arterial airways to the extent of two intakes and two returns provided major advantages. He stressed the fact that they were good open airways without falls, and, though not directly in straight lines, were very close to such. In this he contrasted the position with the proposed new airway in No. 1 Tunnel which he maintained was made on an old return.

In regard to grades, Mr. Winstanley maintained that the margin in favour of No. 2 Tunnel—an important margin—was in respect of the grades as known at the time and not as afterwards described. Furthermore the area of No. 2 Tunnel had been bored by a series of bores and the plan was to open up mechanization in the first place in No. 2 Tunnel between No. 3 West level and No. 4 West.

Mr. Winstanley was swayed in his opinion in favour of No. 2 Tunnel, also by the fact that he anticipated that the extra cost of the surface belt to cover the admitted lengthier distance of 5/8th mile would more than be compensated by the extra production which could have come out of the west side of No. 2, bringing it right over to No. 1.

Mr. Winstanley refers to arterial airways prompting the contention that the ventilation was better at No. 2 Tunnel than at No. 1. Indeed the former had had installed a fan with a capacity of 200,000 cu. ft. per minute and this contrasted greatly with the No. 1 Tunnel fan which had a capacity of only 80,000 cu. ft. per minute.

When this factor is added to the much better condition of the main airways in No. 2 Tunnel than in No. 1, it was easy to see the basis for Mr. Winstanley's contention that the conditions at No. 2 Tunnel would have resulted in a larger quantity of air being available at the face with less water gauge. The airways at No. 2 Tunnel were reasonably straight and of ample area and a second intake readily available. Indeed if this road had been used as was suggested for the installation of the conveyor belt in No. 2 Tunnel, this would have left the existing endless rope haulage road wholly available for transport of men and materials.

Mr. Winstanley stressed that this was a marked benefit as against the position in No. 1 Tunnel where the second intake is a long tortuous route and even now is not yet available for the transport of men or materials. Indeed it is not even connected separately to the workings in No. 3 West but joins the main 3 West as shown in *Annexure No. 35*. A nnexure No. 35.

Mr. Platt. Mr. Platt held the same opinions as Mr. Winstanley, but if anything held them more strongly. Indeed he stated that he could not have been associated with any attempt at mechanization of No. 1 Tunnel according to the information he had at that time. He maintained that No. 28 Bore was a good bore and that the area leading up to No. 28 was also good. This he felt proved the existence of ample coal in the Bowen Seam in that vicinity and that this could be worked from No. 2 Tunnel. On the other hand, bores No. 48 and No. 49 were not good from the viewpoint of the coal shown in the Bowen Seam.

Mr. Platt had not been in favour of the working of the Garrick Seam and had spoken against it and was in fact glad that the suggestion had been dropped and the idea of mechanizing No. 2 Tunnel adopted.

Mr. Platt left no doubt in our minds that the Queensland Coal Board, Powell Duffryn Technical Services Ltd., and the Mine Management were all agreed that the tunnel for mechanization must be No. 2 Tunnel.

In the course of evidence, Mr. Platt was asked whether the Powell Duffryn scheme was not merely a temporary expedient and he replied, " It was always a temporary expedient ; whether it was for 10 or 15 years, it was always temporary."

Mr. Fallins. Mr. Fallins had had no hand and had expressed no opinion in the first decision to mechanize No. 1 Tunnel instead of No. 2. He was asked, however, to give his opinion as to the respective merits and demerits of mechanizing No. 1 or No. 2 Tunnels. Mr. Fallins gave his judgment in these words : " In my consideration I had a good look at the two and gave it a lot of thought, and I consider that, with the pit-top already there and the equipment already there at the pit-top, No. 1 was the right tunnel in which to install it."

This of course emphasises and supports the argument which presumably was the final factor in Mr. Lightfoot's mind in his decision to mechanize No. 1 Tunnel.

It must added, however, that Mr. Fallins did not inspect No. 2 Tunnel. Actually he said that he did not go right down No. 2, but added that Mr. Winstanley, the Manager, had explained the grades down No. 2. It seems a fair assumption therefore that Mr. Fallins made his judgment on the surface conditions with some description of the grades in the No. 2 Tunnel. Mr. Fallins' opinion, coming from one who has spent a lifetime in the coal industry, must be respected. We were left with the thought, however, that the opinion would have been more valuable if Mr. Fallins had had the opportunity to go through the No. 2 Tunnel (and we must add that it was not part of Mr. Fallins' duty to so so as this was not one of the matters upon which his opinion was sought specifically at the time of his visit).

Mr. Fallins paid tribute to the fact that Mr. Lightfoot had information in his possession regarding the fall that had been induced in No. 2 Tunnel on 17th October, 1951. This showed that Mr. Lightfoot knew that there was something in front of him and he tried to get as much information as possible beforehand in order to be prepared for it. Mr. Fallins commented that this was a very sound and practical way of approaching the problem.

He maintained, however, and this appeared in his report, that he thought that further boring should have been done and he did discuss this point with Mr. Lightfoot, who had by that time resigned his position as General Manager of the mine. Mr. Fallins thought it was far too risky to design layouts without getting all the information possible. Indeed he felt that he did not know of any mining man who would design and recommend large outlays of money involved in mechanization and its ancillaries without a boring plan designed to give the maximum of information.

Mr. Fallins repeatedly acknowledged that despite all precautions unexpected troubles may be encountered and that despite all reasonable geological information one can never be really sure what is ahead in mining. Thus there could be no certainty as to what would lie ahead in the development of No. 2 Tunnel.

In his evidence, Mr. Fallins made a further explanation in relation to his comments in the report and said that he intended to convey that the extra boring he strongly recommended should be done before the outlay of any further expenditure on mechanization.

We feel that Mr. Fallins' contention in this regard leaves an unexplained gap. If it was valid that before any *further* mechanization was undertaken it was necessary to get further information through a boring programme, this information surely should have been obtained before the major mechanization proposal was proceeded with. In other words, we cannot see why it should be necessary to commence a boring programme before further sums on mechanization would be spent, when it was not necessary to do this before immensely larger sums were spent in first mechanizing the mine We cannot therefore interpret Mr. Fallins' comment as other than at least hinting that he, Mr. Fallins, would certainly have done what Mr. Lightfoot did not do—engage in an extra boring programme before deciding which tunnel should have been mechanized.

Conclusions.

From our analysis of the position, it is quite evident that, on the information which was available at the time, there was not a great deal of difference between No. 1 and No. 2 Tunnels. In relation to conditions, for example—

(1) There are places which are steeper in No. 2 Tunnel than in areas worked in No. 1 Tunnel and vice versa.

(2) There are places in No. 2 Tunnel where the roof is as bad as the areas crossed in No. 1.

(3) In No. 1 Tunnel the seam is down to as low as 10 ft. 6 in. and in other places goes up to 21 ft.

(4) There are a number of sealed off areas in old workings in No. 2 Tunnel but the same disability exists in No. 1.

(5) At the time of the mechanization decision, the only bore hole to the south of No. 3 West Dip was 1 (a), but the results of this bore were not considered to be reliable. To that extent, therefore, the grade and quality of the seam to be encountered south of both tunnels could be considered as virtually unknown.

Summing up, we feel that the position can best be expressed in this fashion.

Advantages of No. 1 Tunnel—

(1) The Railway Line, pit-top equipment, efficient workshop, screening arrangements, power house and office buildings were situated at the top of No. 1 Tunnel and as such represented a saving of 5/8th mile in transport of coal and transport of employees working the coal in No. 1 Tunnel as against No. 2.

The disadvantages would appear to be—

(1) There was no good second intake to allow of efficient transport of men and materials and even the proposed second intake was a tortuous route. The use of the conveyor belt road in No. 1 Tunnel therefore resulted in excessive dust as the main intake air was travelling in against the coal travelling out on the belt.

(2) There were steep grades, which Mr. Lightfoot anticipated, and these appeared to be in the main steeper than the No. 2 Tunnel. Indeed it appears that the equipment originally anticipated for the No. 2 Tunnel was to be capable of negotiating grades of 1 in 6, but the equipment ordered for No. 1 Tunnel was to operate on grades of 1 in 4.8.

(3) It was known that small dykes would be met in the area to be worked and it was known that a displacement of the seam was fairly close to the workings. Such displacement would have to be penetrated at an early stage.

The advantages of the No. 2 Tunnel appeared to be—

(1) Sufficient coal was provided for reasonable output both east and west of the main tunnel and this would have given at least ten years of working. This length of life was greater than the proved known years of working in No. 1.

(2) Grades were established from existing working places and bore holes, and had a degree of certainty which grades in No. 1 did not have.

(3) The second intake road could have been made the coal conveyor road and would have been separate from the transport road for men and materials. This alternative route was in good condition with reasonable grades except near the tunnel entrances.

The disadvantages were—

(1) All the output would have had to be taken to the existing pit.top at No. 1 Tunnel, amounting to an additional distance of 5/8th voile.

(2) There would be longer travelling time by the employees, who would have had to be transported to No. 1 bath house and change house if the location of such were not altered.

(3) There was a disability because of the hazard of a creek which ran over the workings and the waters of which had at some time escaped into the workings. (This was a questionable disadvantage because the creek had been diverted successfully and there was probably now no disability from this factor, but we feel it should be mentioned because it may have played some part in thoughts at the time.)

We have ruled out the disadvantages arising from the fact that if the main heading of No. 2 Tunnel was continued the workings would have proceeded to the boundary of Bowen Consolidated property because this tunnel could easily have been diverted to the south, and in any case a similar diversion was proposed by Mr. Lightfoot for the No. 1 Tunnel.

Summing up, therefore, we believe that the various opinions expressed in favour of No. 1 and No. 2 Tunnel represented merely differences amongst experienced people, and we believe that Mr. Lightfoot was justified in his decision on this account. He was an experienced man, more experienced in mechanization in fact than some of those in favour of No. 2 Tunnel. He was capable of making an experienced judgment and he was supported by someone of even greater experience in the person of Mr. Fallins.

We believe that subsequent experience may well have indicated that No. 2 Tunnel could probably have provided better results, and thus support the views so strongly held by Mr. Platt and Mr. Winstanley as well as the Queensland Coal Board and Powell Duffryn.

Nevertheless, in our view, Mr. Lightfoot was entitled to his opinion and no blame is attachable to him, to the Department of Mines or to the Government for choosing No. 1 Tunnel, even though results since mechanization have proved to be completely unsatisfactory.

The Department of Mines acted correctly throughout the whole of the negotiations for mechanization over the period of years. The only query that can be raised against it was the length of time over which these negotiations were spread. We do not however regard this as a matter for criticism. The Under Secretary, Department of Mines, was justified in his viewpoint that the Department should procure the services of someone strongly experienced in mechanization before it undertook the expenditure of £500,000. We are bound to add, however, that we were impressed with the logic and reasoning and indeed with the soundness of opinions expressed by Mr. Platt. His whole approach seemed to show ability, careful thought and sound knowledge.

We were impressed, too, with the fact that when Mr. Winstanley made his proposals he did so in great detail with full explanations which can be followed closely by any interested party. There is little doubt that his 1950 estimates for the scheme propounded were considerably optimistic and it needed Mr. Platt's touch to write these down somewhat considerably. Nevertheless the schemes were well prepared and well documented. We make this comment because we were surprised that no comparable write-up and documentation of Mr. Lightfoot's scheme was given to us and we have grave doubts as to whether there was any such write-np. In view of the importance of the scheme and the amount of money involved, we would have preferred to have seen the same type of recording of the scheme ultimately launched by Mr. Lightfoot as was prepared in relation to those not launched but originally propounded by Mr. Winstanley.

We have one other important comment to make. The proposal finally placed before Cabinet to mechanize No. 1 Tunnel also, as part of the scheme, envisaged carrying on hand-mining operations in No. 2 Tunnel. These hand-mining operations were actually carried out until April, 1952, at which time they ceased and did not recommence until after the disaster.

Sufficient evidence was placed before us to formulate the opinion that the cessation of hand-mining operations was probably due to a shortage of power and consequently the operations of both tunnels could not be carried out simultaneously.

We do believe, however, that this factor should have been known when the submission to Cabinet was made and, whilst we do not believe that a deliberate mis-statement was made, we do feel that not enough care was shown in placing before Cabinet the correct position rather than that Cabinet should believe that the mechanization operations of No. 1 Tunnel would be supplemented by hand-mining operations in No. 2 Tunnel and that all factors to ensure this had been covered.

(ii.) WRONG LAYOUT OF SECTIONS.

This was alleged to be a cause of under-production, resulting as it did in excessive flitting and other disabilities.

It would appear that, whilst plans were prepared for the mechanization schemes of Mr. Winstanley, Powell Duffryn Technical Services and the Queensland Coal Board, no written plans apparently were prepared by Mr. Lightfoot for the mechanization which was actually introduced.

In fact, Counsel for the Union drew attention to the fact that, whilst Counsel for Mr. Lightfoot suggested that Mr. Winstanley's plan should have been submitted to an accountant, Mr. Lightfoot had no plan at all.

We were surprised that there was no complete plan actually drawn up by Mr. Lightfoot for the mechanization of No. 3 West district of No. 1 Tunnel, and we were also concerned that the layout which was actually adopted did not include a system of panel working to meet the risk of spontaneous combustion.

Mr. Mollohan in his evidence (p. 4726) stated that he had suggested a method of working with angular pillars in his letter, which would in his opinion have made flitting problems easier as it would have lessened the grades and would have eliminated some of the time taken up by tandem loading. He went on to point out that the elimination of tandem loading would leave six loading machines in production instead of three, each machine loading directly on to the conveyors. He indicated, too, that the time would not be lost in getting a second loader in behind another loader to load tandem, and a lot of time would be saved that could have been used for production. He stated that tandem loading would be eliminated by the use of short chain conveyors in cut-throughs.

Mr. Mollohan was asked if he had seen a mine in the United States similar to Collinsville and he stated that he had seen a mechanized mine comparable to Collinsville which obtained good production. He stated that in such mine steep grades were negotiated with the same method as were those of Collinsville but they put their break-throughs and cross-cuts at an angle so that the equipment would work on it.

He was questioned as to whether angular cut-throughs would assist in the problem of production and he stated it would not be a solution but he felt that angular cut-throughs would help and would get all six of the loading machines into actual production and cut out tandem loading and that is what he had in mind when he submitted the proposal.

Mr. Fallins was asked if the layout were such as to necessitate the machine travelling right back from the face to the first line of cut-throughs before it could get into another level and then have to flit all the way to the next bord's face, would not such a factor cause a waste of production time. He stated that he was unaware that such a roundabout method was going on.

If such a roundabout road was taken, a lot of time would be occupied, and if it was a general practice it was a bad practice.

Mr. Fallins said in case of emergency it may be necessary to tram a machine a long way and there might be a legitimate reason for doing so.

It is difficult for us to be specific about this matter. When so many difficulties were being experienced in raising production to anything like reasonable levels, we would certainly like to have seen more flexibility in thinking round the various problems. We were not impressed with reasons why a suggestion like that of Mr. Mollohan should have been ignored, even if there were real doubts as to its desirability. The depressing state of production warranted trying anything which gave any reasonable possibility of success.

Furthermore, as indicated earlier, we consider it was somewhat ironical to be given layout plans of the schemes which were not introduced and no layout plan of the scheme of mechanization actually put into operation.

(iii.) LACK OF PROPER CYCLE OF WORK.

The general complaints which appeared in evidence given by the men were that—

There did not appear to be any rhythm in working.

Too much time seemed to be occupied in unecessary

No attention was paid to efficiency in preparing a loading schedule for places to be loaded.

Some of the employees, for example, gave evidence that too much time was occupied in flitting unnecessarily and they stated that on numerous occasions an Overman instructed them to flit to a certain place to load and, as the flitting took some considerable time, they could have been more efficiently occupied loading from a place which they had to pass to get to the position to which they were instructed to go.

They further stated that suggestions in order to improve methods of working were not welcomed because if they did suggest anything they were told that their job was to obey instructions.

Mr. Hjortshoj, for example, was asked (p. 1924) :-

> " Can you tell the Commission if there was any organized rotation of places in Collinsville, cut, bored, shot, loaded ? For instance, let me put it to you this way : did you go into, say, A.8 up, which would be a cut-through, would it not ? Yes.
>
> Did the cutter go in there and cut and bore, and then go into A.8, and then go out, and if there was an A.8 down, into there, and then around into A.9, and the loader follow along immediately ? Was that the method used at Collinsville ? No, it was not.
>
> That would be a method that could result in more efficiency, the loaders being at the coal face in quicker time, could it not ? Quite so.

Would you say it was Rafferty's rules—the way places were cut and loaded at Collinsville ? There did not seem to be any system of cutting and loading. I can speak about the loading. I do not know so much about the cutting, but there did not seem to be any system of loading. It is hard to explain. You may have to go from...............

" *By the Chairman.* " No system in the sense of a proper sequence ? That is so.

Is that what you mean ? Yes.

I do not want to put words into your mouth, is that what you mean ? That is what I mean."

Both Mr. Fallins and Mr. Mollohan were questioned concerning any evidence of lack of method and order in the cycle of work and neither disparaged nor criticised it.

Mr. Fallins stated that there was no complaint as to the manner in which the loaders actually handled the coal at the face but that flitting seemed to be the main trouble.

Mr. Mollohan, when asked if he had noticed anything wrong at Collinsville with regard to the cycle of operations, stated that he did not see anything wrong.

Apart from the question of excessive flitting with which we have dealt, it may be that there was lack of proper rotation of work, although this is not very clear.

It is difficult to imagine that Overmen would insist on loader operators doing long ffittings with some valid reason. However, it must be borne in mind that the Overmen were not well acquainted with mechanization and some troubles of this nature may have occurred in the early stages due to lack of experience of the officials.

It is quite likely therefore that some of the things of which the men complained did happen, particularly in the earlier stages of mechanization. Evidence of a lack of system, order, and method in some other spheres does seem to suggest that there was room for some improvement and, when tramming was so difficult, extra attention should have been paid to such matters. Bottlenecks could of course have tied the hands of the Overmen to an extent not realised by the men.

We do not know whether complaints by the men that suggestions were not acceptable to the Overmen and Management were the result of isolated cases or whether it was a continuing attitude. It would of course be a wrong attitude and would not contribute to any sense of feeling that production was important and urgent.

Suggestion systems play too important a part as a means of improving techniques, raising morale and imparting a sense of the importance and urgency of production, for such an opportunity to be missed, to say nothing of its being discouraged.

In the absence of more evidence in this matter, we are unable to say how much production, would be affected by any lack of a proper work cycle, but we do believe Management should be continually looking for means of improving work cycles.

(iv.) LACK OF ADEQUATE TRAINING.

When mechanization *was* ready to commence, and indeed for some little time earlier, the Management had to give some thought to training the men in relation to their new duties. This training was undertaken by Messrs. Cargal and Edwards who were associated with the company supplying the equipment, and by Mr. Stansbury.

Reference was made in other evidence to the fact that the men did not seem to be adequately trained, and we believe this to be the case. Support for this view comes from three sources.

The first was Exhibit 16, which was tendered to show the names of the men who received training before mechanization and the manner and the extent to which this training was carried out.

The amount, time and extent of training mentioned in that document appear to us to have been woefully inadequate for the task in hand.

The second support came from Mr. Fallins in the answers which he gave to questions asked of him on this matter :-

" Did you see anything wrong which would suggest any lack of proper training ? They gave me the impression that they were not properly trained.

Do you know Mr. Cargal ? Yes.

" If he had a period up there training the men, what training do you suggest that they should have had ? I just don't know how long they were training, but they gave the impression whether trained long or short that they did not have sufficient training."

Later (p. 1232), he was asked by Mr. Barrett :-

" Did you come to the conclusion that the men did not want to learn ? No. I came to the conclusion that the men had not been properly trained in the use of the plant, rightly or wrongly."

Later again (p. 1257), this question was put to him :-

" Did you form the impression that that particular operator was well trained ? " and he answered, " No, I did not." This was followed by :-

" Can you remember in what respect you formed the impression he was not well trained ? The first thing is he did not know much about his machines when he talked about the gear box catching."

Mr. Fallins in his evidence welcomed the opportunity of pointing out the importance of training and went to some pains to indicate what the attitude to training was on the part of management of mines with which he had been associated. All of this indicated to us the fact that Mr. Fallins was quite impressed with the lack of training given to the State Mine operators.

The third supporting factor was really spread throughout the evidence. There were many instances (and on numbers of occasions) of something going wrong and the cause seemed to us to and up to lack of adequate training. Furthermore, one of the reasons for the improvement in production in the period approaching the disaster was that the men were more used to handling the machines and we think it a justifiable conclusion that, whilst experience of this kind would always add to efficiency in handling of the machines, nevertheless the men were left to obtain some of their proficiency through experience when they ought initially to have obtained it through training.

We do not believe that nearly enough attention was given to this matter. It must be remembered that the men who were to operate these machines were contract miners and the probability is that in many cases they had never done anything else but either contract mining or other mine work throughout their lives. They were now to be asked to handle very expensive machines in very difficult circumstances and under strange conditions. These factors in themselves ought to have provided a warning that training was one of the most important factors to which attention should have been given.

In the final analysis, production of coal would depend upon the efficiency of the plant and the efficiency of the men in handling the plant, and at least to some extent a breakdown in one could provide a bottleneck for the other. Unfortunately, however, the inefficiency of the men—or maybe it should be called unfamiliarity with the machines on the part of the men—could have and undoubtedly did have an effect upon the efficiency of the machines and therefore provided a cumulative adverse effect upon production. Indeed, greater efficiency on the part of the men could have gone an appreciable way towards overcoming any deficiency in the machines.

We feel that the advice given by Mr. Fallins in his evidence, when he dealt with the importance of training, should be noted by the State Mine Management. Indeed, the money would have been well spent if a very experienced machine operator could have been imported from, say, New South Wales, and kept full time in training and re-training operators, for it must be remembered that the training problem was not one which commenced and ended with the advent of mechanization Every time a new man is brought in, there is a training problem in itself.

Nor should the term " training " be taken as indicating theoretical training either on the surface or in the mine (and incidentally the training indicated in Exhibit 16 was given on the surface and not in the mine), but, as Mr. Fallins pointed out, the opportunity should be taken of the advantage obtained from watching how operations are carried out in other mines, particularly in New South Wales. The best methods there should be copied by the State Mine and this in itself would involve the translation of better methods elsewhere into the State Mine by means of adequate training. We believe that this should be borne in mind for the future.

It is indeed a difficult mattter to assess the effect upon production of the lack of training which characterised this venture. A case could be made out for the fact that it had a serious effect and another to support the view that, whilst there would be some effect, it would be slight. We have carefully examined this matter both in relation to the evidence and our own thinking and experience, and we are of the opinion that production definitely suffered and, as a balance of probabilities, suffered seriously through this lack of training. To support this view, we add that the effect of lack of training is not only to be found in the fact that a job may not be as well done nor as quickly done as when an operator was trained, but also, because lack of training is somewhat insidious in its effects, these latter would stretch out into a number of other causes where perhaps the adverse results were more clearly demonstrated. In any case, we believe that the effect was serious enough to warrant, as indicated above, a much more thorough approach to the training problem in the future.

We regard operator training as being of great importance, but we regard training of the Manager, Assistant Manager, and Overmen as being of much greater importance and we believe that money spent in this way could have represented an exceedingly wise investment. It is our hope that training at all levels will in future be treated as an essential part of running the mine.

(V.) LACK OF MAINTENANCE.

This position has already been examined closely and our conclusions stated.

We believe we made it clear that there was ample evidence to indicate that the standard of Maintenance left much to be desired. In this we believe the major responsibility lay with Management and we are somewhat at a loss to realise why it fell down on this particular aspect of its work to the extent it did.

The very fact that £500,000 had been spent on the plant should have focussed attention upon the importance of maintenance. That it was not attended to in the way that expenditure warranted is, in our view, much more an indictment of Management than it is of the men.

(vi.) SURPLUS EMPLOYEES.

Reference has already been made to the fact that one of the worst features of the State Mine was the number of surplus employees, and particularly the ratio of surface employees to miners at the face and underground respectively.

It is not proposed to repeat the figures already given in Term II B and mentioned again earlier in this Term. We think it necessary to reiterate, however, that on a competitive basis the results achieved by the contract miner at the State Mine compared reasonably favourably with those achieved with other mines throughout Queensland.

Whether because of conditions the underground-miner production of the State Mine should have well exceeded other Queensland mines is immaterial because the overall ratio of the State Mine production (that is, in relation to all employees) contrasted most unfavourably with other mines.

Up to a certain point it was not surprising that there should be surplus surface employees both before and after mechanization.

Before mechanization, the number of contract miners steadily decreased over an eight- or nine-year period but other underground employees and surface workers did not decrease in anything like the same ratio.

In this connection we have yet to be convinced that the necessary effort was put into transferring other employees to make them contract miners. This would not only have redressed the balance but would have meant a great increase in the income of the mine. Indeed it is most likely that, if a little extra effort had been made in this direction and had been successful, profits may have continually been earned instead of so many losses.

Prior to mechanization, at one of the conferences between the Minister for Mines, the Mine Management, and the Union, a number of matters were arranged and agreements entered into. One of the agreements was that the Mine Management would have the right to transfer surface workers to positions in the mine. This was a wise provision because, even though the number of contract miners had decreased consistently over the years, mechanization was bound to require still less underground miners and less surface workers. As was the case before mechanization, however, so after mechanization the labour turnover was greater amongst underground workers than surface workers. This would inevitably mean transfer from surface to underground.

At the conference with the Minister for Mines, it was agreed that there would inevitably be surplus workers but these were to be used on development.

A curious feature enters into this. When the mechanization of No. 1 Tunnel was placed before the Minister for Mines, reference was made to the fact that surplus employees would be used in continuing mining in No. 2 Tunnel on day-wage conditions.

In the statement on mechanization by the Minister for Mines already referred to, reference was made to the fact that the surplus employees would be used on development. These two intentions seemed somewhat contradictory and in any case we are unable to determine what would have been meant by " development." We can of course understand that there would be some development work which would be necessary even after mechanized mining commenced but we do not believe this would be a continuing feature of the work for any great period.

On the other hand, the first intention was apparently to work in the No. 2 Tunnel, because tonnages of coal that came from that tunnel up to the first week in February, 1954, are as the following Schedule shows :—

	Tons.		Tons.
14-11-53 ..	354	9-1-54.. . ..	Nil
28-11-53 ..	849	23-1-54 .	504
12-12-53 ..	671	5-2-54.. .	38
26-12-53 ..	198		

Thereafter no further coal came from No. 2 Tunnel.

Two reasons can be urged against the continuance of No. 2 Tunnel under hand-mining methods. The first would be (and Mr Lightfoot made reference to this factor) that industrial difficulties are always increased where one pit is mechanized and the other on hand methods. Discontent operates in the tunnel using hand methods because of the harder work involved. It is probably inevitable that in such cases the miners in each tunnel would make a feature of the beneficial aspect of the other and forget their own benefit. Experience has therefore shown that industrial stoppages become more frequent in dual-method mines.

With industrial conditions already difficult at Collinsville, it could be understood that there would be some natural hesitation about adding to these difficulties by the use of the two different methods in two adjacent tunnels.

The second reason against winning coal from No. 2 Tunnel would be the very practical difficulty of the shortage of power. Reference has been made to this factor in the Powell Duffryn Reports and it was recognised that, in order to sustain employment in both tunnels, additional power would be required. At least some of the thinking in planning mechanization was devoted to the necessity for obtaining extra power and some units were purchased. Unfortunately, it looks as if synchronisation of these units is very difficult and therefore the full benefits can not be expected from them. In any case, whilst they were purchased, they were not what would be required in order to cater for the requirements of No. 2 Tunnel.

Apart, therefore, from the possible added industrial difficulties in working the two tunnels, it seems most likely that the primary reason for the stoppage of No. 2 Tunnel was the shortage of power. We feel, however, that we must criticise this factor. In the first place, it did appear as part of the proposal to Cabinet and we know of no factor which actually operated when the winning of coal was stopped in No. 2 Tunnel which was not known when the submission to Cabinet was prepared. We are not prepared to say that Cabinet was wilfully misled in the matter but we do think that there must have been some element at least of carelessness in the matter.

We must use these terms in connection with the whole of the circumstances, because we believe that the cessation of the winning of coal from No. 2 Tunnel had serious consequences. In the first place, that was the natural outlet for the surplus labour and it was the major justification for the Minister's promise that no person would be dismissed because of mechanization. Whilst the promise may have been made in any case, it made it logical and correct. Use of the surplus labour in the No. 2 Tunnel would have been the natural way to make sure that the mine did not have surplus labourers, for it should be remembered that the evil effects of surplus labour are more than the adverse effect on the profit and loss account.

That there is an adverse effect is beyond doubt and that the wages paid to the surplus labour were of substantial amount over the year is equally true.

Even more than this, however, is the fact that surplus labour round a mine, over and above what it required to cater for the fluctuations in employment due to absenteeism, sickness, &c., can cause trouble in itself. Comparative idleness causes mischief in the first place, discontent on the part of those who have a full day's work in the second, and a lessening of effort in the third. From these angles alone, therefore, the surplus labour aspect should have been tackled resolutely.

Finally, however—and the importance of this speaks for itself—there would be the effect on the profit and loss account form the angle of coal not won. Even a mere matter of 500 tons per week additional from the No. 2 Tunnel could well have added a net, say, £50,000 per year to income. Whilst this would not of course have been anything like sufficient to offset the actual loss, surely nothing which could give £50,000 per year should under any circumstances whatsoever have been disregarded. Yet this would have required only six pairs of miners—i.e., 12 miners in all. The surplus labour was immensely more than this. On this basis, indeed, 24 pairs of miners may well have made handsome profits for the mine in each of the last two years despite all the difficulties encountered.

It may be argued that the difficulty of obtaining contract miners would have precluded anything of this sort and it may be pointed out that at the 'present time, with no call upon men for mechanization, the number of contract miners has averaged about 44.

We do not want to be either over-critical or unreasonable in a matter of this kind, but we do not believe that a sufficient effort was ever really made to obtain maximum numbers of contract miners. In the first place, the evidence does suggest strongly that the Union had agreed to men being transferred from the surface to underground work and underground to contract mining when it was really pressed to do so. Secondly, one of the reasons why the State Mine was having difficulty in obtaining contract miners was that Bowen Consolidated was giving better conditions. Whilst we recognise the difficulties and the disabilities in making a race out of better conditions, nevertheless there is little satisfaction in using this as an excuse for putting up with completely unprofitable numbers of contract miners.

As the result of our analysis of the position, therefore, we are not satisfied with Management's explanations of the reasons why the No. 2 Tunnel was not persisted in and we do not believe that either the letter or the spirit of the submission to Cabinet was given the attention that it should have received. Even if additional power was required, we have no doubt the financial proposition would have been good enough to have warranted and justified the expenditure. We cannot help feeling, however, that expenditure sufficient to provide the necessary power was made but there was a lack of judgment in what was purchased.

We believe that, if and when mechanized mining is resumed, serious consideration should be given to working No. 2 Tunnel under hand-mining conditions, as this could very well mean a substantial increment to income.

(vii.) CONCLUSIONS.

It will no doubt have been noted that, of the six factors mentioned as being grounds for criticism of Management, the first three relate to matters of judgment and experience and the last three relate to ability to manage.

As already indicated in connection with the mechanization of No. 1 Tunnel, which was Mr. Lightfoot's responsibility for decision, we believe it was a case of experts disagreeing, but, even if we believe that the weight of evidence was in favour of the No. 2 Tunnel, we offer no criticism of Mr. Lightfoot for this decision.

In relation to the wrong layout of sections and the lack of work cycle and method, we believe there was not enough flexibility of thinking shown. With production as bad as it was, for example, a decision to do nothing about Mr. Mollohan's suggestion seems to envisage a judgment that not only could no good whatsoever develop from it but that it must have an almost certain further adverse effect upon production. We think this arose from two factors—firstly, putting too much blame upon the men and thus refusing to recognise that other factors played a part to the extent that they did, and secondly possibly some conviction on being right to an unwarranted degree.

These are, however, matters of opinion and we would not press our viewpoint too far.

When it comes to the other three factors, however, Management cannot, we believe, escape blame. We do not believe that there was a sufficient recognition of the valuable effect upon production that would come from careful attention to training. Nor was there an acceptance of the fact that training should be continuous and that efficiency was a mixture of training and experience and not of experience alone.

In the matter of maintenance, we have already indicated that we cannot place the blame for lack of maintenance anywhere but on the shoulders of Management. In the first place, it is Management's job to see that its edicts in relation to maintenance are carried out. Even if, however, a protest be made on this score that the men were intractable and very difficult to discipline, we do not accept the fact that Management laid down a maintenance programme in anything like the terms it should have used. In our view, it did not really start to ensure satisfactory maintenance, irrespective of the attitude of the men.

Similarly, Management stands indicted by what appears to be a completely unwarranted complacency in the matter of the surplus employees. This is worse because Management stated that it recognised the problem. The consequences of lack of action have already been dealt with : in our view they were serious.

These, then, give some indication of the pattern and style of Management operating at the mine. In the course of so much evidence, however, we came to some general conclusions which were not built up by one specific case but rather gradually grew and reached the force of conviction only as the result of a growing pattern of behaviour.

We believe that Management did fall down on some of the things which would have been adequately covered by good and capable management and we list some of these hereunder :-

(a) There was a lack of team effort even in Management itself. There was, too, much evidence of two camps—the General Manager's camp and the Manager's camp. We are not prepared to say that this went to extremes, but it does make us wonder how a team effort could be built up with employees if it did not operate to a satisfactory degree within the realm of Management officials themselves. We did not like the fact that there seemed to be separate compartments.

(b) It was possibly this factor which led to a divided control. We are not suggesting there is necessarily any harm in divided control itself but we think in this case it was a divided control which did not operate smoothly and which was never clearly specified. We say this because there did not appear to us to be any clear conception of organisation and individual duties. The question as to just who was responsible for maintenance was an example of this kind. We believe that both responsibility and authority require a much clearer, specification of duties than existed.

(c) We found too much evidence of the recognition of a problem but no satisfactory attempt to deal with it. The surplus labour problem was a case in point. The statement that Management would pursue an objective and would withdraw only in the face of a strike as an excuse for not finalising the 'matter has, we believe, serious weaknesses. This seems naturally to lead also to the conclusion that there was not sufficient recognition of the fundamentals which must be pursued at almost any consequence and those which would not be worth fighting over.

(d) There did not seem to be a clear conception of the importance of some factors such as, for example, training. Really good management would have recognised this.

(e) There was not sufficient imagination and flexibility in much of managerial thinking. There was not, for example, a flexibility of mind which would emanate from a desire, when one thing would not work, to try another and, when one thing showed losses, to try some other way to make profits. We believe if this flexible attitude had played a larger part in management it may inevitably have come back to getting coal by hand-mining methods out of No. 2 Tunnel.

(f) We think there was too much emphasis placed upon obstacles and not enough upon how to overcome them. The obvious case is the opposition which came from the men. There was, we feel, a tendency to place too much emphasis upon this when it should have been recognised that there were other factors contributing to the situation and concentration may have been made upon some of them. The attitude of the men would be an exceedingly hard thing to change and it seemed a gospel of despair for Management to say that, as it was hard to change, nothing could be done to redress the situation.

It may be felt that this is possibly a somewhat harsh criticism of Management and if examined on its own it would be. We hasten to draw attention, therefore, to some other aspects which must be placed on the other side of the ledger.

In the first place, there was no lack of technical ability in Management. In technical matters, Management was able, and this did not refer only to Mr. Lightfoot, whose knowledge of course transcended that of anyone else.

In the second place, Management was not short of energy. We are satisfied that, if energy and hard work could have made mechanization a success, its success would have been undoubted. We pay full tribute to the fact that Management did not spare itself in this regard.

Thirdly, we do not believe that there was any reason to doubt the integrity of Management. Only on one or two occasions, more by innuendo than anything, was some factor raised. We could not at the time see any justification for considering anything of that kind seriously.

Fourthly, there was we are sure, on the part of every one of the Management team, an overwhelming desire for the success of the mine. Management did not stand to gain by its failure and it recognised that. It felt the lack of production deeply and in placing so much blame upon the men it showed that it felt it somewhat bitterly. Management was fundamentally honest in its desire to prove worthy of the stewardship.

Furthermore, and this is probably the most important factor of all, we believe that the job which Management was asked to do was not by any means an easy one. The evidence overwhelmingly supports the viewpoint, indeed, that it would be a very difficult matter to command a reasonable standard of success from the operations of the mine. Conditions in the coal mining industry have always been difficult. The Union has never been easy to deal with and the natural conditions encountered right at the beginning of mechanized mining were enough to test the ability to manage in any management team.

One further matter should be mentioned. It is easy enough to enumerate the matters upon which Management is to be criticised but in the first place it is probable that few, if any, people could undertake a half-million pound project without there being some factors which could be criticised. Criticism is never offered in connection with the people who do not do things—it comes to those who attempt to do things.

Summing up, therefore, we think that Management did a reasonable job but more able management would have done a better one, and a better one would have consisted in remedying what appears to us to have been some obvious weaknesses which Management should have tackled and which would have made at least a better showing than was actually made.

Term II C (4).

General Conclusions Regarding the Reasons for Unsatisfactory Production.

We have endeavoured to trace the reasons for the unsatisfactory production through the individual causes as we listed them in hearing and re-examining the evidence placed before us. That the serious fall in production as against what was anticipated was the fundamental cause of the failure of the mine is beyond dispute.

There was nothing in any other condition which would have continued to pile up losses if the production could have been raised to the level originally anticipated. Such a production would have shown a profit after allowing for the full amount for depreciation and interest.

Some idea of the complexity, the inter-relationship and the overlapping of the many factors which were together responsible for this low production can have been gauged from the detailed descriptions we have given under this Term of Reference.

It is not possible for us, however, to indicate that any one of them was responsible for x tons in production. All that we can do is simply to indicate four categories under which virtually all the reasons for low production described herein can be grouped and then endeavour to assess them in terms of importance.

We are of the opinion that these four factors in order of importance would be :-

(a) Grades and Conditions ;

(b) Equipment ;

(c) Men ;

(d) Management.

We have already dealt with these very fully, but it does become necessary for us to give some general conclusions in the matter of unsatisfactory production.

(a) GRADES AND CONDITIONS.

This, we believe, is the No. 1 cause, for three reasons. Firstly, because there is no doubt that the grades and conditions were severe enough to interfere most seriously with the normal methods of winning coal and with accomplishing the normal results from such efforts. Secondly, the effects of the grades and conditions seemed like tentacles, to reach out in many different directions and to spread their adverse result on each. Thirdly, the grades and conditions necessitated the use of methods and means which in themselves had a cumulative adverse effect on production.

The changeover from hand-mining to mechanized methods can be difficult enough at any time. It involves changes in skills, changes in attitudes and changes in outlook, as well as the necessary changes in ways of actually doing the job. That is one of the reasons why a changeover to mechanization is often done gradually with one loader crew at a time. The situation here was worsened a great deal because it was decided to change over completely. This would in itself provide an extra strain in the changeover period.

If to these difficulties one adds a situation where the physical conditions encountered were such as to be classified by an experienced Mine Manager as being the worst conditions possible, it is not suprising that great difficulties ensured.

The difficulties encountered did not remain only in the place from whence they emanated. Rather, the conditions found weaknesses in so many other places ; for example, the weaknesses in the machines were not only made bare but their effect was greatly accentuated. The problems encountered by a not too experienced machine operator were made immensely greater where a very difficult grade had to be encountered instead of either an easy grade or a level road.

Nor was this all. There was the unsatisfactory feature that the adverse effect of a difficult condition could cause further troubles in another direction and before long a cumulative adverse effect would be playing havoc with production taffies.

In the light of all this, the firm conviction held by so many of the employees, and indeed by others, that the wrong tunnel was mechanized can be fully understood. Even a slight easing of the grades makes the job more than proportionately easier—a slight worsening of the grades would make it more than proportionately more difficult, so we believe that if by some good stroke of fortune it had been possible to come upon an area where the grades were much easier, we have no doubt whatsoever that the daily production would have jumped up accordingly, and some of the other difficulties that loomed so large in causing low production would largely have melted away.

(b) EQUIPMENT.

The second factor in order of importance, we believe, was the equipment. As we hope has has been made clear, the main conveyor belts were all that could be desired. The cutters gave no more trouble than could be normally be expected with machines of this type doing work of this kind. The loaders undoubtedly caused a great deal of trouble and it is safe to say that they were not really suitable for the job they were expected to do. True, that job was worse than was envisaged at the time of letting the tenders, but it is still doubtful whether the loaders stood up to the specifications which were covered in the tender. The design of the loader with the overhanging gear box was undoubtedly responsible for a lot of trouble, as were some of the other defects and disabilities experienced under those conditions.

As we indicated earlier, we believe it was a very significant admission by Mr. Mollohan that nowhere else in the world were machines of this type working on the grades operating at Collinsville. This could be interpreted in a different way. Nowhere in the world was there anyone trying to do the job with those machines which people were trying to do in the Collinsville Mine

In these circumstances, there seems to be nothing strange in the problems that were encountered.

The chain conveyors were somewhat worse than the loaders, though here the question of grades was not so significant. The weaknesses and defects of the chain conveyors in reducing loading time and loading rates must have been in themselves a very severe drag on production possibilities.

One thing is certain—that only by an easing of the grades will the machines do the production job in such a way as to ensure profitable quantities. It is a case of finding ways of easing the grades or changing some of the machines, or both. These matters, however, are dealt with in Term II D.

(c) MEN.

The third factor involved was the men. Here is a list of some of the faults and shortcomings with which they were charged :-

Carelessness ;

Indiscipline ;

Idleness ;

Loafing ;

Deliberate disobeying of instructions ;

Job control ;

Communist control ;

Lack of effort ;

Dargs ;

Strikes ;

Sabotage ;

Stealing, and gross negligence.

This is a list sufficient in itself to lessen considerably any chance of satisfactory production.

We did not believe all the charges levelled against the men and certainly we felt that many of them, were over-exaggerated by Mr. Lightfoot. We feel, too, that the mine has many honest, competent workers anxious and willing to do a good day's work and desirous of seeing the mine prosper and succeed. We feel it was too much to expect us to believe that so many men would wilfully make their jobs immensely harder for the sake of hurting production.

Nevertheless, there is no doubt in our minds that morale and discipline were at a low ebb and good production is never obtained with bad morale and bad discipline. Even if conditions had been good and the machines splendid for their purpose, the twin evils of bad morale and indiscipline would always turn a good production effort into one no better than mediocre.

The men could justly be blamed for a lot. There was no will to make sure of the successful operation of the mine. There was little evidence of determination to do everything possible to overcome the natural difficulties and disabilities facing them. On the contrary, there was a general demeanour of a " don't care " attitude and of a readiness at all times to sit down under the disabilities and let someone else—presumably Management—get over them as best they could.

If grades and conditions can be improved and the machines made to do a satisfactory production job, some of the improvement would certainly be offset unless the men themselves determined to give a fair day's work to the employer whose wages they are prepared to accept.

It is to be hoped that the Union throws its whole weight behind doing everything possible to turn failure into success, because unless this is done, the Union and its members will be the main sufferers.

(d) MANAGEMENT.

It is rather questionable as to which of men or managment should be placed in the No. 3 position. We have just indicated the lack of morale and indiscipline. These are never solely the fault of men ; indeed, they are often the fault of Management. The primary aim and duty of Management is to lead. The success or otherwise of leadership in management is usually gauged by the degree of co-operation which can be secured from the men. We believe that the necessary degree of leadership was not forthcoming from the Mine Management.

In this section of the report, we have referred to Management generally. Actually, we think that the term could be applied to all levels inclusive of the Overmen upwards. It would, therefore, include the General Manager, Mr. Lightfoot, the Manager, Mr. Winstanley, the Chief Engineer, Mr. Stansbury, the Chief Mechanical Engineer, Mr. MacLennan, the Electrical Engineer, Mr. Winstanley Junr., the Accountant, and the Overmen.

Before making some general comments in connection with the responsibility of Management, we think we should say something in connection with the main people whose actions came up for examination in the evidence.

Mr. Lightfoot.—The responsibility for mechanization in the final analysis was Mr. Lightfoot's. As previously indicated, we have had to discount his evidence in some cases.

Very briefly our opinion of him in his capacity as General Manager took the following lines :—

We consider he was too biased in his judgment against the men and this affected his judgment in other matters where clear judgment was required. On too many occasions he interpreted other defects as being due to the men. Furthermore, he attempted to drive rather than lead, and in this he did not really attempt to build a team. His greater knowledge of colliery work, and particularly mechanization, made him certain that his own opinions were right and those of others were wrong. This, we think, contributed to something of a lack of flexibility in his thinking. Furthermore, he gave the impression of knowing what should be done but at times appeared to be somewhat afraid to take the necessary action to carry it through to conclusion.

All these things add up to an exaggeration of other people's shortcomings and some blindness to his own.

This is merely one side of the picture. There is undoubtedly another. He had boundless energy and never spared himself or allowed any personal inconvenience to stand in the way of his work. He had plenty of enthusiasm for the project. He brought to his job an expert knowledge of mechanization and on all sides it was said the installation was an excellent one. For this the major credit must go to him.

We think, however, that the many aspects of good management which were to be found amongst his characteristics were somewhat spoiled by one or two adverse ones which turned out to be serious. We believe his cardinal mistake was that he believed that he could drive the miners into co-operation.

In our view, he did not fully accept the viewpoint that the successful operation of the mine could never be achieved unless he could find some way to win co-operation from the men.

Whilst we believe that Mr. Lightfoot himself would not agree with this judgment, we ourselves are convinced that much more could have been done in this connection than was done, but he did not adopt the best way of attempting to bring it about. This was the major fault (and a very important fault) in what might otherwise have been a very good effort.

Mr. Winstanley, as Manager, had been at the mine for a much longer period than Mr. Lightfoot. We do not believe he possessed the ability of Mr. Lightfoot and he certainly did not have the same degree of knowledge regarding mechanization and mechanized mining In many ways, he could not claim to be at all as impressive as Mr. Lightfoot. We doubt whether he would have either the knowledge or the enthusiasm that the General Manager displayed.

On the other hand, he was much less biased against the men and much more realistic in his attitude. From that angle, when judgment had to be made regarding the men we think Mr. Winstanley's judgment was better than Mr. Lightfoot's. Furthermore, we were impressed with the fact that when Mr. Winstanley decided upon an action, he did not fear the consequences to the same degree as Mr. Lightfoot. When it was reported to him that the timbering was unsatisfactory, he had the notices of dismissal prepared. In this way, we are of the opinion that Mr. Winstanley was more prepared to force an issue upon discipline than was Mr. Lightfoot. Furthermore, we were impressed with the fact that when Mr. Winstanley prepared a scheme, it was all written and well documented. Mr. Lightfoot suffered badly in this comparison. After Mr. Stansbury withdrew from the mine and particularly when Mr. Lightfoot ceased to be General Manager, Mr. Winstanley instituted records and statistics which not only could not but help Management to manage better, but which also threw much clearer light upon certain factors than could ever have been gained from the opinions expressed by Mr. Lightfoot. They showed that some of the opinions held by Mr. Lightfoot were not borne out by the facts brought out by actual statistics.

We think Mr. Winstanley, too, however, was too inclined to sit down in difficulties and did not show a flexibility in thinking which would have indicated really high-calibre management.

Mr. Stansbury, the Chief Engineer, was chiefly concerned with mechanization and indeed with the more mechanical aspects of such. He too had great energy and, in a technical manner, we think had more than adequate ability. Apart from the technical aspect, however, we do not believe he had had a great degree of management experience and it was very much of a testing time to be thrust into a mine as difficult as the State Mine and asked to make the best of industrial relations problems. His lack of experience showed itself in some things, such as the policing of maintenance, but in his sphere, he must be given full credit for the part which he played, with Mr. Lightfoot, in the installation.

Mr. MacLennan was something of a contradiction in that he did not appear to execute a high standard of supervision over those working under him. There was no high standard of management in his control of the mechanical factors which came within his jurisdiction. On the other hand, his workshop evoked praise from all. It was first class, showed a knowledge of what was required and at least in a physical sense should have provided the wherewithal to help considerably towards mechanical efficiency.

Mr. Winstanley, junr. figures in the evidence to a small degree only. There was some complaint about the rate at which the electrical work was done and there was some criticism of the electrical workshop which was in marked contrast to the workshop controlled by Mr. MacLennan.

Mr. Winstanley, junr. did not give evidence and we would not feel justified in going any further than this.

Mr. T. Platt. We would like to add a comment in relation to the Chief Inspector of Mines, Mr. Platt.

It will be remembered that Mr. Platt was largely the predecessor of Mr. Lightfoot in the position of General Manager of the State Coal Mines. Throughout his evidence, Mr. Platt definitely gave us the impression of being extremely sound in all the views he expressed. He was not prepared to commit himself unless he had thought the problem through and when he did give an opinion he was able to give reasons for such. We were all impressed throughout with the logic of his contentions and the soundness of his technical conclusions.

We believe that the mine could profit from his wise advice and we do not believe for one moment that there were any possible grounds for criticism of Mr. Platt because of the losses which were sustained during at least some of the years that he was Supervisor of State Coal Mines. We have already given reasons why these losses are somewhat suspect.

Mr. Platt has had a long experience with the mine, knows the miners well, and has a realistic appreciation of both. We think that these could well be kept at the disposal of Mine Management.

We had no opportunity to judge the Mine Accountant, particularly in view of the fact that much of the accounting work was carried out in the Department of Mines in Brisbane.

We do, however, want to say something about the Overmen. Reference has already been made to the actions and behaviour of those Overmen who figured in the rescue work on the night of the disaster, and we refer at this juncture, therefore, to their work as Overmen in the general mine operations. In one or two cases, we feel that there was some ability and a willingness to learn. With one or two exceptions, however, we believe it would be true to say that the standard of Overmen definitely requires lifting. We do not entirely blame the Overmen for this.

In the first place, the best men available were presumably picked for this position. If, therefore, their experience and knowledge was not up to standard we think that top management should have seen to it that additional training was given to them so that they could reach the necessary higher standard.

We would like to stress this because it is all important to recognise how much of the success of that mine would depend upon the standard of the Overmen. It could succeed because of, or in spite of, top management, but it would also have a much better chance of success if the standard of the Overmen was high. We are certain that much better results would have been secured if the Overmen had been able to find out what was done and how it was done in other mines and if they had had an opportunity for careful training and been given extra knowledge by top management within the mine. These things would not only have led to better knowledge, better ability and better efficiency, but would have led to better morale amongst the Overmen and a knowledge that they were part of the management team. They could therefore approach their work with greater satisfaction, with more assurance and with more opportunity for leading the men in the things to be done.

We do not underestimate the difficulties which Management had to face. The combination of most difficult conditions, equipment which in part could barely cope with such conditions, a militant Union composed of somewhat untractable men, were enough handicaps on any management to mean that some degree of brilliance and inspiration would be necessary to drive through the difficulties to success. Nor could this have been done without high-level team work. It was too much for one or two people. The strength at top management level would have to be in evidence down the line amongst the Overmen.

These things may have come from training. They could scarcely be expected without.

Indeed, we think the three major factors which were missing in Management were extra ability through training, flexibility in thinking and leadership at various levels. We feel that the cumulative effect of these would have been sufficient to overcome the difficulties which the mine experienced, but we hasten to add that they are a combination of qualities rarely found in the industry.

We think, therefore, that Management, because of its shortcomings, must take some share of the blame for the smaller production. Even if the mine could not have been turned into a profitable unit, better management would have lessened the losses.

Generally.

In thinking in terms of the future and deciding whether the mine should be carried on as a mechanized unit, some attention must be paid to these four factors and an attempt to do this is made in Term II D. It is encouraging to note that any progress made in any way will have beneficial reactions on the others, just as in the past adverse reactions in one have had a cumulative effect in the others. If the grades improve, the performance of the machines will undoubtedly improve ; the performance of the men, we think, would improve, and Management will have a better showing for its efforts. If the equipment improved, as for example with the use of shuttle cars, some of the adverse effects of the grades would be overcome and again there would be consequential benefits through the men and Management. A better effort on the part of the men, with a much better showing by way of co-operation and assistance, would undoubtedly overcome some of the difficulties which have operated in the past to keep production low, and in addition would, we are sure, provoke a better response on the part of Management. Higher-calibre leadership displayed by Management would, we think, promote a better response on the part of the men and would find ways and means, if not of overcoming some of the problems and difficulties of grades and machines, at least of lessening their influence. Undoubtedly improvement in any one factor will mean improvement in all, with a cumulative beneficial effect on production.

This is the reverse of what happened. Here adverse aspects in relation to grades and conditions, equipment, men, and management had a cumulative vicious circle effect upon production and in themselves provide the reasons why the production figures so confidently expected as a result of expending £509,726 on mechanization were not only not realised but were so far from being realised as to represent very little improvement on hand-mining methods which necessitated no further capital expenditure.

Term II C.

Conclusions.

Our Conclusions therefore are :—

1. In the years ended 30th June, 1954, and 30th June, 1955, mechanized mining was carried on for approximately seven months in the former and three and a-half months in the latter. Work in the remainder of each period (subject to an intervening period of non-production after the disaster) was carried on under contract-mining conditions.

2. For those financial years, the Losses were £160,270 and £196,244 respectively.

3. Apart from the amounts made available by the Government for mechanization, grants from Consolidated Revenue were made of £150,000 to cover Losses in the 1953-54 period and £180,000 for the 1954-55 year.

4. Easily the most important cause of the Losses was completely unsatisfactory production. The figures were very considerably less than had been anticipated and barely exceeded the production previously gained under contract mining.

5. The four causes of totally unsatisfactory production were, in order of importance—

Physical conditions—Particularly excessive grades and (to a much lesser degree) bad roof conditions ;

Faults and shortcomings in machines and equipment ;

The unco-operative attitude of the Union and the employees and the resultant poor production effort ;

Shortcomings in Management, particularly lack of flexibility and initiative in Managerial planning and thinking.

6. Bad grades were the most important factor of all because of the adverse effects of such grades on all production agencies. They exercised a profound influence on the performance of the machines and on the attitudes and work results of the men and also not only imposed great strain on Management, but necessitated leadership qualities of high calibre.

7. It is not considered, however, that the totally unsatisfactory production under mechanization in any way invalidated the conclusions previously arrived at—that the Government's decision to mechanize the mine was the correct decision and that it took all the reasonable and prudent steps that could have been expected of it to give mechanization every change of success.

TERM II D.

WHETHER MECHANIZED MINING SHOULD BE DISCONTINUED IN THAT MINE.

1. Reasons for Discontinuance of Mechanization.

2. Analysis of Original Reasons.

8. Reasons for Failure of Mechanization.

4. Factors affecting Production Results.
   (a) The Quality of the Product.
   (b) Conditions in the Mine-
      (i.) The Gas Outburst.
      (ii.) The Roof Condition.
      Fault Conditions.
      (iv.) The Grades.
      (v.) The Second Intake.
   (c) The Machines.
   (d) The Methods.
   (e) The Attitude, Quality and Quantity of the Labour Force.
   (f) The Quality of Management.

5. Suggestions and Schemes given in Evidence.
   (a) Mr. Lightfoot's Scheme.
   (b) Mr. Mollohan's Suggestions.
   (c) Mr. Fallins's Suggestions.
   (d) The Union's Suggestions.

6. The Commission's Suggestions—Three Schemes.
   (a) The Borehole requested by the Commission.
   (b) Scheme No. 1—Using Existing Equipment.
   (c) Scheme No. 2—Joining No. 1 and No. 2 Tunnels.
   (d) Scheme No. 3—Joining No. 1 and No. 2 Tunnels, Alternative.
   (e) General.

7. Fundamental Factors Governing Successful Operation of the Mine.
   (a) Grades.
   (b) Methods-
      (i.) Panel Layout.
      (ii.) Face Preparation-
         (aa) Timbering.
         (ab) Cutting.
         (ac) Boring.
         (ad) Shot-firing.
      (iii.) Loading.
      (iv.) Maintenance.
      (v.) Power Requirements.
      (vi.) Cable Repair.
   (c) Men.
   (d) Management.

8. Threat of Oil.

9. Comments and Conclusions.

Term II D (1).

Reasons for Discontinuance of Mechanization.

As a preliminary statement a case against the continuance of mechanization could be prepared :-

(a) If the original thinking was wrong and the reasons advanced for mechanization in the first instance were wrong.

(b) If new conditions have arisen and these have suggested a change of emphasis away from mechanization.

(c) If expectations and anticipations were erroneously based and actual experience with mechanization was and/or is not the way to overcome the problems.

The reasoning here is that mechanization was originally undertaken in order to rectify certain adverse conditions and in pursuance of that belief, £500,000 was spent. It would seem, therefore, that at least some of these conditions must have changed or at least it must be shown that the original thinking was wrong in the anticipation that mechanization would provide the cure for some of the problems before a decision to discontinue mechanization should be taken. Even if a case along the lines of (a), *(b),* and/or *(c)* above could be made, however, it still may not follow that mechanization should be discontinued because with the expenditure of £500,000 an important economic loss may follow. In other words, now that the expenditure has been made it may be that it would be cheaper and better to continue with mechanization even granting difficulties in (a), *(b),* and *(c)* above, if the discontinuance of mechanization would mean losing an important part of the £500,000 spent.

In any case, the first judgment called for is in respect of the three conditions outlined above.

Term II D (2).

Analysis of the Original Reasons.

It will be remembered that the original reasons given were :-

(a) The unfavourable financial results.

(b) The necessity for increased production in North Queensland.

(c) The difficulty of securing sufficient labour.

(d) The elimination of the more arduous colliery labour.

It has already been indicated that the financial results under mechanization were immeasurably worse than they were under hand mining. This immediately raises the question (particularly in view of the indications earlier in this report, that pricing and a number of other factors entered into results under hand mining) whether mechanization should really continue when it brings such very adverse financial results.

It is quite evident that the mine could not continue to be allowed to make losses of the magnitude of those experienced in 1954 and 1955 and it is safe to say that mechanization should be continued only if there appears to be reasonable hope that the position in 1954-55 will not be duplicated when mechanization is continued at the State Mine It is fundamental, therefore, that any scheme for continued mechanization must offer substantial promise of a considerable reduction in the losses so far sustained, and if at all possible a return to profitable trading. As has been indicated earlier no increase in price could be expected to turn losses of the magnitude of those sustained under mechanization into profits.

The second factor was an increase in North Queensland coal production because of the demand by North Queensland consumers. This matter is considered in Term IV of this report, but the conclusion made therein could be anticipated to this extent—that the supply and demand position in North Queensland is very much in favour of a policy which will increase production at the State Mine rather than reduce it. This is however subject to one qualification which is considered in detail in Term IV. Everything in the supply and demand position, however, indicates that demand is outrunning the supply. It may well be argued at this stage, therefore, that if mechanization does give greater output the case for its retention could be made out accordingly.

It will be remembered, however, that production under mechanization was not as good as production under hand mining though admittedly neither in the financial years 1954 or 1955 was there one full year under mechanization. The experience so far however does not lend colour to the belief that production will be increased under mechanization unless some of the difficulties experienced in the past are overcome in the future. Indeed, it appears that if there were sufficient contract miners available production is more likely to be increased more quickly under hand mining than under mechanized mining. This is therefore the second doubtful factor.

The third factor is closely tied with the one just considered. If sufficient hand labour was available it is possible that more production could be obtained more quickly from hand mining methods than from mechanization. In the past, however, the labour has not been available and indeed the poor financial and production results in the hand-mining era could chiefly be traced to the serious reduction in contract miners which operated over a 10-year period. It is questionable whether the position is any easier today. In any case, it would be difficult to count on increases. It may be that something extra could be accomplished by making the inducement to come to Collinsville greater. In other words, if extra wages or premiums or something of that kind could be introduced, possibly men could be contracted. In the main, however, this condition still has to be overcome and in that regard there is a case for the continuance of mechanization.

There is little doubt that in the objective of easing the more arduous types of work which exist under hand-mining methods, mechanization has completely succeeded. This is acknowledged by all parties and is one of the few things upon which unanimity was evident. The Union leaders admitted that they would not like a return to the old more arduous hand-mining methods.

Indeed arrangements for machines to do the manual work is in line with a world-wide pattern which extends into other industry, and there does seem to be a case of " putting the clock back," if there is a return to hand-mining methods. In this regard therefore the plea for continuance of mechanization is very strong indeed.

It is safe to say therefore that the original reasons remain, but mechanization which was supposed to provide the answer to those reasons has not done so, and that calls therefore for further analysis.

Term II D (3).

The Reasons for Failure of Mechanization.

As has been indicated earlier in this Report, the secret of profits is to be found in extra production. The losses were only the reflection of production which was much smaller than was ever anticipated.

A thorough analysis of these various factors responsible for the lower production was given in Term II C of this Report and it is not proposed to traverse these in any great detail. It is necessary however to give some further attention to them because if all these conditions are likely to persist, then it is safe to say that the final results will continue to be very unfavourable and the production will not be able to meet a reasonable proportion of Northern Queensland coal consumer's requirements and would leave much to be desired.

In any and all of these excursions, therefore, we are inevitably forced back to an assessment of—

(a) What were the real factors which have operated in the past, have contributed to the unprofitable position, and are likely to affect the future and is an assessment of their likely effect in the future possible ?

(b) Can a working plan for the future be prepared and interpreted in terms of profit and loss so as to give any real guide as to probable future results ?

Before a final determination regarding the future of the mine is made, a judgment on these factors is clearly essential.

Term II D (4).

Factors Affecting Production Results.

These can perhaps best be considered under the following headings :-

(a) The quality of the product.

(b) Conditions in the mine.

(c) The machines.

(d) The methods.

(e) The attitude, quality and quantity of the labour force.

(f) The quality of Management.

As many of these factors have already been dealt with, attention at this stage will be confined to their effect on the future.

(a) THE QUALITY OF THE PRODUCT.

Despite the fact that so many aspects have been urged against the State Mine enterprise, neither throughout the evidence nor in any indirect way was there any suggestion of dissatisfaction with quality. Indeed, one of the arguments in its favour is the suitability of the coal for coking purposes. Furthermore, its suitability as an export coal was demonstrated in the Korean contract. As a factor in continuance of the mine, quality is a definite positive.

(b) CONDITIONS IN THE MINE.

In the main, there appear to be five aspects that warrant consideration under this heading :-

(i.) The gas outburst.

(ii.) The roof condition.

Fault conditions.

(iv.) The grades.

(v.) The second intake.

(i.) *The gas outburst* has been exhaustively dealt with and the conclusion reached that extra precautions should be undertaken in the future. As far as it is possible to ensure extra safety, this should be attempted. Under the methods and with the precautions specified, we can find nothing in itself to prevent the mine from functioning successfully on the grounds of *excessive* financial cost.

(ii.) *The roof condition* seems to be in hand. The major fault running through is known and can be catered for. Despite previous experience, the rest of the roof conditions are not such as are likely to be either very costly in coping with them or troublesome to the extent of very seriously impeding production. As compared with other mines, they do not indicate serious or prolonged trouble, and as such should not represent an intolerable financial burden.

(iii.) *Fault conditions* cannot be lightly overlooked in view of the geological surveys which have consistently drawn attention to faults, dykes, sills, and burnt-out coal. Accepting these, as we must, at face value, such conditions do not alter the fact that the area contains many millions of tons of good coal and whilst temporary setbacks may (and probably will) occur, there is a call for care but not for discontinuance on the grounds of excessive financial burden on this account.

(iv.) *The grades.* There seemed to be much in evidence to support a view that probably the greatest single handicap in the previous working of the mine could be found in this cause. There was some evidence before the outburst that the grades were improving but there was little certainty of this, nor indeed of the extent of the improvement. The survey of the situation, consequent upon what has been opened up as the result of the clearing of the Dip, now appears to give some credit to the belief that grades should be much improved when the fault has been passed and/or if the working plans outlined later are followed. If this be so, there would almost certainly be a very considerable improvement in output and therefore in financial result. Very often an improvement of this kind can have a cumulative beneficial effect and it is to be hoped this will be the case on this occasion. An extra 125 tons per day through the easing of grades could eliminate half of the loss for 1954-55—and this from only one source. There is reason to believe—

(a) That grades will decrease in severity ; and

(b) That financial results will improve in consequence.

Nevertheless, the grades remain an important question mark.

(v.) The second intake has been included as a factor because some aspects adversely affecting production emanated from this cause. To rectify this factor will require a financial outlay but until it is done, the efficiency of the mine will suffer somewhat. There is however nothing insuperable in the way of completing the second intake.

Summarizing the foregoing, therefore, whilst some of the past conditions which have proved adverse, which have been causes of decreased production and which have contributed to the losses of the past two years, are continuing, others of these conditions are now improved and because of this and (it is hoped) because of the prospect of more careful managerial control, the effect of conditions in the mine should not be so adverse in the future.

(c) THE MACHINES.

As far as the future is concerned, the effect upon results is best examined from two standpoints—whether the machines can and will do the job for which they have been purchased and, secondly, whether they can and will be adequately maintained.

Even though Mr. Lightfoot placed the major responsibility for the adverse financial results upon the men, it was evident throughout that he was consistently worried about the extent to which the failure of production rested with the machines. His letter of the 6th April, 1954, (Exhibit 156) leaves no doubt about this.

There is certainly still a doubtful quantity in the matter of machines, but is should be remembered that-

(i.) The cutters were satisfactory.

(ii.) The belt conveyor was satisfactory.

(iii.) The loaders gave trouble.

(iv.) The chain conveyors were unsatisfactory.

Much could be done to improve performance of the machines despite any limitations they may have—for example-

(i.) Improve the supervision.

(ii.) Improve methods of working.

Endeavour to eliminate bottlenecks.

(iv.) Improve the maintenance.

{v.) Establish proper workshops.

(vi.) Increase the training.

(vii.) Improve morale.

(viii.) Use greater initiative.

Nevertheless the ability of the machines to do a better job must still remain doubtful.

(d) THE METHODS.

This is the second of these major factors (machines, methods and men) concerning which the great bulk of the evidence was given. This factor cannot be divorced from the other two. Queries in relation to methods took the form of complaints (either from men or management) concerning the lack of rhythm in working, no systematic approach to the jobs, lack of adequate preparation for work to be done, excessive spillage through a careless approach, lack of efficient approach to maintenance and others of a similar nature.

Fortunately each and all of these are capable of being overcome by a reasonable, logical, efficient and constructive approach on the part of management and men. To that extent perhaps they are best considered when dealing with those two agencies.

The fundamental factor is that there is certainly nothing insuperable in any of these things. To overcome them simply requires an efficient and enlightened approach.

(e) THE ATTITUDE, QUALITY AND QUANTITY OF THE LABOUR FORCE.

Practically the whole tenor of Mr. Lightfoot's evidence was that the major, and virtually the only, reason for the most adverse results achieved was to be found in the attitude of the men and their consequent work effort. That there was cause for complaint seems beyond doubt. That Mr. Lightfoot's assessment of the importance of this factor in assessing it as far outweighing everything else, was unnecessarily biased is, in our view, equally beyond doubt.

It must, however, be recognised that in the final analysis the attitude of the men, the quality of the management and the availability of finance are the three major agencies that can lead to profit or loss, success or failure.

It is quite evident that if mechanization is to continue one of the unknown factors would be the degree of co-operation which could be expected from the men. It is quite likely that the experience over the last year or so will have made them realise that over production was really no threat to their own jobs, that mechanization has eased their work considerably and that mines which continue to make important losses are in danger of being closed altogether and their jobs affected accordingly.

Nevertheless, if mechanization is to continue some means will have to be found to obtain, earn and/or ensure that the work effort of the men will play a helpful part in seeking to turn losses into profits.

(f) THE QUALITY OF MANAGEMENT.

This is very often the major factor in success or failure and it is certain that its importance in Collinsville cannot be overstated. This, together with the attitude of the men, is, and will be in the future, the greatest factor in the success of the mine.

Management certainly cannot escape some of the blame for what has passed. In our view there was not as much as we would like to have seen of the right type of leadership, and this is true from the General Manager through to the Overmen. It is admitted that the task of Management was very difficult when it was struggling with the problems of mechanization and had what it regarded as a recalcitrant group of miners to deal with. Nevertheless, some of the things which it omitted to do, seemed to be things which should have been plain to Management and should have been instituted by it. We refer to such matters as the numbers of surface labourers, possibly the angle cutting, the use of the winch, an organised scheme of preventive maintenance, an underground workshop, and a real attempt to make it possible to use the shuttle car by the completion of the No. 2 airway.

Perhaps even more important than these is the fact that there did not appear to be a sufficient realisation that with the expenditure on mechanization, output was fundamental and with the difficulties being encountered, the introduction of contract miners to supplement this output may have made all the difference. It is admitted that this may not have been easy and there were problems to overcome, but the overcoming of problems of this kind is one of the tests of Management, and the necessity for providing *alternative* ways of getting production seems to have been better understood by Mr. Winstanley that anyone else.

If mechanization is to continue, means should be found of strengthening Management. There was undoubtedly a lack of leadership and other qualities. These too will have to be tackled if mechanization is to continue in the hope of satisfactory results.

The four major problems are therefore :-

(i.) Grades.

(ii.) Machines.

(iii.) Men.

(iv.) Management.

Assuming that the Union and the employees are prepared to co-operate with Management by trying to reach higher standards, we are still left with the problems—the important problems—arising from (i.) grades and (ii.) machines. It would be wise not to 'underestimate the number and importance of the problems that emanate from the grades and the machines.

We have in consequence devoted considerable thought and attention to the possibility of easing the effects of these conditions. In the first place, however, we must analyse the schemes and suggestions made for the future working of the mine. It is of great interest to know that all such schemes and suggestions pointedly refer to problems of grades and machines.

Term II D (5).

Suggestions and Schemes given in Evideence.

(a) MR. LIGHTFOOT'S SCHEME.

Just before Mr. Lightfoot's resignation took effect, he wrote a memorandum to the Under Secretary, Department of Mines, in relation to the State Coal Mine. In this he dealt with some of the difficulties which had been experienced in relation to grades and machines, but then went on to consider how the mine should, in his view, be operated in the future. Because of the importance of this matter, we set this out verbatim and it is taken from Exhibit 179, being a memorandum to the Under Secretary, Department of Mines, 26th August, 1954-

" I submit that a new system should be introduced that will—

(a) Enforce the employees to earn their moneys, i.e., a contract system ;

(b) Be simple enough that the present Manager and staff can supervise it.

With this in mind, I strongly suggest that we retain the present pit-top equipment and arrangements and also the main trunk belt haulage system and chain conveyors. These are all economical on labour and reasonably trouble-free in operation.

The new system of production I would introduce would be by contract miners getting the coal by means of a power borer only and hand filling it onto the chain conveyors. Miners to be cavilled in groups of four into 15 working places with five working places worked double shifted, i.e., the main heading and four adjacent developmental places. This would provide for 80 contract miners, who should average 12 tons per miner per day. Only one experienced man would be required in each group, which would overcome the inexperienced labour problem, always present previously at Collinsville.

The present contract rate for getting, filling, and hand cleaning the coal and erection of timber is 6s. and this was supplemented by an additional 8d. per ton to cover all disabilities not covered by the ordinary contract rate.

Immediate application should be made to the Coal Reference Board for a rate for such work, payment to be made on a tonnage rate arrived at by measuring the cubic content of the working place on a fortnightly basis and converting this to tons. This rate should include the filling off all coal once only and any spillage outbye would obviously have to be cleaned up by the Management. However, the contract miners would not be paid for any coal left lying along the ribs or floor near the face.

The extension of the chain conveyors should be included in the rate and be part of the miners' normal duties.

All conveyor pans, chain and timber would have to be snigged to a reasonable point near the face for the miners' use.

All disabilities, such as faults, dykes or other disabilities should be the subject of a basic consideration rate to ensure that miners were retained on contract in difficult places and not be declared " deficient " as previously.

There is a basis for the adoption of such a rate by reference to the Mt. Mulligan Colliery, where in 1923 the Industrial Court fixed a rate for getting and filling coal onto chain conveyors and also for belt conveyors.

At that date the rates fixed were—

	s. d.
Filling into skips and wheeling	7 1 per ton ;
Filling onto chain conveyors	4 0 per ton ;
Filling onto belt conveyors	4 6 per ton ;

This showed a reduction of 3s. ld. per ton.

At Collinsville the 6s. did not cover the wheeling, which is fixed at ls. per ton, so therefore we should apply the adjustment by way of a reduction at Collinsville from 6s. plus Is. wheeling, i.e., 7s. to 4s. or a reduction of 2s. per ton.

To this new rate of 4s. per ton should be added the 8d. per ton for consideration.

Based on a tonnage of 12 tons per miner, which should be quite easily realised under this system, their earnings would be-

	£	s.	d.
12 tons @ 4s. 8d.	2	16	0
Cost of living adjustment	1	12	0
	4	8	0
Less Explosives		6	2
Net average	. 4	1	10 per day.

To this figure would be added any amounts in the way of consideration for water money, or anything of a special nature. As they averaged 8.8 tons per miner into skips the average under this system should exceed 12 tons per miner.

In my opinion this proposition should be placed before the Union. If not accepted a case should be immediately presented to the Coal Reference Board and when approval is obtained placed in operation.

At 12 tons per miner for 80 miners an output of 960 tons would be realised, which would place the colliery on a profit-earning basis.

The loaders and cutters could be reconditioned and if desired sold elsewhere.

It is suggested that these comments be placed before my successor for his benefit to be accepted or otherwise, but they are tendered in good faith after I have had three years of experience in all phases of the operations at the State Coal Mine, Collinsville.

A. LIGHTFOOT,
General Manager. "

It will be seen that Mr. Lightfoot's scheme is the adoption of a proposal for a partly-mechanized mine. His idea is that there would be hand-mining methods which would be used to get coal onto the chain conveyors. This would eliminate the use of the cutters and loaders and the latter in particular gave trouble. It would still necessitate the use of the chain conveyors which gave even more trouble, but no doubt Mr. Lightfoot felt that with hand-mining methods the operation of the chain conveyors would be much more under control and would therefore be much more satisfactory.

We find it hard to follow Mr. Lightfoots' reasoning in connection with this plan. Presumably it is based upon the idea that the men are determined not to make a success of mechanized mining, and it therefore becomes necessary to tie their earnings to the results of their work.

We feel however that the men in the vast majority of cases like mechanized mining and would not welcome a return to hand-mining methods. The question would therefore arise as to whether you would get the necessary numbers for hand mining. Mr. Lightfoot apparently would believe that the numbers of men required would be forthcoming.

We fail to see also upon what logic Mr. Lightfoot bases his premise that the men would work a great deal harder in order to earn money under hand-mining methods than they would under mechanization. By his incentive rate it is true the men would earn more rapidly and may well reach higher figures than under mechanization. On the other hand, Mr. Lightfoot went to very considerable pains in his evidence to show that all kinds of dargs operated under hand mining and that the Union was determined not to allow the men to earn too much. We believe therefore that there is grave inconsistency in this statement and we fail to see the logic behind the thought that the men were never content to allow production to rise under hand-mining methods before mechanization, but that a return to hand-mining methods after mechanization would bring production up to such figures as to allow the mine to proceed satisfactorily.

We do agree that the losses sustained cannot continue but we would hope that some better method than that propounded by Mr. Lightfoot would be available because it is based upon the presumption that nothing can be done which would sufficiently help the cutters and loaders to enable the mine to proceed as a mechanized unit.

(b) MR. MOLLOHAN'S SUGGESTIONS.

The letters which passed between Mr. Mollohan and his principals on one side and Mr. Lightfoot and the Under Secretary, Department of Mines, on the other, have already been referred to and are to be found as Exhibit 156. Mr. Mollohan was dealing with the complaints made against the machines, and any suggestions he made in relation to future working emanated from this cause. It must be remembered that these were made within six months of the commencement of mechanization and almost a like period before the disaster occurred. It is not surprising therefore that Mr. Mollohan's suggestion revolved around ways and means of easing the grades and thus in turn easing the load on the machines his organization had supplied.

In essence he suggested driving the cross cuts in the mine on a 45 degree angle so as to eliminate the steep grades. This would have the effect of bringing the grades down to about 1 in 8 and in Mr. Mollohan's view this should speed up production.

Mr. Mollohan submitted his plan which is shown in Exhibit 156 to indicate just how the angle cut-throughs would operate.

Any scheme which promised relief from the grades and the conditions operating was worthy of serious consideration. It was not admitted by Mr. Lightfoot, which may appear a little surprising in view of the extremity in which production was placed.

As far as the future is concerned, however, we are of the opinion that as it is necessary for the companion headings to the main Dip to be parallel with the main Dip for ventilation and transport of materials, the suggestion by Mr. Mollohan which would necessitate the multiplicity of chain conveyors would probably not have resulted in a substantial increase in output.

The increase in production in order to make the mine profitable must be substantial and we do not believe that it would come from the experiment of angular cutting.

(c) MR. FALLINS' SUGGESTIONS.

It will be remembered that Mr. Fallins' Report (Exhibit No. 24) arose out of a request by the Government for his opinion in relation to—

(1) Whether the right type of machinery had been installed.

(2) Whether it had been installed correctly.

(3) Whether it was installed in the correct place.

(4) Any other matters that may be observed during the inspection.

It will be noted that he was not asked to prepare a specific working plan for the future in an attempt to make the mine profitable. Though there is therefore no specific plan for future working, there are references to future workings of importance and, in his evidence, Mr. Fallins supplemented some of the statements made in that report.

The most important factor to which Mr. Fallins drew attention was that a series of boreholes be drilled because in mechanized mining it was absolutely necessary that the physical characteristics of the seam should be known. In this it was entirely different from hand mining, where the main haulage could be either direct, main and tail, or endless rope, and whether any adverse grades were encountered did not matter very much. With mechanized mining, grades made all the difference between success and failure.

Mr. Fallins based his demand for a boring programme on the fact that it was far too risky to design layouts without getting the maximum information reasonably obtainable. He pointed out that this had been not only his practice but that of all sound mining men, and indicated that no large outlays of money should be spent without such information.

It may be a fair inference from this that Mr Fallins indicated not only that no further expenditure should be incurred without getting additional information from a drilling programme, but that, if mechanization was carried on, the drilling programme was in any case essential.

Mr. Fallins in his report suggested the allocation of three working faces to each of five loaders, leaving one loader as a spare.

By this method, coupled with an alteration in the position of the chain conveyors, he anticipated an output of 150 tons per loader, i.e., 750 tons from the five operating loaders per shift.

This plan was not given a trial, as the report was made just prior to the disaster.

As indicated earlier in this Report, Mr. Fallins was strongly of the opinion that the grades were extremely difficult and made operations very difficult. Indeed he classed the conditions at Collinsville as being of the worst type. It is this factor which makes us question whether the suggestion by Mr. Fallins will provide the solution which everyone would seek in relation to turning the mine into a profitable unit. We have no doubt that the suggestion is full of merit but we do not believe that it goes deep enough into the question of providing a definite plan which can be embraced as the means by which losses could be turned into profits. Again it must be remembered that this was not one of the questions asked of Mr. Fallins and which prompted his visit and his report.

We believe therefore that the suggestions by Mr. Fallins, though valuable, do not go far enough.

It was not surprising to find, however, that Mr. Fallins was very definitely in favour of mechanization, firstly because of humanitarian and secondly because of economic reasons.

(d) THE UNION'S SUGGESTIONS.

In a letter of 2nd August, 1954, the Secreatry of the Collinsville Branch of the Queensland Colliery Employees' Union addressed to the Minister for Mines, Hon. E. J. Riordan, the Union dealt with the future of the mine and made some suggestions in relation thereto. The letter (Exhibit 144) is quoted in full hereunder :-

" QUEENSLAND COLLIERY EMPLOYEES' UNION,

Collinsville Branch,
Collinsville,
2nd August, 1954.

Mr. E. J. Riordan,
Minister for Mines,
Brisbane.

Dear Sir,

At a meeting of the branch held to discuss the recent conference in Brisbane it was decided to suggest the following to the Department as a real way to overcome the present difficulties associated with mechanization production. The following would increase production to a considerable degree :

That the management revert to hand mining in No. 2 Tunnel by immediately putting 10 pairs of miners or more on contract as previously to supplement coal production from the mechanized tunnel. It would take very little work to have it in readiness.

Further, that they concentrate on the Dip section in the mechanized mine so that a panel system may be developed and bords worked on a rotational basis.

The members also contend that no good purpose would be served by the appointment of another General Manager because of the high cost particularly if he was of the calibre of the previous one.

We put these ideas forward as concrete suggestions to generally improve production at the mine. Any improvements that can be put forward by the Department or the Management we will endeavour to put them into operation.

Yours faithfully,
J. NISBET,
Secretary. "

Certainly this letter is not a basis for criticism (except perhaps the reference to a new General Manager) and the suggestion made is similar to that put forward by Mr. A. Winstanley and similar to a temporary scheme suggested later. The scheme undoubtedly does offer some concrete suggestion. Furthermore it may not refute but it certainly does not support Mr. Lightfoot's conclusions that the Union and the men were concerned only with the restriction of production, never with improving it.

Term II D (6).

The Commission's Suggestions—Three Schemes.

In examining the possibilities of making some suggestions to overcome the difficulties which beset the mine, we paid particular attention to the fact that in essence nearly every witness put the major blame for the adverse results upon grades. Even where machines were mentioned, many of the difficulties in relation to the machines operated because of the difficult grades. It seemed to us, therefore, that any solution for the future, which could envisage an immediate or near immediate easing of the grades under which work was carried out, would make a substantial contribution towards success. For example, easing of the grades could help reduce machine troubles, bottlenecks, breakdowns, improve the rhythm of work, reduce tramming time, reduce the frustrations and annoyances to operators inherent in difficult conditions and many other things. Because of these factors, three schemes rather than one are suggested for consideration.

(a) THE BOREHOLE REQUESTED BY THE COMMISSION.

Before these are outlined, however, it is necessary to note that an analysis of the whole position indicated that the knowledge of the seams (and grades) in the mine would be considerably improved if a borehole was drilled in a spot south of No. 1 Tunnel workings beyond the fault met in No. 3 West Dip. A suitable spot was selected by the Commissioners, and the Mines Department agreed to proceed with the bore N.S. 1. (1955). This borehole has proved the seam to exist south-
Annexure No. 36. east of borehole 1A, as shown on *Annexure No. 36*.

A report by Mr. J. B. Cameron, Assistant Geologist, also one from Mr. H. Cribb, Senior Geologist, was made available to us. (Exhibit 181).

The Bowen Seam was encountered at this point at a depth of 922 ft. 1 in. and consisted of 13 ft. 8 ins. of carbonaceous shale and coal bands.

Owing to their powdery nature, the soot bands so characteristic of the Bowen Seam in the State Mine workings were not recovered. However, a trace of sooty material was evident in the core approximately 3 ft. 4 ins. from the floor.

It is interesting to note that the assistant geologist reported that, for up to an hour after being brought to the surface, the coal core from the Bowen Seam in N.S. 1. emitted gas. This was discernible only when the coal was wet, the gas then bubbling through the thin film of water around the core. It was not possible to collect any of this gas for analyses but indirect evidence indicates that it was most likely carbon dioxide.

A summary of the depths at which the coal seams were encountered and their thicknesses in this borehole are as follows :—

Seam.	Depth.	Thickness.
	ft. ins. — ft. ins.	ft. ins.
Garrick ..	551 5 — 558 111	7 61
Scott ..	769 11 — 776 7	6 7
Denison ..	794 1 — 798 51	4 41
Potts ..	830 7 — 833 1	2 6
Bowen ..	922 1 — 935 9	13 8
Blake ..	1,037 0 — 1,059 21	22 21

The level of the Bowen Seam at this point now having been firmly established, structural contours can be plotted from this point to Bore 1A, and the limit of the workings at the dip in 3 West, also levels at 4 West which will allow of future workings in this area being planned on known grades.

For analyses, the seam was sampled in three sections, the core being split to provide duplicates for reference. A fourth sample was prepared to include the 1 ft. 6 ins. of coal and stone bands on the floor of the seam.

Results of examination by the Government Analyst were as follows :—

	Sample Number.			
	404/55G.S.	405/55G.S.	406/55G.S.	407/55G.S.
	Depth.			
	922 ft. 1 ins.-925 ft. 9 ins.	925 ft. 9 ins.-930 ft. 9 ins.	930 ft. 9 ins.-935 ft. 9 ins.	935 ft. 9 ins.-937 ft. 3 ins.
Proximate Analysis—				
Moisture at 105°C	0.7	0.8	0.8	0.9
Volatile Matter	19.8	22.4	20.8	13.2
Fixed Carbon ..	65.6	58.5	59.9	28.6
Ash ..	13.9	18.3	18.5	57.3
Calorific Value—				
Joules ..	30,580	28,680	28,640	12,930
.	13,160	12,340	12,320	5,560
Sulphur	2.53	0.97	0.50	0.23
Specific Gravity	1.438	1.459	1.457	1.922
Coking Properties—				
Coke Classification ..	CW	Cm	Cm	Af
Swelling Index (1 gm. sample)	1	11	11	1

The analyses of the full seam section (922 ft. 1 in.-935 ft. 9 ins.) as calculated from the above sectional analyses is as follows :-

Proximate Analysis—	
Moisture	0.8 per cent.
Volatile Matter ..	21.1 per cent.
Fixed Carbon ..	60.9 per cent.
Ash	17.2 per cent.
Sulphur ..	1.22
Calorific Value—	
Joules	29,175
B.T.U./lb.	12,550
Specific Gravity	1.453

The drilling of this borehole has proved the complete strata section and has shown that there is no evidence of appreciable disturbance by faulting from bore 1A to this bore N.S. 1.

The quality of the seam at this point as shown by the analyses proves that the Bowen Seam continues to be of good quality and comparable with that which is at present being worked at the mine.

Annexure No. 37.

The reports by Mr. J. B. Cameron, Assistant Geologist and Mr. H. Cribb, Senior Geologist, appear as *Annexure No. 37.*

(b) SCHEME NO. 1—USING EXISTING EQUIPMENT.

Annexure No. 38.

In considering this scheme, we have to keep in mind it is necessary to arrange the lay-out in panels, and we have to endeavour to get rid of what were termed " bottlenecks " during the past method of operation, and in this connection *Annexure No. 38* shows " *A Possible Method of Working with Existing Plant."* It is very necessary that work with the existing plant be considered as it would take time and much more additional finance to obtain additional equipment and, although later we will suggest that shuttle cars be obtained for the face to main belt haulage, we realise that to acquire same would take considerable time. The suggested plan of operation shown on the annexure is for five levels to be driven in a panel and for chain conveyors to be so arranged that they will not at any time have to operate for a greater distance than 300 ft. This is achieved by placing a subsidiary belt conveyor in the lower level of each panel with a chain conveyor delivering downhill from chain conveyors situated in each level. Five places have been selected for each panel, which, with cut-throughs, should give an average of at least six places and this will allow for each loader loading at least three places per shift. On the evidence before us, we can *see no reason why* this should not be accomplished, and, as far as cutting is concerned, it was admitted in evidence that a cutter could cut five places.

It will be necessary to raise the downhill chain conveyor to give access for the machines to the working faces. This is an inherent fault with chain conveyor face haulage and has resulted in much of the difficulty in flitting at the mine. However, it may be found that a simple bridge can be built to allow the machines to cross over the conveyor, for, unlike previous unsuccessful attempts with this improvisation, the loader will not be required to turn into the bord while on the bridge but will be travelling on the level to the face.

Later in this Report, we will be recommending that as far as possible coal cutting and shot-firing be done on the afternoon and night shifts for stated reasons. We can therefore assume that on the day shift there would only be the loaders operating without interference from other plant, and if this system is adopted at least five to six places per unit (two loaders) should be loaded out.

It is expected that, with normal operations on the A side and allowing for an average depth of 8 ft. cut, over a range of 20 ft. in width and 12 ft. high, 75 tons should be obtained per place. On the basis of five to six places per shift, this *would give 375 to 450 tons per unit* (two loaders).

The production in the Dip would be impeded due to grading over the fault, but three places should be loaded out when the section is available and the production from the Dip should therefore reach 225 tons. This should give a minimum of *375 tons A side,* 375 *tons B side,* and *225 tons Dip Section-975 tons per day,* with a possible 1,125 tons.

It is felt, therefore, that, with the existing plant properly maintained, an *average* output of at least 900 tons per day (i.e., *one loading shift)* should be obtained.

For reasons which will be stated elsewhere, the above suggestion pre-supposes that most of the coal cutting will be done on the afternoon shift and the bulk of the shot-firing on the night shift.

Scheme No. 1 would thus envisage continuation of mechanization in No. 1 Tunnel and would require the following :-

(a) Overhaul of present equipment, cutters, loaders, and boring machine.

(b) Installation of subsidiary Mavour and Coulson belt conveyors in A.8 level and location of the 61 W.H. chain conveyors on the A side as shown in *Annexure No. 38.*

(c) Installation of subsidiary Mavour and Coulson belt conveyors in B.8 and location of the 61 W.H. chain conveyors as shown on the B side in *Annexure No. 38.*

(d) A continuance of the plan to drive down the main dip grading over the fault. (In Term III grunching is recommended in this connection.)

(e) The extension of the main belt to cover the progress made in the main dip.

(f) Continuation of driving in the parallel dips with grunching again operating.

(g) The preparation of a new section of the B side with coal cutting on the afternoon shift and shot-firing on the night shift.

The cost of this scheme would be as follows :—

(i.)	Preparation of face equipment	500
(ii.)	Transport of subsidiary belt below ground and erection of same in A.8	450
(iii.)	Transport of subsidiary belt below ground and erection of same in B.8	450
(iv.)	Extension of main belt (say)	300

The total immediate cost would therefore be £1,700.

(c) SCHEME No. 2—JOINING No. 1 AND No. 2 TUNNELS.

This proposition would appear to be the ideal set-up for the future, and *Annexure No. 39* shows the outline of " *Possible Future Lay-out Combining No. 1 and No. 2 Tunnels."* Annexure No. 39.

In this scheme we envisage the continuation of the main belt heading in No. 3 West by means of a graded drift down to the Bowen Seam on the South-western side of the fault. Two other connections by drifts for ventilation would be necessary and from these entries three headings would be projected towards the south-western boundary of the holding. To join with the No. 4 East level of No. 2 Tunnel it is anticipated driving five headings so that not only will the two tunnels be connected but several working sections can be developed.

From the joining of the No. 1 and No. 2 Tunnels a number of advantages would be realised :

(i.) The No. 2 Tunnel is an ideal straight road which could be fitted and used for transport of men and materials. Machines also could be transported below and removed to the surface for major overhaul.

(ii.) Ventilation could be materially improved as the fan at the No. 2 Tunnel is of ample capacity and return airways are straight and of adequate area.

The borehole recommended by the Commission has proved the seam to exist south-east of 1A, as shown on *Annexure No.* 36. The seam thickness at this point is approximately 14 ft., and this thickness is similar to that at the face of the Dip workings in 3 West.

We can therefore now assume that there is, in addition to the coal already proved in the vicinity of No. 2 Tunnel, an extensive area to the south available for exploitation, and with the No. 1 Tunnel and 3 West being used as the coal transport road per medium of the 42-inch belt, which is an excellent installation, we see no reason why in the future the No. 2 Tunnel should not be used for ventilation, and for the transport of men and materials.

The grades in this virgin area can now be assessed more accurately with the completion of our suggested bore, and the structural contour of the seam can be determined and we have no hesitation in recommending that for greater efficiency shuttle cars should be purchased to replace the chain conveyors, as the conveyor medium between the face and the main conveyor. Shuttle cars which have four-wheel drive and four-wheel steering are giving excellent service in New South Wales. *Caterpillar-mounted* shuttle cars may be investigated, but we are of the opinion that the existing four-wheel-drive shuttle car would give satisfaction on the grades which will be encountered from below the fault to the face of the Dip in No. 2 Tunnel, and we are also of the opinion that they would give satisfactory service on the grades which exist west of the No. 2 Tunnel and south-east from No. 2 Tunnel to the borehole which was put down at our request. It is interesting to note that Mr. Fallins, Mr. Lightfoot, and Mr. Barrett favourably mentioned the introduction of shuttle cars.

With this in mind, two suggested possible layouts are shown—Annexure No. 39 " Possible Future Layout Combining No. 1 and No. 2 Tunnels " and *Annexure No. 40 " Alternate Possible Future Layout Combining No. 1 and No. 2 Tunnels."* Both methods of working make use of a conveyor belt as haulage situated in the centre heading of a small panel with face haulage by means of cable-reel shuttle cars. Annexure No. 40.

The layout shown in Annexure No. 39 (Scheme No. 2) has been adopted very successfully for a shuttle-car installation in New South Wales and could be quite successfully employed provided the grade does not become too severe. In the plan submitted, seven bords are driven to the rise with the belt conveyor installed in the centre bord and advanced as the panel progresses. This will allow an ample number of places for one unit, and two can easily be accommodated by increasing the number of bords or increasing the percentage of extraction. With systematic extension of the belt, shuttle car running distance can be kept to a minimum and, although bords are driven to the rise, the grade is with the load and greatest running would be on the level. This method of development allows a simple and systematic face cycle to be followed and gives a maximum utilisation of conveyor belt installed.

(d) SCHEME No. 3—JOINING No. 1 AND No. 2 TUNNELS—ALTERNATIVE.

The alternative scheme shown on Annexure No. 40 (Scheme No. 3) allows greater extraction from bords on the level and could be more adaptable to heavier grades. Three headings are driven to the rise, and bords broken away at right angles to develop a panel, the coal being fed to a conveyor belt in the middle heading. In this method, the coal can be won either advancing or retreating. With the latter, the three headings would be driven the panel length before bords were opened out and the belt retracted as they are completed. This could be advantageous if only solid working of this seam was considered, or immediate pillar extraction thought wise. Either shuttle cars or the present chain conveyors could be utilised ; with the former, bords would be driven approximately 450 ft. and with chain conveyors a maximum of 300 ft. from the conveyor belt. Two units, one on either side of the headings would be operated in either case.

In the event of an uncontrollable spontaneous heating only three places will require seals to isolate the panel.

(e) GENERAL.

Until the No. 2 Tunnel can be used for transport of materials, it would be essential that an efficient workshop be established in the Dip to enable adequate servicing of the machines until such time as they could be transported to the surface for a complete overhaul, and in this connection, we suggest that an efficient workshop be established in the Dip at A.7. This workshop could be locked at both ends with wire mesh doors, and the necessary spares for satisfactory maintenance could also be kept in a store situated at this point. Timber and other materials could be stored in A.6 or A.5. level, between the main dip and the adjoining dip, and these would be readily accessible for the working section. The present endless rope in No. 1 Tunnel and the direct haulage in 3 West would have to be kept in operation for materials until such time as No. 2 Tunnel could be brought into use for this purpose, and to make this supply of materials more efficient, consideration could be given to running the endless rope into 3 West ; in fact a reversible endless rope could be taken alongside the belt into 3 West so that the materials could be taken direct to the point from where they are to be distributed, without the double handling which was in operation in the past.

The present ventilation system at No. 1 could be continued until such time as the workings at No. 1 were joined up to No. 2, but in this connection, it will be necessary that attention be given to prevent leakage at all stoppings and by enlarging the return airway at places where without doubt it was restricted. It would be necessary to level out the falls in the second intake to make this road a second means of egress, but this road is not an efficient transport road, and the transport of men and materials will have to be in the road adjacent to the conveyor belt until such time as the No. 2 Tunnel roads can be brought into use.

The schemes outlined require additional capital, but the cost could be spread over something upwards of two years. These costs would be-

		Cost.
1. As per Scheme No. 1 .. .	Production per day-900 tons	1,700
2. Two shuttle cars for face haulage to subsidiary belt (for new section in Dip)	1,125 tons—after 6 months .. (Two shuttle cars £30,000, rectifiers, gate end boxes, cables, &c., £3,000)	33,000
3. Additional power-generating plant ..	1,125 tons—after 12 months ..	10,000
4. Additional main trunk conveyor ..	1,125 tons—after 12 months ..	35,000
5. Four cable-reel shuttle cars and rectifiers, &c.	1,125-1,350 tons—after 24 months	66,000

The position would be as follows :—

Production under Scheme No. 1 should give 900 tons for a capital cost of £1,700. Scheme No. 2 would go a futher stage and thus obtain 1,125 tons as the result of an expenditure of £34,700. It could go a further stage of up to 1,350 tons in 24 months for a further expenditure of £111,000.

In suggesting that the mine should carry on under mechanization with a plan such has been outlined, it became necessary for us to calculate what would be the expected cost of actual production. The figures in accordance with our estimates are shown• as follows:—

1956-57.

PIT COST AT 900 TONS PER DAY.

	Per ton. s.	d.
To Mine working (labour including Oncost) ..	32	0
„ Repairs and Renewals (Stores and Services)	12	9
„ Royalty	0	6
„ Interest	3	9
„ Depreciation ..	6	9
„ General Expenses (£35,891 1953-54—£29,559 1954-55) say	3	4
Total	59	1

Cost 59s. ld.—Sales 70s. .. Profit 10s. Ild. per ton.

1957-58.

PIT COST AT 1,125 TONS PER DAY.

	Per ton. s.	d.
To Mine Working (Labour including Oncost) ..	26	0
„ Repairs and Renewals (Stores and Services)	12	9
„ Royalty	0	6
„ Interest	3	9
„ Depreciation ..	6	9
„ General Expenses, say,	3	0
Total	52	9

Cost 52s. 9d.—Sales 70s. .. Profit 17s. 3d. per ton.

ESTIMATED PROFIT AND LOSS ACCOUNTS.

	1956-57. 900 tons per day 220 days ay. = 198,000 tons.	1957-58. 1,125 tons per day 220 days = 247,500 tons.		1956-57.
	£	£		
To Mine Working	316,800	321,750	By Sales ..	693,000
,, Repairs and Renewals ..	126,225	157,781	,, Sundry Receipts	
,, Royalty	4,950	6,188	,, Net Loss .	
,, Interest	37,125	46,406		
,, Depreciation ..	66,825	83,531		
,, General Expenses	33,000	37,125		
,, Net Profit ..	108,075	213,469		
	£693,000	£866,250		£693,000

It will be seen from these that in respect of the year 1956-57 we have calculated on an output of 900 tons per day for a 220-day year. In calculating the amount of labour required, we have carefully gone through the operations in the mine and we have arrived at the necessary work complement to cover this. From this, we have calculated the amount of wages that would be incurred. The other expenses are largely taken from the experience of the mine over the last two years. This particularly operates in respect of repairs and renewals, royalty, general expenses, and interest and depreciation.

We have calculated on a selling price of 70s. and as the cost comes to 59s. ld., there is an estimated profit of 10s. 11d. per ton and this totals for the year £108,075 net profit.

In view of the losses during the last two years, such a figure no doubt sounds fantastic. Actually, what it really does do is to show up two things :-

Firstly, with lower than a break-even point production total, losses at the mine accumulate very quickly. Any increase over that break-even production total means that profits accumulate very quickly.

The second factor is that the number of workers allowed for would not be as high as the mine has operated under during the last two years. On the other hand, because of resignations, the same amount of labour is not now available so that it is likely that the number would reduced be in any case.

These are the two major factors which have contributed to the showing of this net profit of £108,075. Everything is in production. Good production will undoubtedly mean good profits and even a very drastic pruning of expenses will never make up for shortages in production.

Nor should it be thought that we have drawn too fine a picture of what can be accomplished. Actually an efficient mine should be able to cut all of these expenses. We have over-allowed fairly considerably in the amount of labour which, in our view, should be able to produce 900 tons. There is good margin in the labour figure, and good management should be able to reduce it. Furthermore, we have calculated expenses on what has been the position in the mine over the last two years. In this, too, we feel we have been somewhat over-generous.

We do believe, therefore, that what is shown should very definitely be within the accomplishment of Management if the plan that we have outlined is followed and if Management and men work to make the success of the mine.

The figures in relation to 1957-58 are calculated on the basis of 1,125 tons per day, again with a 220-day year. This gives a total of 247,500 tons, and net profit of £213,469.

Again we have over-allowed fairly considerably cost in respect of labour.

These figures look very attractive and of course if they could be realised an exceedingly strong case against mechanization on some other grounds completely would have to be prepared if it was contended that mechanization should not be proceeded with. The obvious question is how realistic are the figures. Profits of that magnitude do not come easily and it is a very simple thing to prepare figures which do not bear any close relationship to reality and yet upon which also decisions can be based. That was the trouble earlier. Mechanization looked most profitable and attractive on paper but only huge losses materialised.

There is little doubt that the mine always could produce 900 tons per day under mechanization and it requires a strong examination of the position to make sure that this 900 tons appearing in these schemes is not simply a duplication of the optimism of the original 1,500 tons. If it leads to the same fate as happened to the first 1,500 tons, obviously instead of an attractive profit a devastating loss would continue.

It must be admitted that Scheme No. 1 is largely based upon the assumption that the grades will ease and, though this was the original thought in 1953 when mechanization commenced, there is a sounder ground for the contention at this stage because of the new borehole. This gives a little more certainity to the position than that which operated previously. In essence, therefore, as far as Scheme No. 1 is concerned, it simply means that there is conjecture that the grades will ease, this in turn easing other conditions which operated so adversely because of the excessive grades, and in turn all of this would produce the 900 tons anticipated.

The great virtue of Scheme No. 1 is to be found in the fact that only £1,700 is necessary by way of expenditure and most of this is in any case an expenditure which would have had to be made after any period of operation. Apart from the grades, the other hopeful aspect would be in shifting the chain conveyors so as to overcome difficulties and bottlenecks which characterised their operation previously.

As far as Scheme No. 2 is concerned, it is a natural follow-up of Scheme No. 1, but in addition it envisages joining the No. 1 and No. 2 Tunnels and these grades could fairly accurately be worked out. To our mind this is a sound approach. It was suggested in the original plan that production should emanate from two sources. In that case, however, it was mechanization in No. 1 and hand mining in No. 2 Tunnel. In this second scheme, we envisage mechanization operating in No. 1 and also another section of No. 1 driving towards No. 2. The expected increase from 900 tons to 1,125 tons (as a minimum) is a very acceptable increase both in relation to the extra coal available and also, of course, in point of increased profit. The adverse feature is in the amount of capital expenditure and, as this borders on £150,000, it is considerable. (It is rather ironical to note that it is less than the loss in either 1954 or 1955.) If some acceptable degree of certainity could be anticipated in this proposal, this could go far to ensuring that the suggested profits would be earned and a strong case could be made up for the expenditure of £150,000. It is realised, however, that the Government is not likely to look with favour upon a further expenditure of £150,000 unless there is much stronger evidence that profits will result in the future than it has ever had in the past.

Under the circumstances, therefore, we feel impelled to suggest that concentration should be made upon the No. 1 Scheme at this stage and that every effort be made to ensure that this turns out according to plan, which in effect means that the 900 tons per day is actually obtained and at the cost suggested. This could well go on for six or twelve months and, if success attends this effort, then we believe it would be wise to pursue Scheme No. 2 even at the expense of the £150,000, which after all would be spread over a further two years.

Term II D (7).

Fundamental Factors Governing Successful Operation of the Mine.

We indicated earlier that the four fundamental factors which must be considered as the elements in success are :-

Grades.

Methods.

Men.

Management.

We stress strongly that the maximum advantage must be obtained from each. It will be readily seen that the adverse operation of any of these could destroy the desired production and again plunge the mine into losess. It is imperative, therefore, that a further analysis of these factors be undertaken to ascertain what possibility there may seem to be of improvement in each.

(a) GRADES.

We have already indicated that we believe that there will be some easing of the grades and, any time that this made itself apparent during the months before mechanization ceased, there was a lift in output. Scheme No. 1 relies upon an easing of the grades in a similar type of working scheme as operated in the past. Scheme No. 2 deliberately sets out to ease the grades in part of the operations through turning in another direction—thus joining No. 1 and No. 2 Tunnels—and in the latter area the grades are reasonably well known.

We repeat that, if the easing of the grades does eventuate, we believe the beneficial effect will be felt in a number of other factors all of which have in the past impeded production.

(b) METHODS.

There are many things which could be added under this heading. In his original plan, Mr. Lightfoot's idea was to continue in No. 3 West, through the troubled ground, and then proceed with workings in a south-westerly direction to the boundary.

This could have resulted in heavy working costs during this developmental period, and as boring had not been carried out in the southern portion of the area, structural contours of the seam were not available to allow of an efficient layout being planned to suit the grades which were likely to be encountered.

(1.) PANEL LAYOUT.

As it is known that the seam was liable to spontaneous combustion, we are of the opinion that a panel layout should have been adopted as this would have allowed for efficient sealing off of any area affected by heating. We do consider that in any future layout such a panel system should be planned in order to guard against spontaneous combustion. It is an accepted principal that in mines where spontaneous combustion is likely to occur, the layout should be such as to allow of—.

(a) The whole of the coal in a panel being extracted within the incubation period ; or

(b) A high percentage of extraction in the first workings, conceding that the coal that is left will not be extracted.

(c) Hydraulic or pneumatic stowage proposals being adopted which could result in a very high percentage of the coal available being extracted, but the cost of implementing same may be such as to be uneconomic, and therefore for this report stowage proposals are not considered.

It is suggested that this proposal (panel layout) be adopted in future.

(ii.) FACE PREPARATION.

Mechanical mining as introduced at Collinsville does bring forward many perplexing problems in efficient and economic operation. These problems must be attacked from many different angles and one of the main considerations in face preparation, after which the problem of loading the coal requires extensive study. These two phases of mining must be so conducted that there will be a minimum of congestion and confusion and at the same time work must be concentrated as much as possible.

The problem of face preparation is to loosen the coal so that it can be handled by the loader with as much ease as possible and, at the same time, keeping in mind that it is necessary to have as much large coal as possible with the fines reduced to a minimum. When the face is prepared to the best advantage of the loading unit, the next step is to remove the coal from the face in the most efficient and economical manner. This step involves the question of deciding whether or not the number of working places per section is to the best advantage of the working cycle, and this factor has been considered in our recommendation.

It is also necessary to examine the timbering, coal cutting, boring, and shooting, in order that the face is properly prepared for loading.

(aa) TIMBERING.

The hold-up in this work during the early stages of mechanization was overcome by agreement, and it is anticipated that this cycle of the operation will be so organised that the timber gang will at all times immediately follow the loading crew into any working place, in order that the places will be ready for cutting. If financial results improve, the Management could give consideration to the purchase of mobile timber-setting machines.

(ab) CUTTING.

The fact that some places in the past were not cut to the full length of the cutter bar has already been dealt with in Term II C, and it follows without question that, if maximum output is to be obtained from each working place, it is essential that the cutter bar be inserted to its full length. Cutter operators should be trained with this object in view.

With such a thickness of seam, i.e., 12 to 14 ft., it may be found that the single horizontal cut is inadequate, for good shooting, and provision of additional space could be provided by inserting a shear cut, or by " snubbing " or doubling the horizontal cut. We appreciate that the Bowen Seam presents relatively good shooting, but nevertheless suggest that it could be of advantage to enlarge on the horizontal cut in the interest of good face preparation and reduced explosive costs.

(ac) BORING.

The boring has been dealt with in Term II C, and as it was considered that this function of the production cycle was not efficient, we must stress that all holes must be drilled to the correct depth if the places are to be shot efficiently, and in this connection experiments should be carried out with various drilling patterns. This could result in better preparation for loading and reduced explosives cost.

If financial results improve as can be anticipated consideration could be given to the purchase of mobile boom articulated coal drills.

(ad) SHOT FIRING.

As it was stated in the evidence that the places to be loaded out were not at all times properly shot or properly prepared, we would recommend that the Management give consideration to the following points :-

(1) Placing the responsibility for proper shot-firing on the Overman.

(2) Educating the shot-firer in correct methods.

(3) Experimenting to determine the most adaptable form of explosive to obtain good sizing with minimum amount of powder.

(4) Investigating the benefits, if any, in the particular coal, of cushion shooting.

(5) Encouraging suggestions from the shot-firer and Overman with regard to the method of preparation—this will pay dividends.

(6) Experimenting with the position of the horizontal cut in the seam, and further with the shear cut in addition to the horizontal cut.

(7) Experimenting with simultaneous and milli-second delay shot-firing.

(8) Experimenting with hydraulic " Coal Burster " and/or Airdox Equipment.

It must be appreciated that careful study often reveals the possibility of greatly reducing explosive costs per ton by various drilling patterns, and the placing of the responsibility of good shooting on the Overman, and the ensuring that shot-firers are experienced in the proper use of explosives under the particular conditions, should result in much better preparation of coal at the face.

(iii.) LOADING.

This factor has been extensively dealt with in Term II C, and it will be realised that, for any mine to operate profitably, this operation must continue smoothly, with a minimum of interruption.

All of the bottlenecks that have been mentioned may not be eliminated until shuttle cars replace the conveyor chains, but, if the face preparation is as it should be, the capacity of the loader should be the maximum capacity of th, chain conveyor and good outputs should be attainable.

We do not see any reason why the present L600C loading machine should not load at least three places—i.e., approximately 225 tons per shift.

(iv.) MAINTENANCE.

It must be realised that the gap between hand mining and mechanical mining is wide and the transition from the old to the new methods at Collinsville was rather sudden, and while efficient supervision cannot be organised overnight, the Overmen should be trained and fitted for their positions in order that proper results can be obtained from mechanization. We have already stated that considerable trouble occurred with regard to maintenance and we are of the opinion that during mechanization it was not all that could be desired. We say further that there are three chief types of maintenance *:* —

(aa) Ordinary,

(ab) Preventative, and

(ac) Planned.

(aa) ORDINARY MAINTENANCE.

Ordinary maintenance regrettably represented too much a proportion of the practice in the past, and is the type where repairs are made only if a breakdown occurs, such repairs being made in any manner in the quickest time possible and nothing further being done until a further breakdown occurs. This method, therefore, should be avoided as much as possible.

(ab) PREVENTATIVE MAINTENANCE.

Preventative maintenance saves many interruptions in the smooth flow of production by the use of routine inspections, observing of operations and conditions, making minor repairs and adjustments, checking overload relays and other protective devices, and the machine operators and the maintenance fitters should be trained to observe any weaknesses in this regard so that defective parts could then have been changed on the off-shift and thus not have interfered so much with production.

(as) PLANNED MAINTENANCE.

Planned maintenance works on the theory that every machine and motor is eventually destined for complete overhaul. Details are worked out and it should be decided—

How and where the work will be done, if and when necessary ;

When units can be serviced without interfering with the continuance of production ;

What is the estimated cost of replacements so that these could be provided for by an overall consideration charge in the working cost ;

To plan advance schedules for inspection, repairs and overhaul of each machine in line with its relevant importance to production and relevant to the particular life of its various components ;

To have available special fitters for the various types of work ;

To keep a record of each unit of plant showing performance, repairs, costs and other data essential to factual analysis of the plant system.

Planned maintenance has gained prominence as the solution to the overall maintenance problem and it is therefore by this method that the successful management can best serve the industry.

(v.) POWER REQUIREMENTS.

It would appear to us that the electrical supply position will have to be investigated, as the present generating plant available at the colliery, while providing an adequate supply of power when all the plant is running, does not allow for regular maintenance and certainly does not cover breakdowns.

Any consideration of the power position must include the factor that power is not only required for the operation of the mine, but also for the town requirements.

Mr. Stansbury, Chief Electrical Engineer, when questioned with regard to this matter, stated that they had two alternators of 560 kVA and 625 kVA. When asked if they had sufficient power for the mine, including the mechanized portion of it, he replied that they did have sufficient power and had not suffered any difficulties from the point of view of power. He also stated that they had four diesel boosters, each 75 kVA, which could have been used, but it had not been necessary to ever use the booster diesels to augment the power supply.

When further questioned with regard to this matter, he stated-

> " There were occasions when, due to lack of power, the machines were not able to work successfully ? Only two or three times in the whole time I was there."

He further stated that there had been some power failures but they were related to exceptional circumstances, and the position was that the capacity of the generating plant was more than ample for the purpose of operating No. 1 but was not really sufficient for the purpose of operating Nos. 1 and 2 Tunnels simultaneously.

Mr. Lightfoot, when questioned in regard to this matter, stated that, during the period No. 1 was operating as a mechanized concern, they ran the fan only spasmodically in No. 2 and he was against the purchase of a second-hand generating plant as he did not desire to have Collinsville regarded as a dumping ground for obsolete plant from other power houses.

He further stated that there was sufficient power to carry on partial operations in No. 2 Tunnel but not the ordinary contract mining, as the power available did not permit of that, as there was not enough power to allow for contract mining, as such, in No. 2 Tunnel.

Mr. A. Crowley, of the Queensland Coal Board, and P.D.T.S. Limited reported on this position as early as 1950 (Exhibit 112) and drew attention to the fact that the maximum extra demand on the power house as a result of their scheme for mechanization would be of the order of 600 kW and that that extra load could not be carried by the existing generating plant, even after the installation of the Chillagoe boilers which they understood were being installed, and at that stage they recommended that the best unit available from Maryborough or Townsville should be transferred to Collinsville as soon as it was available.

Mr. Lightfoot, the former General Manager, communicated with the Manager, Mr. Winstanley, on 21st December, 1951 (Exhibit 153) and asked for information with regard to the power position. Mr. Winstanley replied on 31st December, 1951 (Exhibit 153) and informed the General Manager that the position as at that date was—

(a) 1,250 electrical h.p. available at power house ;
(b) 703 steam h.p. (minimum) ; 977 steam h.p. (maximum).
(c) Estimated load on complete mechanization of No. 1 Tunnel (excluding No. 2 was 1,720 h.p.)

Therefore, it appeared necessary for additional boiler and generating plant to be installed before complete mechanization in the No. 1 Tunnel area.

From the foregoing, it would appear to us that the Management will have to examine the power position very fully, as it will be necessary for additional power to be available *in approximately* 12 *months when the method of working that we have suggested, combining No. 1 and No.* 2 *Tunnels, could come into operation.*

The fan at No. 2 Tunnel will require 125 h.p. and the haulage for materials and man transport approximately 250 h.p.

It will therefore be noted that provision had to be made in the capital expenditure estimates for the sum of £10,000 for this purpose.

As already stated this would be required in approximately 12 months and if additional power is not available at that time from a central distribution authority, the above capital expenditure would be required.

(vi.) CABLE REPAIRS.

It was admitted by all witnesses that the engineering shop on the surface at the mine was a very good shop, but attention must be drawn to the inadequacy of the electrical shop and to the , fact that there was no separate cable-repair workshop. In order to have efficient cable repairs it will be necessary for the Management to build a cable-repair shop and equip it with the necessary modern equipment for rapid cable repairs in order to avoid the unhappy experience of the past. In this connection it would be advisable for the Management to have the electrician and the person who would be doing the repairs visit a modern cable-repair installation at one of the efficient collieries in New South Wales, in order that they would be better equipped to deal with this phase of the work, which in mechanization is most important.

(c) MEN.

There is undoubtedly room for great improvement in the attitude of the men. It is sincerely to be hoped that the experience of the past year, the fact that serious consideration is being given to discontinuance of the mine and that continued seriously adverse results would almost certainly leave the Government little option but to vacate this field of activity, will have the effect of making the men and the Union alike realise that *continued losses cannot possibly continue to pay wages.* Indeed, we are of the opinion that it should be clearly indicated to the Miners' Federation that a better work effort is essential, that more will to work must become evident and that a partnership between men and Management, designed to increase production and thus re-establish profitability, is an essential ingredient for continuance.

If the Federation and the men are agreeable, giving the men a stake in profitability could certainly be considered. It is unlikely that the Federation would countenance incentives, though they may do so under these special conditions and in view of the State ownership of the mine. Nevertheless, we do not believe it would be right to pursue this as an essential in the face of the Federation policy against it. There may not, however be the same objection to profit sharing and formulae to cover this could be reasonably quickly evolved. There would almost certainly be no objection to the inauguration of a Suggestion Scheme with attractive prizes.

The responsibility of Management for the building of morale is dealt with when dealing with Management factors.

We believe that much more attention should, in the future, be paid to the subject of training. Apart from Management, we think that much more opportunity should be taken to train :-

(i.) *The men* in the respective duties which they must cover ;

(ii.) The Overmen in-

(aa) How to be good Overmen ;

(ab) The best way to cover their various duties ;

(ac) Methods of raising morale in the men under their charge ;

(ad) How to become efficiency and economy conscious.

We believe that authority should be given to the Management to spend money on training schemes to the extent of sending Overmen away to New South Wales at ownership expense and that training should be regarded as a continuing function. If it is practicable to arrange exchanges of Overmen for a period with the southern mines, this would be well worth investigating.

It would, in our view, be wise to obtain the services of a competent man in whom the training function can be confidently reposed. It must be remembered that, as at present and with present personnel, there is a great deal of training to be done. Furthermore, transfers of surface workers to underground work should not be done without the necessary attention being paid to training them in the jobs to be done. As will be seen a little later, the mine may face a major problem in obtaining the necessary number of miners experienced in mechanization to carry through mining operations to financially successful and profitable conclusions. Even if these are obtained there may still be a training problem involved. If experienced miners cannot be recruited, the problem becomes even more acute.

The number of people required to staff the mine adequately and efficiently may raise a problem of the first magnitude. Reference has already been made to the serious withdrawal of employees from the State Mine. The reasons for this withdrawal may be summarised as being :-

(i.) Uncertainty regarding the future of the mine.

(ii.) The gas outburst.

(iii.) The low morale factor operating at the mine and in the area.

(iv.) The availability of employment at the adjoining mine.

It is believed that this Report may pave the way for a declaration by the Minister which may overcome the uncertainty surrounding the future of the mine and it would be our recommendation that such a statement be made, even if it is couched in language leaving little doubt that greater co-operation by the men is an essential for continuance. Uncertainty can, we think, be relieved in this way.

It is, we think, a justifiable conclusion that not as many miners as may have been anticipated, resigned as a result of the gas outburst. That some went because of this cause is beyond doubt. However, acceptance of the views and recommendations contained in this Report should convince most miners that a very determined effort is being made to minimise the chances of any disastrous result of any recurrence of a similar nature. We think this may keep future resignations from this cause at a minimum.

The low-morale factor must show a definite improvement before any real progress can be made in getting the numbers required. It was inevitable that much unfavourable publicity has centred round the State Mine at Collinsville, and new people will be hesitant about coming. Nothing succeeds like success, however, and reports of improvements in employer-employee relationships (and in financial results) will undoubtedly promote confidence and have a generally beneficial effect.

The availability of employment at the adjoining mine may prove to have its beneficial aspect. Just as employees found it easy to move to the Bowen Consolidated Mine, so there may be a return to the State Mine by quite a number of these people, when conditions become stabilised and confidence is re-established. Nevertheless, at least once these natural transfers have been effected, it may be a wise procedure to establish a rapprochement with Bowen Consolidated for mutual purposes and indeed the inauguration of any necessary employment policy which may lend itself to a joint approach.

We admit that we find it hard to adopt any optimistic viewpoint in favour of the opinion that the employment angle will be overcome, were it not for-

(i.) The surplus of surface labour ;

(ii.) The definite indication of unemployment at least in the New South Wales mines.

This latter, in particular, may establish clearly that men who do not want to leave the industry (and who are experienced miners) may well be prevailed upon to come to Collinsville. They may, of course, bring with them a measure of experience that may act as a leavening factor amongst the present employees.

The various problems which centre round the present labour force at Collinsville will require firm, careful, just, and able handling. With such, the frustration, opposition and studied carelessness of the past may be shown as being capable of being turned into co-operation and a positive and helpful attitude.

(d) MANAGEMENT.

In view of the difficulties of the past and their legacy effect upon the future, it should be recognised at the outset that Management's task is likely to be a very difficult one, and it is therefore necessary to buttress and support Management in the most effectual ways and to a maximum degree. The best ways of doing this appear to be-

(i.) Make it possible for Management itself to receive a maximum degree of training. This should involve periodical visits to other mines, particularly those which have a record of efficiency and have somewhat comparable conditions. As with men the training of management should be a continuing function.

(ii.) Give to Management the maximum help from Overmen by creating the facilities and granting the finance to pay adequate salaries that will attract good people and inspire present Overmen to protect their own jobs by first-class service.

(iii.) Insisting upon Management setting up controls that-

(aa) Set the path, plans and budgets for profitable operation ;

(ab) Show immediately when plans and budgets are being seriously departed from ;

(ac) Thoroughly understand the profitability of varying courses of action and of varying production outputs.

(iv.) Make available to Management the best of advice so that new proposals and courses of action can be the subject of expert assessment and assistance.

One of the fundamental necessities is that Management become profit conscious and it should be given all necessary support in taking any reasonable measures designed towards successful operation of the mine The lifting of morale amongst the men will be a major task. The consistent awareness of the necessity for finding ways and means to reduce expenses is a Management " must."

These things are not easy and we suggest that the Mine Management would be greatly strengthened if the form and control of the mine were changed. At present the Manager is responsible to the Mines Department. If a General Manager is appointed the line of authority will no doubt be, The Minister, the Under Secretary of the Mines Department, the General Manager, the Manager.

We believe that the position could be further strengthened by altering the relationship between Management and the Department of Mines but this is dealt with under Term IV.

It must be realised that modernisation of coal mining entails much more than the application of machines to work that was formerly done by manual methods. Mechanization creates new problems and we do not hesitate to say that by far the most important of these new factors arising out of mechanization is that of organising and maintaining management and supervision personnel capable of utilising the machinery available, and developing, by creative skill, the necessary new methods and techniques.

So much emphasis is sometimes placed on the importance of the type of machinery that other factors are sometimes neglected and, in many cases, so little attention is given to the human equation and so little is heard of it, that we are inclined to wonder if that problem is really being recognised.

It must be appreciated that for a project to be successful, Management has to concern itself with people as well as machines if the operation is to be entirely successful.

Mechanization has greatly increased the amount of supervision required. Under the old method of contract mining, the miner was largely his own boss and the direct rate incentive tended to produce initiative in him. One of the effects of mechanization is to greatly emphasise the effect of adverse natural conditions on mining costs.

Efficiency is more easily obtained where a definite working routine can be established, but when new problems are constantly arising from adverse or varying natural conditions success could depend entirely upon effective leadership. It follows, therefore, that the Overman, or any underground official, must possess capabilities and qualities superior to what was generally found amongst men in positions of similar responsibility under the older mining methods. Underground officials must be selected from the employees and they should have every opportunity of being trained for their new jobs under mechanization, as without training they would not develop the qualifications which are required in a modern mine.

Management should impress on Overmen a proper sense of responsibility and dignity and they should be made to feel that they are definitely part of Management. It must be realised that successful operation depends on effective supervision, and management must be skilful in the field of human relations for unless the management group work together, they cannot function efficiently.

Notwithstanding the greater efficiency of modern mining machinery, the ultimate success of mechanical coal mining operation depends on the ability and effort of the human element employed throughout the mine. The more extensive the investment in mining machinery and the fewer men required to operate this machinery, the greater is the need for high individual efficiency, and sincerity, in each employee, and the greater is the call for able and industrious supervision. A good type of management is that which puts properly designed, well maintained machinery into the hands of capable, honest employees, following a well-planned mining system, and furnished with ample supplies and ample power. The management that guarantees such a mining situation day after day, year in and year out, could be an asset not only to the owners of any particular mine, but to the coal mining industry as a whole.

Term II D (8).

Threat of Oil.

In considering whether it is in the public interest for the mine to continue, we think it necessary to make some reference, brief though it need only be, to the possibility of the threat of oil competition. If a cheaper fuel was to become available in North Queensland, some of the conclusions already arrived at may well be nullified.

We felt it advisable to obtain Mr. McCarthy's opinion in this regard and we felt that his answers were realistic and somewhat reassuring.

In Mr. McCarthy's view, any threat from oil as a competitive fuel would not be encountered in the near future and in the main the continuance of the mine could therefore be justified even if, from a longer term viewpoint, competition may arise from oil.

We believe we are justified, therefore, in accepting Mr. McCarthy's viewpoint and of believing that oil competition can be excluded from any serious consideration, at least from the shorter term viewpoint, as to whether it is in the public interest that the mine be continued.

Term II D.

Conclusions.

Our Conclusions therefore are :-

1. Any approach to the question of whether mechanized mining should be discontinued can logically commence with acceptance of the validity of the original thinking in favour of mechanization and acknowledgment that the installation is a first-class piece of work.

2. The biggest single advance towards successful operation under mechanization would come from an easing of the grades and this would be helped and supplemented by a strengthening of the equipment. This still leaves plenty of scope for a great improvement in attitude and work effort on the part of the Union and the employees and the display of greater initiative and more dynamic leadership on the part of Management.

3. Having these matters particularly in mind, three schemes have been outlined in the belief that each offers opportunity for higher production and profitable operation of the mine. The first requires virtually no capital expenditure, should give 900 tons per day and at that figure an acceptable profit. The second scheme envisaging a combination of No. 1 and No. 2 Tunnels should mean considerable easing of the grades and should give a daily production of 1,125 tons with enhanced profits. The second and third schemes would embrace the use of shuttle cars and would secure production of 1,125 and possibly 1,350 tons per day. The profits at such a production figure would be very considerable and make a valuable contribution to the liquidation of past losses but would mean a progressive capital expenditure over a two-year period of up to £150,000.

4. Any future working of the mine should embrace the adoption of a panel system of working, to allow of efficient sealing off in the event of spontaneous combustion.

5. Continuance of mechanized mining should include proper face preparation, a sound scheme of planned and preventive maintenance, and an enlightened approach to adequate training at all levels.

6. Consistent with the foregoing, the mine should continue as a mechanized unit. We believe it is capable of and should produce acceptable profits which in time should help to recoup the losses of the last few years.

TERM III.

WHETHER, REGARD BEING HAD FOR THE SAFETY, HEALTH AND PROTECTION OF THE MINERS, THE USE OF THE SAID MINE SHOULD BE DISCONTINUED.

We propose to deal with this Term under two headings :-

A. Is the safety, health, or protection of the miners likely to be imperilled or endangered in the near future by any unsafe condition, practice, custom or usage ; want of care negligence ; lack of qualification or incompetence of the staff ; dust ; insufficient or tainted ventilation ; leakage of air ; insufficient means of egress ; inadequate rescue arrangements ; bad roof ; or any factor of a like nature to any of these ?

B. Is the safety, health, and protection of the miners likely to be imperilled or endangered in the future by the nature, quality, or condition of the seam or seams of coal, the mine containing, as it now has been undoubtedly proved as regards the Bowen Seam, at least one lethal gas ?

In other words, is the mine inherently unsafe ?

A. Unsafe Practices, &c.

(1) Incompetency and lack of qualifications of the Staff.
(2) (a) Inadequate ventilation.
(b) Ventilation—Black Damp.
(c) Conclusions.
(3) Negligence and want of care.
(4) (a) Coal Dust.
(b) Conclusions.
(5) Means of Egress.
(6) (a) Shot-firing practices.
(b) Conclusions.
(7) Method of work.
(8) Transport of Men.
(9) Supervision.
(10) (a) Rescue arrangements, training and equipment.
(b) Conclusions.
(11) Roof Troubles.
(12) Miscellaneous.
Finding.

B. Is the mine inherently unsafe due to the possibility of further outbursts of CO, or by reason of any other inherent Danger ?

(1) Possibility of future outbursts of 00_2—Opinions of overseas experts.
(2) Outbursts at Metropolitan Colliery, Helensburg, New South Wales.
(3) Collinsville State Mine
Recent report by Mr. Cundith.
(4) Conclusions and Recommendations.
(5) General.
Finding.

Term III A.

Unsafe Practices, &c.

We could speedily dispose of this aspect of the term by saying that, if all or any of these conditions exist (and many of those suggested do not), they are only of a temporary nature or of such a nature that remedial measures can, and indeed should be, taken, or they are the ordinary hazards of coal mining.

However, we are of opinion that in view of certain of the allegations made, we should deal, to some extent, with them.

Term UT A (1).

Incompetence and Lack of, Qualifications of the Staff.

It has been suggested that Overman Allan was incompetent in the discharge of his duties ; that he did not have sufficient experience of the coal face ; that his test for his Deputy's certificate was inadequate ; that his knowledge of ventilation was inadequate ; and that he was wrong in allowing small pockets of gas to be wafted or hosed out.

Further, it was suggested that there was insufficient check on the Deputies and that the Overman should carry a safety lamp.

It was also urged that the rescue training was quite inadequate.

From the safety, health, and protection angle, we have no hesitation in coming to the conclusion that there is nothing in the allegations against Allan. We are quite satisfied that Allan was competent in the discharge of his duties of Overman in charge of a shift ; that he had ample experience at the coal face ; that his test for his Deputy's certificate was adequate ; that his knowledge of ventilation was adequate ; that any wafting or hosing out of Black Damp did not in any way imperil or endanger the miners ; and that his training of the men in rescue operations so far as it went does not deserve blame, but merits commendation.

As to the suggestion about Overmen carrying a safety lamp, it appears that such had been the practice until the Deputies had complained of it, when such practice ceased. It appears that the objection came at the instance of the Union (the Queensland Colliery Employees' Union, of which the Deputies are members).

We are of the opinion that the Overmen should always carry a safety lamp when on duty.

We deal elsewhere with the checking of the Deputies.

As to the qualifications of the Overmen, we have already referred to the matter elsewhere and *repeat that the position as to their qualifications and status should be clarified.*

What we have said in relation to Allan concerning his competence and the discharge of his duties as an Overman, looking at the matter from the angle of the safety, health, and protection of the miners, applies equally to the other Overmen.

The Overmen's supervision and control of the men and the arrangement of the work are outside the question now being dealt with and different considerations apply.

Term III A (2) (a).

Inadequate Ventilation.

It was strongly urged that the ventilation of the mine, particularly at the Dip face, was inadequate both before and at the time of the disaster.

The advocate for the Union suggested that some of the men may not have died if the ventilation had been better.

In our view this is not so. We think the ventilation was adequate and, indeed, it is quite possible that if the ventilation had been stronger, one or more of the other men on the return airway may have lost their lives.

Allan naturally did not know the actual quantity of air entering the Dip bord on the night of the disaster, but said that it was adequate when he went to the face. He further said that the ventilation was about the same as it had been on the preceding night and it was sufficient then.

On 13th October, his Deputy checked the water gauge on the fan. No breakdown in the fan motor was reported to him and if there had been a breakdown on the fan during the day it would have been reported to him coming on shift. While on shift, Allan did not feel any alteration in the ventilating circuit of air by reason of the stopping or speeding up of the fan, or otherwise.

If there had been an appreciable lessening in the amount of air the fan was delivering, the effect would be eventually felt down below and the men would have been withdrawn, If there were a breakdown in the power house or boiler room resulting in a reduction of 50 per cent, of steam operating the fan, such would have been reported underground.

Mr. Stansbury gave evidence that *the induced draft fan was broken down during the day shift of the day of the disaster but the boilers were at full pressure between 4 and 5 p.m.* The pressure had fallen from 150 to 90, but that does not necessarily mean that the speed of the motors would fall. It was not reported to him that the speed did fall.

It was put to Allan by Mr. Barrett that there was a *breakdown of the fan motor on the night of the disaster,* but not only did Allan say it was not reported to him, but Mr. MacLennan, the engineer in charge, who was not hostile to the Union and who gave lengthy evidence, made no reference to it, nor was he even asked by Mr. Barrett any question on the matter.

The making of an unfounded allegation of this nature puts into bold relief some other suggestions that were made by the Union representatives. Inflammatory and false statements were published in the Union paper " The Common Cause," shortly after the disaster, and during the course of the Inquiry a number of groundless suggestions were made. Graft was mentioned at one stage, in our view quite unjustifiably and absolutely without proper foundation.

The Deputies' reports of 12th and 13th October, show the water gauge on the fan as-

12th October	6 a.m.	5 ins.
12th October	7.30 a.m.	5 ins.
12th October	7.45 a.m.	5 ins.
12th October	3.45 p.m.	5 ins.
13th October	6 a.m.	5 ins.
13th October	7.45 a.m.	5 ins.
13th October	3.45 p.m.	5 ins.

Clause 1, Schedule 2, of " *The Coal Mining Acts,* 1925 *to* 1953," provides—

> "An adequate amount of ventilation shall be constantly produced in every coal mine to dilute and render harmless inflammable and noxious gases to such an extent that all the shafts, roads, levels, stables, and working places of the coal mine, and the travelling roads to and from those working places, shall be in a fit state for working and passing herein.
>
> Such ventilation shall be the supply of pure air in quantity not less than the amount hereinafter prescribed for each man, boy, and horse employed in the mine, which air (in that proportion, but with as much more as the inspector directs) shall sweep along the airways and be forced as far as the face of and into each and every working place where man, boy, or horse is engaged or passing, main return airways only excepted. In no case shall less than 150 cu. ft. of air per minute be provided for each man or boy and 600 cu. ft. of air per minute be provided for each horse while employed underground."

Mr. Victor Reginald Cundith, Senior Government Analyist, tested the air supply on 27th October, 1954, and found that the supply on the intake, inside the brattice near the working party at the Dip, was 10,000 cu. ft. per minute ; on the return at the Dip, 10,000 cu. ft. per minute ; and on the return between B.10 and B.9 cut through, 52,800 cu. ft. per minute. Again, on 28th October, 1954, an air reading in the intake showed 10,000 cu. ft. per minute.

The blast of the outburst tore down some of the brattice near the Dip face and during attempted rescue operations on the night of the disaster some brattice was turn down and replaced.

The brattice had been, as we understand it, repaired or reinforced before Cundith's test. There is no evidence that such alteration had been made in the condition of the brattice as had existed at the time of the disaster, as to warrant our discarding the value of his tests.

L. Rogers, of the surveying staff, had, on 15th October, 1954, made a test and found, on the intake, 64,230 cu. ft. per minute entering the Dip section at A.1, and 59,960 cu. ft. per minute leaving it at B.3.

It is perfectly true that a great proportion of this intake air did not get to the Dip face, having leaked through the brattice and brattice doors between the entry of the Section and the Dip face, into the return, but we are satisfied that on the night of the disaster an adequate supply was reaching the Dip face and that such supply far exceeded the specified minimum amount required under the Act.

There were 43 men and two horses underground that night.

In the absence of any direction of the Inspector under Clause 1 of Schedule 2 of the Acts as to increased ventilation, the statutory minimum was 7,650 cu. ft. per minute for all.

There were only four men at the Dip face. Some of the men were outside the Section altogether, viz. three drivehead men and the winch driver. Others working, say at A.8, were no doubt getting much more ventilation than those at the Dip face.

We cannot assess how much of the 64,230 cu. ft. per minute entering the Section ventilated the men on the A. side, nor how much of the air which escaped was added to the air which went right to the Dip face and back on the return, and so ventilated any particular men on the B. side.

It is interesting to note that Mr. Davies, a miners' check inspector, was at the scene of the disaster on 12th October, the day preceding the outburst, and as far as we know, made no complaint as to the ventilation.

Coupled with the suggestion of inadequate ventilation and really forming part of that allegation, is a claim that the main heading was driven too far in relation to the workings of the bords or levels and that, in consequence, the intake cut-throughs were not sufficiently advanced, resulting in an excessive length of brattice being required to bring air to the Dip face.

The evidence shows that they were getting on with the Dip at this particular time to make room for another belt extension. In fact, the cutting or grunching on the night of the disaster was to be the last operation of that nature before such extension.

Another factor in the prolonged Dip extension was the intention to drive the cut-throughs up instead of down, because of the nature of the grades.

It would appear that the main heading was driven a little further on this occasion in relation to the levels and cut-throughs than would normally be done and that the practice was not good, but this fact does not alter our view that adequate ventilation was reaching the Dip face.

At the time of the disaster the brattice was carried to about 6 ft. from the face.

The installation of a booster fan on the intake was decried and such installation was used as an argument to support the suggestion of faulty ventilation. It was moved forward from time to time and in our opinion was most useful in making the conditions more pleasant at the working face for the men and was most useful in assisting to dispel any noxious gases which may otherwise have accumulated.

The clearing of what must have been a great amount of Black Damp on the dog watch of 8th October (extending as it did nearly up to A.12), by the ordinary system of ventilation, in an hour and a quarter, speaks volumes, we think, of the ventilation and its efficiency in the Dip.

There is evidence that booster fans have been used in the mine for many years, and in our view the particular fan on the night of the disaster was doing an effective and useful job.

Again, it was suggested that loose coal behind the brattice, some 2 to 3 ft. high, from fretting of the ribs, which was not cleaned up between A.11 and A.13, impeded the ventilation. It would certainly restrict the airway a little in space, but in our view such restriction was of no material consequence.

It is abundantly clear to us that the volume of gas released at the outburst and the pressure under which it was released were such that no system of ventilation would have obviated the disastrous consequences, including the death of the seven men. As we have said, additional air may very well have enlarged the fatal consequences by carrying the lethal gas in more powerful concentration up the B. side.

It was further urged that the main intake was impeded by machinery, the haulage way, the belt, sometimes skips and sometimes timber ; and that the second intake was incomplete, unsatisfactory, dangerous and tortuous, and that is passed old workings with a likelihood of picking up noxious gases.

It is sufficient for our purpose to say that however true these assertions may be, the result is still the same—adequate clean air was reaching the working places.

The evidence of Deputy V. Davis shows that work was going on at the material time, under the supervision of Deputy Lambert, in the second intake, stopping off old workings.

Although we have come to the conclusion that, on the night of the disaster, adequate air was reaching the Dip face, this by no means finishes the matter.

Without doubt ventilation is a very important consideration and should receive attention at all times, particularly in view of the fact, which has been clearly proved, that by its nature the coal is giving off quantities of CO_2, and Black Damp is very prevalent, as indicated in the Deputies' reports.

There is also the feature of the comfort of the men.

Extracts from the Deputies' reports from 4th January, 1954, to 13th October, 1954, show that from time to time the ventilation was fair or poor in the Dip, and that sometimes on the A. and B. side it was not as good as was desirable.

On 12th March, 1954, the Miners' Inspectors complained about the ventilation and, whilst recognising that climatic conditions had a bearing on the comfort conditions in the mine, they attributed the trouble largely to the intake airway, so that two-thirds readings were recorded, i.e., that conditions as to temperatures were such that the men were required to work only two-thirds of the eight-hours' shift for eight hours' pay.

They complained that the air was travelling through old workings and as a result there was an increase in temperature in the intake air.

They suggested more attention to the brattice.

Government Inspector Henderson visited the mine on 12th May, 1954, and also stated that the ventilation was only fair but was of opinion that, when B.3 bord was holed through, improvement could be expected.

On 29th June, 1954, when the Miners' Inspectors, i.e., Mr. Conway and Mr. Currie, again reported they stated that the ventilation was fairly good.

From the first complaint abovementioned, it would appear that the secondary intake was not satisfactory but apparently its condition was improved and work was proceeding on it at the time of the disaster.

In addition to the readings of Mr. Cundith already mentioned, Mr. Rogers and Mr. S. Bulloch took readings towards the end of December, 1954.

Briefly, these readings show :-

On 20th December, 1954-

52,592 cu. ft. per minute entering the machine section, with neither blower fan operating ;

50,160 cu. ft. per minute in the return end of the section, B.3 and B.4-neither fan operating ;

8,568 cu. ft. per minute ; 8,624 cu. ft. per minute ;

8,456 cu. ft. per minute ; and 8,400 cu. ft. per minute, in the intake at the Dip, 15 ft. outbye the end of the brattice, with neither blower fan operating ;

6,365 cu. ft. per minute at the commencement of the Dip return at the top end of the angle brattice-neither blower fan operating.

On 21st December, 1954-

In the section intake, 53,048 cu. ft. per minute ; and on the return end of the section, 54,480 cu. ft. per minute, with neither fan operating ; 8,568 cu. ft. per minute, 8,400 cu. ft. per minute, and 8,568 cu. ft. per minute in the intake, 15 ft. outbye the end of the brattice, with neither fan operating ; 6,912 cu. ft. per minute at the beginning of the return at the Dip at the top end of the angle brattice, with neither fan operating.

On 29th December, 1954-

At the section intake, from 48,944 cu. ft. per minute to 58,216 cu. ft. per minute, with both fans operating, and with variances according as to whether some of the brattice doors were open or closed.

In the section return at B.3 and B.4, 51,600 cu. ft. per minute with both fans operating ; 10,920 cu. ft. per minute at the Dip intake 15 ft. outbye the end of the brattice, with both fans operating ; 9,072 cu. ft. per minute with only the bottom fan operating ; 7,616 cu. ft. per minute with neither fan operating,; and 10,584 cu. ft. per minute with both fans operating ; and again, 9,128 cu. ft. per minute with only one fan operating and 7,728 cu. ft. per minute with neither fan operating.

Lastly, 6,569 cu. ft. per minute at the beginning of the Dip return at the top end of the angle brattice, with only one bottom blower fan operating.

These various readings confirm our opinion that there was adequate ventilation in the section under normal conditions but that the operation of the blower fans assisted materially in increasing ventilation in the main Dip.

To conclude our figures with regard to ventilation : When an inspection was made on 30th January, 1955, preparatory to undertaking the work of cleaning out the Dip after the disaster, the air readings showed in the intake airway 71,740 cu. ft. per minute, and at the sectional intake at the air station below the old supply road approximately 65,000 cu. ft. per minute. Air readings between A.11 and A.12, with one blower operating in the Dip, 47,250 cu. ft. per minute and, with the blower stopped, 47,625 cu. ft. per minute.

Between A.12 and A.13, with blower going in the Dip, 33,930 cu. ft. per minute, and without blower, readings of 36,000 cu. ft. per minute and 34,380 cu. ft. per minute.

In the Dip at the end of the brattice near the fall, without the blower fan, there was a reading of 20,160 cu. ft. per minute and, with the blower, 28,665 cu. ft. per minute.

It will be noted that much more air was being sent to the face of the Dip before the cleaning operations began than was the case at the time of the disaster.

Overman Allan gave evidence that, after complaints had been made by the Inspectors about the ventilation, additional air, over and above that which was required, was provided. This is supported by the written report of the Inspectors.

On the question of the brattice, *Overman Morgan* gave evidence that the practice was, as the work proceeded, to strip the brattice which was not required and take it further down so that the stage was reached where there were four thicknesses of brattice in places. On the night of the disaster, he stated that there were two thicknesses of brattice between A.12 and A.13 and one thickness from A.13 down to the Dip. He further stated that the brattice was not as good as pre-war material.

Mr. Lightfoot stated that the intention was, and plans were made, to have two intakes and two or more returns. He proposed that the surplus employees after mechanization commenced would be employed for such purpose. At the commencement of mechanization, there was one intake and two returns. The intake air travelling against the belt caused excessive dust to be raised along the belt heading. This was discussed with Union officials and permission was given by the Mines Department to use one of the existing return airways as a second intake. The second intake was brought into operation about six or seven weeks after commencement of mechanization. The object was to reduce the air velocity going down the main heading This second intake in fact went through several small areas of old workings which were too dangerous for the men themselves to travel, but these old workings were sealed off by about August and from that date on, both intakes were regarded as being safe to travel.

It was intended to use the second intake at some future time as a road to the surface.

Mr. Winstanley gave evidence as to the capacity of the fan to produce 83,000 cu. ft. per minute with a water gauge of 5 ins.

He stated that there were 64,230 cu. ft. per minute entering the machine section and the ventilation at the Dip face itself was assisted by a portable blower fan. The quantity of air circulating in the main dip was over 10,000 cu. ft. per minute.

The B. side working places were ventilated by the intake airway on the larger section, assisted by a portable blower fan.

Mr. Winstanley gave very relevant evidence that, in an investigation made in America some years ago of the ventilating systems of 16 mines in the mid-western coalfields, only 8 per cent. to 34 per cent.—or an average of 18.6 per cent.—of the volume of air leaving the fan reached the working places, owing to leakage of doors and stoppings.

Mr. Winstanley gave figures that, in the machine section with an intake of 64,230 cu. ft. per minute, the average per man on the day shift was 909 cu. ft. per minute ; on the afternoon shift, 1,783 cu. ft. per minute ; and on the night shift, 1,750 cu. ft. per minute.

Mr. Platt stated in his opinion the ventilation at the Dip heading was for all normal purposes quite adequate. He further stated that, if the cut-throughs had been put in between A.11 and A.12, and B.11 and B.10, the ventilation at the Dip would have been improved, but, whilst it would have made working conditions more pleasant, it would not in the ordinary course of mining activities have been a necessity before the outburst.

Mr. Platt referred to the important consideration—i.e., *that ventilation arrangements are made for the purpose of ordinary mining operations and not in anticipation of an outburst such as happened,* but he made the point that now, in view of the disaster, the requirements of ventilation is very much greater than would have been necessary prior thereto.

Mr. Platt said that there is a possibility of Methane coming from the seam and that before-shift inspections are made by a Deputy with an oil-burning lamp and also an electric lamp. An inspection of that nature is also made during the shift. He stated that, with such inspections and a six-monthly examination of the return air, such precautions are a definite protection against explosions of Methane.

The advocate for the Union urged upon us that a quicker and better return out of the mine was necessary in case of explosions or fires.

This may be given consideration by the Management, but we consider that the present airways will have to be used until such time as the No. 2 Tunnel roads can be brought into use.

Term III A (2) (b).

Ventilation—Black Damp.

Allied to the subject of ventilation is the subject of the accumulation of Black Damp, and this is a matter which must be considered apart altogether from the question of the likelihood of another outburst of 00_2.

There is overwhelming evidence of the continuous emission of CO_2 which must be dealt with by ventilation to prevent accumulation of Black Damp in the working places which might imperil the safety or health of the miners.

It is clear to us that Black Damp accumulates very quickly at times, and, although a Deputy may have examined a place and found no Black Damp, yet under certain circumstances Black Damp may come in rapidly after such inspection.

The answer to this is to have the greatest possible ventilation in such places and continual vigilance by the Deputies.

If these recommendations are carried out, we cannot see that Black Damp will, as such, be a hazard to the miners.

The posting up of a copy of the Deputy's report at the end of each shift is a very desirable practice and should be strictly adhered to.

Mr. Lightfoot stated that immediately after he arrived at Collinsville he noticed something effervescing through a pool of water in the mine. He was told by the Manager that it was quite usual and that anywhere in virgin country where water accumulated there was some gaseous matter of some description in the water, which matter was too microscopic to be analysed or detected by ordinary methods, and that it was customary for the seam to emanate this gaseous matter.

Mr. Lightfoot, on further inspections of the mine, discovered that this was so and found in one place in No. 2 Tunnel an area which had been bubbling for some 17 years.

He stated that it was unique in his experience and that there had been frequent tests by ordinary methods and never at any time had anything been detected which was regarded as troublesome or unhealthy or unpleasant. He further stated that this gaseous matter (which no doubt was CO, and became the constituent of Black Damp when it came in contact with the surrounding atmosphere) came from places in which there was no fault in any close proximity.

We have referred under Term I to the miners' knowledge of the prevalence of Black Damp in both tunnels, particularly in the dip workings.

Overman Morgan and the Manager, *Mr. Winstanley,* were of opinion that the gas which brought about the Black Damp emanated from the Blake Seam.

It is interesting to note that the new bore, N.S. 1, put down at the suggestion of the Commission in October 1955 (which has proved the Bowen Seam to the South at a depth of 922 ft.) has revealed in the core of the seam the presence of CO,.

This bore is at a considerable distance from any known fault or disturbance of the seam.

Term III A (2) (c).

Conclusions.

Generally with regard to ventilation, we are of opinion that with the existing arrangements and in normal conditions, ventilation was adequate, although we believe that it was undesirable to bring part of the ventilation through old workings. We have been informed that these old workings have now been sealed off.

The second intake should be completed at the point in 3 West as shown on *Annexure No.* 35. Annexure No. 35.
It should be completely separate from the other intake and not run into it for some distance as it now does at this place. At present where the two intakes join there is, no doubt, restriction on the total intake.

With a possible continuous emission of CO_2 in the future, and the possibility of further outbursts, more than normal ventilation will be required and, until the area being worked can be joined to No. 2 Tunnel, bottlenecks in the present *return* will require to be eliminated.

In other words, the method of egress, which is the return airway, should be cleaned up ; and the second intake should be cleared up, made safe, and rendered less tortuous if possible, and be separate altogether from the other intake.

It can be accepted that the continuous emission of CO_2 will in all probability result in accumulations of Black Damp in the working places in the Bowen Seam and will continue to be a hazard unless precautions are taken.

Such precautions, we strongly recommend, should be by way of vigilant inspections and the utmost ventilation reasonably possible.

If such precautions are taken, we see no reason to believe that Black Damp will become in future a danger to the miners.

It follows from what we have said that, on the aspect of ventilation generally, nothing has been put before us which would lead us to believe that the safety, health, and protection of the employees are likely to be imperilled or endangered in the future working of the mine.

Term III A (3).

Negligence and Want of Care.

It is suggested that no proper testing for Methane was done and if any such tests were made, such were made at irregular intervals.

Like other suggestions, we regard this one as having no foundation. We have no reason to believe that the Deputies—the safety men—failed to carry out their duties in making the inspections required. In fact, we are satisfied that they went further than the required statutory inspections, particularly when there was any sign of trouble.

Negligence was alleged because no chemical analysis was made as to what caused the bubbling.

In the light of the disaster it may well be regretted now that thorough chemical analyses were not made, but failure to make them at the time does not, in our view, constitute negligence or want of care in any person in the mine.

After all, what is emitted from the coal is CO, which becomes a constituent of Black Damp when mixed with the atmosphere into which it is emitted, so that if Black Damp is traced back to its origin pure CO, would be found.

We are satisfied that no-one ever anticipated an outburst.

It is suggested that someone should have checked on the Deputies to see they carried out their duties. This is a Management function at all times, and we are satisfied that there was no negligence or want of care in these matters.

We are satisfied that the health, safety and protection of the employees will not be imperilled, or endangered, in the future working of the mine by reason of negligence or want of care, reasonable precautions having been taken.

Term **III A (4)** (a).

Coal Dust.

Over recent years, coal miners have continued to raise serious objection to the recurring danger arising from the prevalence and inhalation of coal dust.

Dust, naturally, rises in the course of any process of mining coal and methods have been adopted for its control.

In Collinsville, some criticism has been expressed against the excess use of water, which, it is alleged, played a part in the bogging of the machines.

It can be appreciated that the employees were well aware of the hazards and discomfort arising from coal dust and they applied ample water in all places to deal with such hazard as well as to render conditions more tolerable for themselves. There were misting attachments on the cutters and loaders for the purpose of minimizing dust in cutting and loading operations. The cutter also had a jet on one side.

According to the evidence of *Mr. Stansbury,* the machine operators were instructed to use these attachments, and at times they did and at other times they did not, and on many occasions he stated he had seen them using an open hose.

In Mr. Stansbury's opinion, the use of an open hose was not as effective for dust suppression as a mist spray and left a lot of water lying around the floor.

Mr. Lightfoot was asked about the incidence of pneumoconiosis at Collinsville and he stated there had been a survey conducted by the Health Department just prior to his leaving the colliery, i.e., about July or August, 1954, and he was informed by two of the Union officials that not one man in the colliery showed any symptoms of pneumoconiosis.

The General Manager also stated that he did not agree as an overall statement with the suggestion that mechanization created more airborne dust than hand-mining.

He also stated that operators who desired them were provided with respirators, but in his view they did not prove any safeguard to the wearer in relation to the inhalation of dust. The nuisance created by them offset any advantage. In his opinion only two types of men may have required them, shot-firers who returned quickly after firing a shot and cutters who may be working in very dusty places, and even in these cases the men need use them only for a few minutes at a time.

When questioned as to the dust counts, he stated the only counts that were abnormal were, in the early stages of mechanization, where the belt transfers to the next belt on the main intake airway, and, at a later stage, some counts which were taken immediately after firing in the working places. He pointed out the obvious fact that the counts would have to be averaged, and the fact that there was a reading of from 1,000 to 2,000 in one count would not give the true picture. He stated that a count should be taken every five minutes for an hour to get an average and that some of the dust counts as quoted for Collinsville were isolated readings and others within the permissible time were disregarded. He stated that a standard was suggested of 350 by the Miners' Federation. He further stated that the wish of the Management was to get the counts down as low as possible.

There is no fixed standard for Queensland, and the New South Wales standard is, as we understand, the one adopted, i.e., 700 particles per cubic c.m.

Mr. Lightfoot stated that he promised the Union to conduct experiments in water infusion and that information had been obtained and blueprints of equipment secured at the time he left Collinsville but, in his own opinion, from his own knowledge and experience, he thought that it would be a waste of time and money to adopt water infusion methods because of the nature of the coal—the soft bands in the coal.

The Manager, *Mr. Winstanley,* gave evidence of a requirement by a Mines Inspector to clean loose coal and spillage and that the Inspector gave a direction in the Mines Record Book. On 23rd March, 1954, Inspector Henderson reported that all roads and working places worked by mechanical loading units were found to be in a dirty condition so far as spillage and dust on the floor were concerned and that attention must be given to filling and cleaning all those roads.

On 12th May, 1954, the same Inspector ordered that the cleaning of dust and coal from all roadways had to be carried out and was to commence on 15th May, 1954, and was to be continued until the roadways, so far as dust was concerned complied with the Act.

On 29th June, 1954, miners' check inspectors stated that spillage was still a problem on both the roadways and should be cleaned up in accordance with instructions of the Mines Inspector.

On 14th July, 1954, Inspector Henderson recorded that spillage was still excessive along pan conveyors and ordered that the cleaning of roadways as required by previous reports had to be carried out.

From these extracts, it appears that spillage caused dust trouble along the roads mentioned and there was considerable delay, to say the least, in complying with the inspector's requirements.

Mr. Winstanley, when asked in a specific question, stated that the mine, apart from incidents which may occur in it, was an inherently safe mine and free of dust.

Mr. Platt, Chief Inspector, stated on one occasion that further attention had to be paid to the cleaning of roadways and additional treatment, with limestone or other dust, was required to build up the inert dust content, and he further stated that the roads were not satisfactorily treated to comply with Rule 7 of the Second Schedule of the Act.

Mr. Platt is of the opinion that water infusion was worth a trial at Collinsville.

In August, 1954, Mr. Platt visited the mine and one of his duties was to inspect regarding the dust position. He made an inspection when the shot-firers were at work and found that the shot-firers were in fact returning too quickly to the face. He had with him an analytical chemist to take dust counts.

He reached the conclusion, he stated, that the shot-firers were too quick in returning and that everything depended on the time which elapsed before counts were taken.

Term III A (4) (b).

Conclusions.

In our view, the spillage caused trouble along certain of the roadways for some period at least, but we see no reason to believe that, when the spillage was cleared the dust trouble would not have been over.

The intake airway running against the belt does cause more dust to rise than would ordinarily be the case. With the completion and satisfactory performance of the second intake, we think this position will be alleviated.

Unless the sprays were giving trouble, and there is really no evidence of this, we do not see any reason why the open hose should have been used to lay the dust.

In any event there was, in our view, ample facilities available, either by the sprays or by open hoses, to counter any dust trouble in cutting and loading operations.

The high dust counts reported after shot-firing are typical of any counts obtaining in any mine if taken immediately after shot-firing. The prudent shot-firer will not rush into the places immediately after shots have been fired but will allow the airborne dust to settle or be carried away before he returns to the place.

Mr. Platt seemed inclined to the view, which appears to us not unreasonable, that a " show"' was put on for his benefit, i.e., the counts taken were taken too quickly after firing.

To summarize our conclusions, we are satisfied that coal dust is not a menace at the mine and we see no reason why it should constitute one in the future.

The lack of incidence of pneumoconiosis shows that no miner has been seriously affected by it.

The problem at Collinsville is no different from that at any other mine and, if the Coal Mining Act is adhered to, and it should be complied with, we see no difficulty or danger in this regard.

Ordinary precautions should be taken after shot-firing, and stone dusting done when required.

We are satisfied that reasonable precautions having been taken, the safety, health, and protection of the employees will not be imperilled or endangered in the future working of the mine by reason of coal dust.

Term HI A (5).

Means of Egress.

It was put to us that the return airway and second egress were unsafe, i.e., that, if the main tunnel was obstructed, there was no alternative safe way of leaving the mine. It is sufficient to say that we accept Allan when he says the return airway was safe to travel, and indeed Mr. Flowers has travelled both roads himself and found them safe.

The second intake is, up to the point where it joins the main intake, the second means of egress, but below that point the return airway is the only alternative route. The second intake having been completed as we have recommended elsewhere, i.e., made safe and separate entirely from the main intake, will provide a complete alternative means of egress.

We have, elsewhere, from the ventilation angle, recommended that bottlenecks in the return airway should be eliminated.

We are satisfied that the safety, health, and protection of the employees will not be imperilled or endangered in the future working of the mine by reason of any lack of a safe and effective alternative means of egress.

Term III A (6) (a).

Shot-Firing Practices.

For some time prior to the disaster, simultaneous shot-firing was engaged in. It was the usual practice to fire five or six shots across the face, lifting the bottoms of the cut, then fire another series across the middle and then a further series near the top. Each series was connected to the cable linking up with the battery which was of the plunger type working a magneto.

It was alleged that there was no insulation where the detonator leads were joined, but with competent shot-firers no real hazard was present. It is apparent that, at times, some of the shots missed firing and it was alleged, probably with good reason, that the missed shots were caused by the operation of simultaneous firing in that the detonators did not have the same resistance, so that unless the plunger was forced down properly some of the detonators would explode and others remain unfired.

The missing shots had to be carefully watched during the next operation at the coal face and there was evidence that, at times, unexploded gelignite has been picked up by the loader. Loose detonators have also been found.

Another allegation of dangerous shot-firing methods was that the bottom holes had been bored, charged, and stemmed before the machine cut the face. At one time, apparently, instructions had been issued that the bottom holes were not to be charged before the cut was made but were to be marked by means of plugs. This practice, if ever carried out, became obsolete.

There would appear to have been no trouble in the past due to this practice, and we consider it is a matter for the Mines Department to approve or otherwise of its continuance.

Another practice condemned by the Union representative was the carriage by packhorses of the explosive down the mine and the storage of it in the open on some occasions.

It would appear that there are steel boxes for the purpose of storage kept below, and it is desirable that the explosives should go into them.

There is no evidence that the detonators were not properly cared for by the shot-firers.

It was urged that the charge limit of 28 oz. per hole was exceeded on occasions. It appears to have been done at times in the early stages of mechanization. It is something within the power of the shot-firer himself and as far as the evidence goes it was not a practice in the latter stages.

We have no reason to believe that the practice was ever countenanced by the Management.

It is important to note that there have been no accidents due to explosives in Collinsville since mechanization commenced.

Mr. Lightfoot gave evidence that three shot-firers were selected prior to mechanization and received careful instruction as to the method of shot-firing and were told to acquaint themselves with the provisions of the Act as to their duties.

He stated that he instructed them to keep within the charge limits, i.e., 28 oz., and to increase the number of shots if necessary. Particularly heavy shots were necessary in the bottoms.

Mr. Lightfoot said that the machine crew were required to bore the bottom holes (apparently mark them), cut the face and scrape the slack away with the cutter blade so that, when the shot-firers came in, the bottom holes would be marked to facilitate the finding of the holes.

He stated that, in his opinion, it took from 10 to 14 holes to shoot out a place, full seam. Some four or five weeks after commencement, he heard that a place was being shot out in seven holes and came to the conclusion that more than the charge limit was being used. The Manager, through the officials, took the matter up with the employees, and drew their attention to the fact that there was an economic ratio between number of holes and powder used in any one place, and a stage was reached where powder was wasted by not boring sufficient holes.

Subsequently, the number of holes was increased to from 10 to 14 per place.

Mr. Lightfoot was aware, during the latter part of his period with the mine, of the practice of boring and charging before the cut. In his view, there was nothing to prevent it from a shot-firer's point of view, as it was probably the easiest and most sensible way of doing the job and he stated that he was aware of no danger that could be created thereby, in the manner in which it was done at Collinsville.

Dealing with the suggested menace in the carriage and storage of explosives, he stated that the men objected to taking the explosives down under mechanization, although as contract miners, they had each carried down a can of explosives every day. The result of the objection of the miners to carrying down the explosives during mechanization was that, when shot-firers went to get explosives, there would not be any there because some men had not been told specifically to get a can of explosives, and had gone down without them.

The upshot of this trouble was that permission to store bulk explosives underground under certain conditions was given by the Chief Inspector, The explosives were taken down by horse and pack saddle and distributed underground into magazines of which there were a number provided in the mine, each with a capacity of 100 or 200 lb.

The type of explosive used was such that it could be handled freely and in fact contract miners deal with it quite casually.

Mr. Lightfoot made the point that simultaneous shot-firing obviated a number of trips which would be necessary by the shot-firer going to the face to fire shots individually. It also obviated repetition of examinations and possibly repetition of watering and there was less dust raised than if the shots were fired singly

As to the type of exploder used, he stated the Union suggested that an improved type of exploder should be obtained, and he investigated the suggestion and discovered that the proposed exploder was not regarded as successful. It had not been perfected and was in an experimental stage.

Allied to the suggested bad shot-firing practices was a suggestion that, at certain times, tops were left overhanging in such a condition which may have been a danger to the men.

Mr. Lightfoot attributed this to shallow holes being bored in the top. (This, of course, means that the difficulty in this connection can be overcome by boring the holes to a proper depth.)

Mr. Lightfoot further stated if any loose coal is left overhanging in the top, a good cutting crew manipulates the cutting blade in such a way as to scrape the face and clean it, which job can be done in a fraction of the time and much more efficiently than by men with picks or other implements.

As to overcharging the holes, he stated that, after the Union check inspectors had reported that such was taking place, he gave instructions that no shot hole should be charged over the maximum amount.

As to the type of battery used, the Manager, Mr. Winstanley, stated that it was approved by the Chief Inspector as suitable for operations in non-gassy mines and he himself was satisfied on that point.

Mr. Winstanley stated the number of misfired shots was practically nothing.

He agreed that grouping the detonators into definite resistance categories would be beneficial and that he further believes that the Mines Department would take some steps to improve methods of shot-firing when simultaneous shot-firing was practised.

On 12th March, 1954, the Union check inspectors reported in the Mines Record Book, (Exhibit 9), on the practice of charging holes in excess of 28 ozs. and went on to say that simultaneous shot-firing was being carried out in a manner which had never received the approval of the Chief Inspector or the Union and that the Union would only countenance it if carried out according to the latest development regarding delayed action detonators and by means of proper multiple shot exploders.

So much for the evidence in connection with shot-firing practices.

Within the past few years, a new technique involving the firing of charges at very small delay intervals has been developed. A great deal of blasting in quarries and on excavation projects, where simultaneous firing of charges was practised, is now being carried out by such methods.

The method enables shots to assist one another in that in rotation firing each shot establishes a free or semi-free face for the following shot.

We believe that there are numerous advantages in this method of firing and, although the application of it to the coal-mining industry has been smaller than in other forms of mining, sufficient work has been carried out in this country and overseas to indicate its economic and safety potential.

The time of delay between consecutive shots is about 25 milli (.000025) seconds in the lower range and multiple shots can be fired within a fraction of a second on the one application of the firing current.

It is claimed that there is a reduction in noise ; a marked reduction in concussion ; minimized vibration with consequent reduction in roof damage ; appreciable reduction in fumes and airborne dust ; better preparation of coal for loading, due to improved fragmentation ; saving in explosives consumed ; reduction in time lost in waiting for fumes and dust to clear, and when applied in grunching a full face, elimination of the necessity for handling heavy coal-cutting equipment on steep grades.

On the question of simultaneous shot-firing as distinct from milli-second delay shooting, we have tested the resistance value of the type of detonators which were in use in the colliery and find differences in resistance ranging from 1.1 ohms to 1.9 ohms in 100 detonators.

In a large colliery in New South Wales, where simultaneous shot-firing is practised, it is a custom to test a large number of detonators and issue only detonators of the same resistance each day, e.g., a shot-firer may use detonators with 1.1 ohms resistance one day and next day have a complete set of detonators of F9 ohms resistance.

Term III A (6) (b).

Conclusions.

We have under Term II D made certain recommendations as to the future operation of the mine and the method of shot-firing.

As to simultaneous shot-firing, we think that the detonators should be all grouped as to resistance and only those of the same resistance be used in the same operation. We are satisfied that there is no reason why simultaneous shot-firing should not be continued.

We are also of the opinion that delay action detonators should be used in those places where we recommend grunching in place of coal cutting.

In our view, there is no greater danger of ignition of dust or gas when a number of shots are fired than when a single shot is fired and that, where the conditions permit of shot-firing at all, the joint blast does not imperil the roof or sides in the mine any more than when one shot is fired.

Any irregularities in shot-firing practices or the handling of explosives are matters to be dealt with by the Management and the Mines Department.

We recommend that shot-firers should be the holder of at least a Deputy's certificate.

It should be noted that the Queensland Coal Mining Act, Clause 69, Schedule 2, allows the simultaneous shot-firing under certain conditions. It may be that this rule will require some amendment if the scheme we have outlined and recommended elsewhere in the Report of milli-second delay shooting is adopted in those places where we recommend grunching in place of coal cutting.

On the whole, we are satisfied that reasonable care being taken and the statutory provisions being observed the safety, health, and protection of the employees will not be imperilled or endangered in the future working of the mine by reasons of shot-firing practices or the method of carriage, storage or handling of explosives.

Term III A (7).

Method of Work.

The bord and pillar system of mining as adopted at Collinsville is almost exclusively adopted in New South Wales and the United States. It is the accepted system for comparatively thick seams.

There is, however, one matter to which we desire to draw attention.

Considerable trouble will be caused if there is spontaneous combustion or fire in the mine, and we think that the system at present adopted should be altered to embody a system of panel working to allow of effective sealing off in the event of spontaneous combustion of fire.

Term III A (8).

Transport of Men.

There is no doubt that lack of foresight in the past in the development of collieries in omitting to make provision in them for the ultimate installation of an efficient transport system for men underground has been a disadvantage and Collinsville is no exception to this rule. Although the Dip face is about a mile from the surface, there is really no adequate provision for transport of the employees. This factor will have to be taken into consideration in the future, although it will be difficult until the straight roads in No. 2 Tunnel can be used for this purpose.

Apart altogether from the loss of time involved in actual working operations, there is the factor of fatigue of the employees, and that is the reason why we have mentioned it under this term.

Term III A (9).

Supervision.

There are three parties concerned in the supervision of the colliery so far as safety is concerned, namely the Management, the Government inspectors, and the miners themselves, through their Union and check inspectors. The subject of training any miner is closely allied to safety in the industry.

With the advent of modern mining methods the industry needs safe, skilled workmen and the facilities for training these men must keep pace with the changing conditions. With mechanization, there is a demand for more highly skilled employees who are thoroughly safety conscious.

With the present law of seniority, Management cannot select employees and have to accept men who may not be altogether suitable for handling mechanized equipment and many mines today employ machine men who operate expensive machinery, who are not altogether fitted in training and technical knowledge to efficiently, mechanically, and perhaps safely, operate the machinery.

There is an old adage, " The best safety device yet developed is a careful workman." Training is essential and of course depends for its success upon the willing co-operation of the Management and men. If the employer is conscientious in his endeavour to eliminate accidents and if the co-operation of the employee can be enlisted, the safety problem can be met, but there must be co-operative effort.

There is a responsibility upon Management to make clear to the workmen an understanding of the reasons for the various regulations, rules and practices adopted for safe operation of a colliery under the Coal Mines Regulations Acts.

Discipline is essential in all operations of the mine—timbering, shot-firing, cutting and loading—where there is an element of danger and such danger must be appreciated by the men concerned with these operations.

We are of the opinion that the men who are to supervise work must be very carefully chosen and once selected should be fully trained to enable them competently to supervise the various departments to which they are assigned and as we have indicated elsewhere it would be advantageous for some of the senior men to see practices elsewhere.

Term III A (10) (a).

Rescue Arrangements, Training, and Equipment.

It must be stressed that the rescue station at Collinsville is not a rescue station established under section 76 of the Act.

What has been done, has been done quite voluntarily by the owner and some of the staff and employees, and co-operated in by Bowen Consolidated Mines Limited.

It was intended that the rescue station should service the State Mine as well as the Bowen Consolidated Mine and it was financed partly by the latter mine and the State Government Insurance Office.

Just prior to the disaster, a committee had been formed to manage the rescue station.

Overman Allan had been in charge of the station for some four years prior to the disaster and had acted in such capacity for a limited period prior thereto. Some 10 men employed in the State Mine had received training in the use of proto suits between 4th October, 1952, and 13th March, 1954, ranging from 108 to 144 hours each.

Despite such length of training, Allan stated that, in his opinion, none of the trainees had received such training as he thought necessary to render them fit persons to go underground in an irrespirable atmosphere, i.e., 16 two-hour lessons.

The training ceased in March, 1954—as Allan describes it, " lack of interest crept in "—and it would appear that Saturday work also played a part.

Deputy McPherson stated that he trained regularly for some six to nine months and found difficulty with the suit ; apparently the reducing valve was not properly adjusted.

No training was ever done underground.

Certainly the proto suit equipment was not all in good order at the time of the disaster, but the fact that two suits were rapidly assembled and used effectively by Allan and Spiers on five occasions in the mine immediately after the outburst, in an irrespirable atmosphere, speaks for itself.

There were 12 suits, of which two certainly were available for use and were so used immediately. Two other suits, of which the police took possession on 15th October, may also have been in good condition, although no satisfactory evidence was given on this point. The evidence is not clear as to the condition of the remainder, but, on the 25 October, 1954, eight suits from the rescue station were being used and Mr. Crozier gave evidence that all eight were in order and required minor adjustments only.

Allan and others had worked on the suits between the disaster and the time of their use under Crozier. The fact remains that at least two, perhaps four, and possibly more with minor adjustments, were available for early use.

Overman Allan stated, however, that apart from the two suits worn on the night of the disaster, the rest of them were not fit to be worn in an emergency.

Oxygen was available in the rescue room and the resuscitator was in good working order.

From the aspect of the safety, health, and protection of the miners, we have no hesitation in coming to the conclusion that, even if the proto suits had been 100 per cent. efficient at the surface, with a rescue squad 100 per cent. efficient and everything concerning rescue first class, the disaster, or its consequences could not have been averted.

There is a class of mining disaster, of which this is one, in which the best equipment and training are ineffective except as to salvage.

Various suggestions were made as to types of rescue equipment and positions where it should be kept.

We cannot see that it could be reasonably kept in any other place than on the surface.

We do not accept Barrett's proposition that Allan was an incompetent instructor.

Term III A (10) (b).

Conclusions.

We are of the opinion that a rescue station should be set up in the district *under the Act* to serve the State Mine and Bowen Consolidated Mine, such station to be equipped with the necessary apparatus. The trainees should be properly trained, including training underground.

If the above scheme is implemented, there are other forms of rescue equipment apart from the proto apparatus, and consideration should be given to equipping the station with the most modern apparatus.

M.S.F. Chemox self-generating oxygen breathing apparatus, which has been tested in New South Wales by the Mines Rescue Station at Abermain and found satisfactory, could be given consideration in this connection.

There is a further matter to which we think the Management should give attention and that is consideration as to the organisation of a fire-fighting group among surface employees to deal with all surface fires and a fire-fighting group among the underground employees to be readily available in the event of trouble underground.

We think such groups should be formed. A fire would be most disastrous from the view-point of the safety of the men, not to mention the damage it may do to mine property.

If such groups are formed, they should, of course, be supplied with all plans and necessary data showing points of connection of water pipes, &c., and plans of the mine, and it should be required of such groups that they have a complete knowledge of all possible means of escape in the event of a fire underground. If the scheme is implemented useful practice should be allowed to enable them to become conversant with what is required of them.

We are satisfied that the safety, health and protection of the miners will not be imperilled or endangered in the future working of the mine by reason of defective rescue equipment and arrangements if our suggestions are implemented.

Term III A (11).

Roof Troubles.

No statistics were made available to us with regard to accidents from roof falls and we are satisfied as a result of the inspection of the technical member of the Commision, who inspected every place in the mine, that on the whole the roof in the mine is good, with the exception of the section of troubled ground across the main dip which has already been referred to in another connection and which is shown hatched in Annexure 34.

Mr. Lightfoot, the General Manager, stated that one factor in the initial stages which militated against production was bad roof, but the bad roof disappeared fairly quickly and was not a big area.

We are quite in accord with this view.

Mr. Lightfoot further stated that, on the whole area that had been worked in Collinsville, the roof proved to be better than average in the industry.

Except for the fall at A.4, which has been mentioned in Term II and which indicated a danger at the time to the men engaged, no other falls of any consequence have taken place.

As we say, we think the roof at Collinsville is good, except for this small area of troubled ground which has already been passed and, *of course, now, at the face of the Dip where the disaster occurred.*

Extreme care will have to be exercised in dealing with the roof at the scene of the disaster and while grading through the fault, but once through this difficult strata we do not anticipate any undue roof trouble.

The roof at this place may be dealt with by proper and efficient mining methods, as indeed may any bad roof, if met in the future, by efficient and good timbering.

We are satisfied that the safety, health, and protection of the employees will not be imperilled or endangered in the future working of the mine by reason of bad roof conditions.

Term III A (12).

Miscellaneous.

Many other matters were urged as to the safety, health, and protection of miners by the Union representatives, not as a reason for closing the mine but as an attack on the Management and supervision—for example, that Allan did not have a complete knowledge of the layout and workings of the mine ; that the brick stoppings were ineffective ; that the mine plan was inaccurate ; that the detonators were not tested ; that the type of exploder used was not efficient ; that the district return airway in No. 2 Tunnel was only one pillar-length from withdrawn pillars ; that the Deputy's report form was inadequate ; that the report should disclose gas even if cleared before the end of the shift ; weak bratticing ; leakage in brattice and doors ; width of bords, particularly excessive width in the companion intake heading ; method of timbering ; lamp testing ; and perhaps others. We are unable to find in any of them any reason to conclude that the safety, health, or protection of the miners will suffer in the future by reason of any of them. We repeat that, if any of these practices, or any of these conditions, exist which might imperil the men, such should be stopped or remedied.

As we have stated, many of the matters put forward are not borne out by the evidence. Others are part of the ordinary hazard of coal mining, and others are remediable.

It is important to remember in regard to these matters the inspectorial powers given to the miners themselves and their representatives. Ample provision is made for the report of any unsafe practice or condition. Indeed, under the Act the miners themselves have a duty to themselves and others not to work under unsafe conditions (see Clause 133, Third Schedule to the Act), and to report unsafe conditions and breaches of the Act, including special rules as to safety. If danger is apprehended, a miner is required to immediately warn, if practicable, persons in the parts of the mine likely to be affected.

Term III A.

On the whole, therefore, with regard to this heading, we find—

> Regard being had for the safety, health, and protection of the miners, from the angle of unsafe practice, usage, custom or condition, the use of the mine should not be discontinued.

Term III B.

Is the safety, health and protection of the miners likely to be imperilled or endangered in the future by the nature, quality, or condition of the seam or seams of coal, the mine containing, as it now has been undoubtedly proved as regards the Bowen Seam, at least one lethal gas ?

In other words, is the mine inherently unsafe ?

Term III B.

Is the Mine Inherently Unsafe due to the Possibility of Further Outbursts of CO_2 or by Reason of any other Inherent Danger ?

The most important factor to be considered under this term of reference is the possibility of further outbursts of Carbon Dioxide, 00_2, as it must be realised that, in an area of coal which is constantly giving off this gas, it must be anticipated that, with the increasing depth being worked, and the presence of (a) dykes, *(b)* igneous sills, (c) burnt-out coal, and *(d)* faulting, the above possibility will be a constant hazard.

We propose to quote the opinions of overseas experts and eminent authorities on this subject Apart from the ones which we do quote, we have read many others, but consider those referred to are of the greatest value.

We then go on to deal with CO, outbursts at the Metropolitan Colliery, Helensburg, New South Wales, and then to deal with the Collinsville Mine itself and what the various witnesses of authority had to say about the matter.

Lastly, we propose to make certain recommendations as to the future.

Term III B (1).

Possibility of Future Outbursts of CO_2—Opinions of Overseas Experts.

It is a well-known fact that during the working of coal mines, gases are often continuously given off and in some mines under very high pressure. Outbursts of CO, have taken place in most coal mining countries, particularly in Europe. Exhibit 45 contains extracts from technical works relating to such outbursts. They are—

(1) Extract from " Transactions of the Federated Institution of Mining Engineers," Vol. VIII., 1894-95, pages 549-559.

" Investigation on the Composition, Occurrence and Properties of Black Damp," by John Haldane, M.A., M.D., Lecturer on Physiology, University of Oxford, and W. N. Atkinson, H.M. Inspector of Mines.

(2) Extract from " Geology. of Coal," by Otto Stutzer, late Professor, Geology and Mineralogy, The School of Mines, Freiberg, Saxony. Translated and revised by Adolph C. Noe, late Associate Professor of Palaeobotany, The University of Chicago—published December, 1940.

(3) Extract from " Transactions of the Federated Institution of Mining Engineers," Vol. V., 1892-93, pages 564 and 565.

" Outbursts of Carbonic Acid Gas at the Rochebelle Collieries, France."

(4) Extract from " Bureau of Mines (U.S.A.)—Bulletin 26. Notes on Explosive Mine Gases and Dusts with special reference to Explosions in the Monogah, Darr, and Naomi Coal Mines," by Rollin Thomas Chamberlain. 1911.

" Possible Conditions of Gas in Coal."

(5) Extract : " Economic Geology," August, 1946, Col. XXXI.

" Carbon Dioxide Eruptions from Coal Seams in Lower Silesia." 0. Stutzer.

(6) Extract : " Characteristics of Outbursts of Gas in Mines," by Prof. Henry Briggs, D.Sc., Ph.D., A.R.S.M.

The most important of these extracts are Nos. (5) and (6).

We quote part of extract No. (5) from " Economic Geology," August, 1936—" Carbon Dioxide Eruptions from Coal Seams in Lower Silesia," by 0. Stutzer, a distinguished expert in this field :—

" Coal seams exhale gases among which Methane and Carbon Dioxide are most important. These two gases may erupt suddenly from the seam and cause great accidents. Catastrophes caused by Carbon Dioxide are rare and fortunately restricted to few districts only, but Methane appears in many coal mines and may cause mine explosions on account of its inflammatory nature. Carbon Dioxide eruptions occur primarily in two districts, in Lower Silesia in Germany and in the Department of Gard in Southern France. Smaller eruptions occur in the interior and in the northern portion of the French plateau (Basin of Single and Basin of Brassac). They occur also less frequently in the Basin of Mahrisch-Ostran in Bohemia. In other coal basins they seem to be unknown.

If human beings breathe air containing from two to seven per cent. of Carbon Dioxide they are stimulated ; breathing of air containing 10 per cent. or more Carbon Dioxide causes fainting. If a miner faints and sinks to the ground he falls into a stronger mixture of Carbon Dioxide and suffocates, since Carbon Dioxide being heavier than air sinks to the lowest places.

Carbon Dioxide is found in every coal mine in small quantities, and it is more common in brown coal mines than in bituminous mines. It originates through the slow oxidation of coal, through the breathing of men, through the burning of lamps, and as an after-effect of mine gas explosions. These small amounts in general are harmless, and are carried away by ventilation. But eruptions of the gas, which suddenly fill entire rooms with Carbon Dioxide are dangerous.

The eruptions have increased in violence as mining has progressed ; that is, as greater depth has been reached. The first eruption occurred in 1894. It was at the time quite inexplicable. Twelve years later (1906) two other eruptions occurred, and by 1926, 438 eruptions had taken place, which had ejected 45,000 tons of coal out of the seams. During the latter part of these years the most violent eruptions occurred in the region of Neurode. There, the Ruben group of mines had its first eruption in 1908, its second in 1911, and there were 427 explosions up to 9th June, 1931. In the Wenzeslaus mine, in the district of Neurode, there occurred on 9th July, 1930, the most disastrous explosion, in which 150 lives were lost.

Carbon Dioxide is in coal at the places of eruption under a pressure that increases with depth. If a relief of pressure is brought about slowly through the mining of the coal, Carbon Dioxide emanates either slowly and unnoticeably, or in the form of periodical blasts or sudden explosions. Carbon Dioxide which slowly and continuously emanates is not dangerous because the miners in the Carbon Dioxide districts are prepared for it, and *ventilation removes it.* The following data illustrate how large this quantity may be : The shafts of the Wenzeslaus mine between 1921 and 1925 gave off on an average an amount of Carbon Dioxide such that 18.5 cu. metres of the gas came out with each ton of coal.

Some people believe that the Carbon Dioxide quantity which is freed during a great eruption is still larger, but this is not the case, if calculated with regard to the tons of coal thrown out. An eruption distinguishes itself from slow gas delivery only through the rapidity of Carbon Dioxide emanation.

Investigations in coal petrography have shown that coal which is inclined to have explosions is greatly fragmented: This feature seems to be a prerequisite for an eruption. The mining of such seams always produced coal screenings. In the Ruben mine near Neurode, a screening is produced of which 75 per cent. is of a size of less than 10 mm. (up to 90 per cent. below 30mm.).

How does the Carbon Dioxide occur in the coal seams? It can be contained in visible fissures and pores, but also in microscopic and ultra-microscopic pores, as a gas which is condensed in proportion to gas pressure. On the other hand, Carbon Dioxide may be adsorbed on the surface of the coal, especially fossil charcoal, which is very common in the Lower Silesia seams. Or the Carbon Dioxide is absorbed and forms a solid solution with the contents of the coal, especially with the vitrain, and is released whenever the gas pressure decreases.

Experiments have been made concerning the absorption and release of Carbon Dioxide in coal by 0. Ruff using coals from Upper and Lower Silesia. It has been determined that one ton of coal, if placed in pure Carbon Dioxide under a pressure of one atmosphere, and at 21 deg. C., will hold four cu. metres of Carbon Dioxide. The coals absorbed three cu. metres more of Carbon Dioxide if exposed to a pressure of two atmospheres. The ability of the coal to absorb gas rises with increased pressure at first rapidly, later more slowly. The curve of increasing gas absorption under increasing pressure has the form of a parabola. If the pressure is decreased, the gases again emanate.

The following is of importance : The size of the grain of coal influences the rapidity of absorption and of emanation of Carbon Dioxide. Powdered coal absorbs Carbon Dioxide rapidly and eliminates it quickly. Nut-size coal does it more slowly. After a few hours the former is in a state of stability with the Carbon Dioxide, but the latter reaches that state after days or weeks. Furthermore, it has been shown that coal which is rich in fusain absorbs and eliminates Carbon Dioxide very rapidly. Fusain is porous. The fusain content is relatively large in the coals of Lower Silesia, but generally it is not greater in the seams of the Carbon Dioxide region than outside of it. The experiments of Ruff indicate that the Carbon Dioxide is in solid solution with the vitrain of the coal. It seems that the large surface which is created through the breaking-up of the coal by tectonic movements is a necessary condition for the sudden emanation of Carbon Dioxide in Carbon Dioxide eruptions. Before some eruptions, the coal suddenly loses its lustre and appears dull. Then Carbon Dioxide breaks out from an eruption channel. In many cases the coal begins to " work " before an eruption. This occurs with a distinctly audible noise and under lowering of temperature in the coal face. Other eruptions occur without warning. During an eruption, a solid coal face may be pushed into the workings. For instance, during the great catastrophe of 1930, a coal block of 16.5 metres length, 8 metres width, and F5 metres height, 240 tons in weight, was moved forward in a solid mass. If one compares the quantity of coal which has been thrown out during an eruption with the size of the cavity that was formed, one has to assume that the walls of the cavity have moved forward, because this cavity is always smaller than the corresponding quantity of thrown-out coal, even if the coefficient of expansion of breaking is considered. Also, drill holes from which Carbon Dioxide emanates become more narrow, just as if the coal were swelling.

The pressure of a Carbon Dioxide eruption is usually overrated. It has never been measured. In many cases the Carbon Dioxide seems to become free only under a pressure of from two to three atmospheres, *and seems to escape at the rate of two to three hundred metres per second.* Observations during removal of the debris made it clear that sometimes much greater pressure, at least as a result of the explosion, must have existed. For example, loaded coal wagons have been known to be lifted up through gas pressure. During an eruption in the region of the Ida mine, pump water under a pressure of 20 atmospheres, and machinery was pushed back by the Carbon Dioxide.

The explosions are caused by reduction of compression, caused by mining. The released Carbon Dioxide streams out, expands, uses up heat, and lowers the temperature. The refrigeration is great enough to be felt through one's boots. In drill holes, temperatures of one degree Centigrade have been measured. In large explosions the ejected coal often remains ice cold for days because it continues to emit gas.

Carbon Dioxide eruptions cannot be prevented but catastrophes can be avoided. The districts are known in which seams are inclined to erupt, and it is important to recognize the danger of a Carbon Dioxide eruption. There are eruptions which announce themselves beforehand. If mine lamps are extinguished in the depressed places of workings, if the drill holes exhale gases which put out lamps and if these gases have a low temperature, an acid and prickling taste, and if they make breathing more difficult, then under special precautions only is it permitted to continue mining. Sometimes an eruption occurs without warning.

Bituminous coal seams contain large quantities of Carbon Dioxide in many places in Lower Silesia, Germany. During mining, this Carbon Dioxide is released through reduction of pressure. This sometimes occurs suddenly, and the released gas blows many hundreds of tons of coal into coal dust, which is spread over the mine workings. The Carbon Dioxide containing seams of Lower Silesia are highly fragmented. The fragmentation is a prerequisite for the sudden release of Carbon Dioxide. The Carbon Dioxide is a constituent which is foreign to the coal ; it has arisen along fissures from which it entered into the coal, forming a solid solution with the vitrain of the coal —Freiberg, Saxony, Germany."

We quote from Extract No. (6), a paper prepared by Professor Henry Briggs, a British *expert—Characteristics of Outbursts of Gas in Mines.* (His paper dealt with outbursts not only of CO_2 but general outbursts of gas in mines)-

" Geological conditions.—Another important characteristic of these occurrences is that they are usually associated with faults or other disturbances of the strata. There were eruptions from the side of faults or from their close neighbourhood in the Bensham Seam, Jarrow Colliery, in 1830 ; at Wallsend in 1833 ; at Haswell, where the burst took place against three small parallel troubles and discharged about 35,000 cu. ft. of gas ; at Glencraig, Fife in 1902 and 1905 ; and at Valleyfield in 1911. A number of outbursts have happened at a depth of 1,100 ft. at the Metropolitan Colliery, New South Wales, and they were all in the vicinity of faults or igneous intrusions."

Professor Briggs further states :

" To sum up, sudden outbursts of gas and coal from the solid are due to the co-existence of four factors, namely : (1) the presence of gas under considerable pressure, (2) the presence of a mass of disintegrated coal which is loose enough to move under a sudden relief of pressure and to set free almost instantaneously the greater part of the gas absorbed in it, (3) the absence of water in the soft coal, and (4) the employment of a method of working which affords little opportunity for the gas to drain quietly from the soft coal ; as an alternative to the last, the presence in the seam, and surrounding a soft zone, of ribs of low permeability which prevent or interfere with that drainage. It has also been shown that in the instance especially studied the phenomenon of `activation' played a part in increasing the volume of gas absorbed by the loose coal. Activation is, however, not an essential factor as normal coal can absorb sufficient gas to cause outbursts if the necessary conditions obtain."

When Professor Briggs delivered his paper in regard to this matter, Professor Henry Louis (Newcastle-upon-Tyne) had this to say :

" I want to call Professor Briggs' attention to the fact that in his bibliography he has apparently overlooked the most important paper of all, namely, on *Instantaneous Outburst of Carbonic Acid in the Mines of the French Central Plateau,* by J. Loiret, read at the International Mining Congress held at Dusseldorf in 1910. I think that if Professor Briggs had read that paper he would probably be inclined to modify somewhat some of his views. It states rather the opposite point of view to that which he would lead us to believe. It has been found that the best way to overcome these difficulties is to forbid all hand-hewing. The method there advocated is to get the coal by firing very heavy shots. *The coal is drilled, the hole charged, and an order given for everyone to get out of the mine, and then very heavy shots are fired electrically."*

An excellent paper by M. Quentin, of France, has been translated by the National Coal Board of Great Britain. This article deals with instantaneous outbursts and is most informative and of fairly recent date (June 1952). We quote in full :—

NATIONAL COAL BOARD.

(Translation Section.)

REMARKS ON INSTANTANEOUS OUTBURSTS.

(Reflections sur les degagements instantanes).

By M. QUENTIN.

(" Revue de l'Industrie Minerale," Vol. XXXIII, No. 581 June 1952, pp. 418-439.)

The phenomena known as " instantaneous outbursts " have remained unexplained hitherto and are equally unpredictable. You will, therefore, not find any explanation here of the phenomenon itself, as we shall not do more than record the practical observations which have led to the establishment of precautions and regulations.

Some time ago the Committee for investigation of instantaneous outbursts assembled a good deal of information on this subject and issued a list of " essential principles to be observed." This information was analysed and summarised by M. Riffaud (in the " Revue de l'Industrie Minerale " for July, 1946). The difficulties which he met with in doing so made him say that the information reviewed " does not always give an impression of unanimity in spite of the high quality of the studies made."

In this simple article you will, therefore, simply find a resume of practical experience in the Cevennes, in particular, in the southern group of pits.

INSTANTANEOUS OUTBURSTS AND THEIR EFFECTS.

It is well-known fact that an instantaneous outburst is an explosive phenomenon. It is, in fact, a kind of explosion which caused coal from the solid to move towards the cavity created by working, this movement being accompanied by the release of a large volume of gas. According to the local conditions the gas may be either CO, or $C11_4$, or a mixture of both ; in the latter case we speak of heavy Firedamp, as the CO, keeps the mixture of gas near the floor of the roadway.

The weight of coal ejected may vary from 20 to 30 tons to several thousand tons. The greatest weight of material ejected was recorded in connection with a sudden outburst in the Fontanes pit, in the south of Cevennes. In this instance the weight was 5,602 tons.

Experience has taught us that the most violent outbursts are those in which CO, is emitted.

The material ejected by large-scale outbursts fill the roadways over a distance of several hundred metres, blocking the flow of air and stopping the passage of water. This makes clearing of the roadway a laborious affair, and recovery work must frequently be done using respirators. It is necessary for the men to load away either mud or else a very fine dust which runs like water and has to be loaded in buckets. Everything that has been displaced by the outburst is buried in this mass, and mixed up with the fine coal-dust, e.g., support timber, ventilation ducts, compressed-air piping, rail tracks, tubs, fans, winches, and large blocks of rock.

When the work of clearing reaches the point where the outburst occurred we find the cavity caused thereby ; this enormous cavity is filled with large blocks of rock. It may take exceptionally skilled timber men several months to clear this zone and to set the supports anew. Frequently the very next outburst, which may occur only a few metres away, sometimes even the very next time a shot is fired there, sweeps the whole support system and the work has to start all over again.

It will be noted that more than three years were necessary to head 135 metres of roadway in this seam, which is exceptionally subject to instantaneous outbursts.

WHAT POSSIBILITY IS THERE OF PREDICTING WHETHER A SEAM IS SUBJECT TO INSTANTANEOUS OUTBURSTS?

In districts where sudden outbursts are known to occur certain seams are found to be more liable to outbursts than others, even quite near ; others may be discovered to be entirely free from outbursts.

Unfortunately, the indications which might serve to predict whether or not a seam is subject to instantaneous outbursts are very slight. Only one unquestionable fact has been recorded hitherto—

> In those of our deposits which are subject to instantaneous outbursts of 00_2, a seam which, on being pierced by a borehole, begins to emit CO, will certainly be subject to large-scale instantaneous outbursts.

Notwithstanding this, it is impossible to affirm that if the borehole remains quiet, then no outbursts will occur. In consequence of this inability to predict that any seam will be free from outbursts, in an area where these are known to occur, every seam should be approached with precaution.

When the seam has been reached and heading is taking place in coal the same precautions should be continued, since even when we are actually in the coal it is impossible to state with any certainty that no coal outburst will occur.

Experience has shown us that many of the ' signs ' proposed by the older generation of overmen are far from being of general application. Of these signs we may quote the following examples (1) cold coal ; (2) friable coal ; (3) sudden reduction of the amount of gas in the working

Nevertheless it has been observed that instantaneous outbursts occur more frequently in roadways driven in parts of the seam where the coal is thinning or faulted and that they must be expected in the zone lying vertically below safety pillars of coal left in the adjacent seam.

It has also been observed that the number and scale of outbursts in a seam are considerably reduced as a result of the relaxation caused by previously working in its entirety an adjacent seam in the floor, or even in the roof, of the seam in question.

Where the strata between the seams are fairly plastic and their distances are not more than some 50 metres, it frequently happens that no outbursts occur even in the seam known to be subject to them.

CAUSES OF SUDDEN OUTBURSTS.

It seems to be generally agreed that it is in deposits which are mostly disturbed, i.e., heavily faulted or folded, that sudden outbursts most frequently occur ; it would seem that a large degree of residual stress remains locked up in these strata. This irregularity of the seam is a consequence of the compressive stresses produced by movement of the earth's crust.

In the Cevennes this compression was probably contemporaneous with the Alpine upthrust period and the seams were thus pinched between the Alpine chain and the existing massif of the Cevennes.

The south of this area is particularly disturbed and must have been most strongly compressed at the time of the alpine movements referred to ; consequently this is the area most subject to sudden outbursts of gas.

The southern group of pits finished the year, 1951 by recording its 3,919th instantaneous outburst, thus constituting a little-envied record.

All of these instantaneous outbursts occurred during the heading of roadways. Fortunately it has been observed that under the protection of these headings coal-winning can proceed without any risk, as we shall demonstrate later in this paper.

When an instantaneous outburst occurs it is as if the strongly-compressed seam were protected by a crust of coal which acts as a retaining band. This band is sufficient, but only just sufficient, to hold the seam in place ; the seam itself in a plastic state, lies behind this band ready to irrupt into the cavity produced by working.

It may be of assistance if we liken the working to a vertical spring-leaf which, being compressed between two walls, is in unstable equilibrium and is ready to release suddenly its stored-up energy under the effect of a slight blow. Miners working in the seams subject to instantaneous outbursts all know that it's quite sufficient for them to hold a coal-face which is thrusting forward, even simply holding the face with their hand, to ' quieten it ' whilst waiting for their companion to set suitable wooden supports.

A heading in coal ' thrusts forward ' when the blocks of coal release themselves, although they may not do so abruptly but with slight creaking. This movement of the coal accompanied by creaking noises is also frequently accompanied by sharper sounds which are apparently caused by readjustment of the strata in the roof. Many catastrophes have been avoided by the presence of mind of workers or Overmen who were calm enough to hold and support firmly the heading in which they were working when this thrust occurred.

One day it may be possible to predict with certainty which headings are likely to produce outbursts and which are not, and thus ensure that headings are only taken in those workings where it is essential. For the moment the miner must keep his eyes skinned and is, in practice, reduced to attempting to provoke instantaneous outbursts from a distance, after having taken shelter. If the outburst takes place at all, it does so without there being any possibility of saying why it should have occurred at that moment rather than at any other. In addition, we have been fortunate enough to find a method which hitherto infallibly provoked outbursts at a distance, namely ' inducer shot-firing,' i.e., shot-firing intended to induce instantaneous outbursts.

INDUCER SHOT-FIRING.

We *have learned by experience that in a heading face with a normal area of 4 to 5 square metres, it is sufficient to fire four shots containing a total of 700 grams of dynamite, to break the hard coal band and provoke an instantaneous outburst.*

Fortunately it is possible to drill the shot-holes in the usual way and *the percussion of the drill has never been known to induce an outburst.* It is as though a circular band of hard coal is formed around each hole as it is bored in the plastic coal, the formation of this band being due to local elimination of the excessive pressure.

In this way coal-winning in roadways being headed in a seam subject to instantaneous outbursts is exclusively by means of this 'inducer shot-firing.' The use of the hand pick or pneumatic pick, both of which are likely, as has been shown in the past, to provoke outbursts by premature breaking of the retaining band, is completely forbidden. The ' inducer ' rounds are fired from the surface by means of long cables, when everybody has left the mine. This is, at least the general rule in the southern groups of pits in the Cevennes. In the central and northern groups, where these instantaneous outbursts are less violent, the ' inducer shots ' are sometimes fired from shot-firing points underground, set in the intake airway at a certain distance from the explosion point, when the whole district has been evacuated. After the shot has been fired the miners are only allowed to return to the pit or re-enter the district, as the case may be, when special inspectors have examined the workings and determined that no gas is present and that work can be resumed without danger.

The shot-firing deputy examines the fan diagram before allowing these inspectors to descend into the pit, which they do 20 minutes after firing the shot ; the fan diagram shows very clearly the effects of the instantaneous outbursts of CO_2 of some size. In the southern group of mines the average number of shots fired per day from the surface is more than one thousand. Special instructions regulate the carrying out of shot-firing itself and subsequent inspection ; the latter must be made in the direction of the air flow to ensure that the inspecting officials are not caught by a current of gas.

THE EJECTION OF COAL.

The first idea which occurs to us is to imagine that the instantaneous outburst ' breaks out,' pushing before it a mass of coal which increases in size as it goes on, and that this movement stops when the resistance to any further progress is equal to the thrust.

However, it would appear that this hypothesis is unsound, judging by the fact that if it were true, then the men engaged on clearing up the roadway during recovery would find ejected material which was progressively more compacted, as they advanced until they reached the face itself, which would be under tensile stress, not having resumed a state of equilibrium. This would render clearing of the roadways a dangerous task ; in actual fact, however, *no clearing up operations have ever produced an instantaneous outburst.*

On the contrary, it has been observed that coal ejected by the instantaneous outburst is always expanded and entirely free from stress. Thus the ejected material never entirely fills the roadway ; on the contrary, there is along the top of the roadway a space which is termed the ' flow channel.' Would it be correct, in the light of this, to think of successive waves of ejected material the first of which creates a sloping heap, the second moving over the first and dropping to the other side and soon, each of these successive waves of material passing through this flow channel ? If this were the case, the first wave, which is found very close to the original heading face, would be in its initial position and would therefore not be particularly compressed.

In other words, would it be proper to think of an instantaneous outburst consisting of a series of small instantaneous outbursts which advanced until a state of equilibrium is reached by the front of these waves with a sufficiently strong retaining band ?

This successive wave motion has in fact recently been confirmed by the rare eye-witnesses who have survived instantaneous outbursts ; a further confirmatory factor is the occurrence of successive impulses which have been noticed at the pit-mouth when very large instantaneous outbursts have reached the surface.

It may thus be supposed that this ejected material forms not so much waves of coal as suspensions of gas and coal mixed and that these suspensions are propagated like jets of powdered coal injected into a ball of fire.

When the instantaneous outburst stops because the front has obtained equilibrium against a band of coal sufficiently firm to act as a retaining wall, the successive waves of suspension become deposited by settling. This would leave at the top of the roadway a space which would, in this case, be wrongly called a flow channel.

DESCRIPTION OF SOME HISTORIC INSTANTANEOUS OUTBURSTS.

Working the outcrops of the southern group of pits began to be important about the 1830's. The reports of that time indicate that slow and continuous emission of CO, into the workings occurred. As the workings went deeper and deeper this emission grew in intensity and was sometimes accompanied by ' blowers ' which made *the water on the floor of the roadway boil.*

The first large pit was sunk at Fontanes in 1874 ; when heading out in the seam from this shaft at a depth of 246 metres the first explosive phenomenon of the type now called instantaneous outburst occurred on 1st April, 1879 ; no-one was hurt.

The second outburst occurred in the same year ; 76 tons of material were ejected and three people killed. The first 13 instantaneous outbursts between 1879 and 1892 caused 33 deaths in all.

The first indication into the nature of the outbursts and the precautions to be taken dates from 1892 and was made by M. Lange ; it is from this time that the general use of ' inducer shot-firing ' dates. The next 13 outbursts claimed no victims at all. Of all the 26 outbursts referred to the largest caused the ejection of 400 tons of material. Subsequently, far greater outbursts occurred as a result of ' inducer shot-firing.'

The largest outburst recorded was of CO, and occurred at Fontanes ; 5,602 tons of material were ejected, 5,034 tons of coal and 568 tons of dirt. This outburst was induced by shot-firing on 11th November, 1921, at a depth of 300 metres, during heading-out in a dipping roadway which ran in the lowest seam of the deposit, near the micaceous shale which lies at the very bottom of the coal field.

Another very violent outburst of CO, occurred on 6th July, 1907, again in the southern group, in the St. Martin division ; this outburst occurred in a shaft when the latter reached a seam at a depth of 320 metres and was induced by shot-firing. The fine coal was spread over an area having a radius of several hundred metres from the shaft. A total of 4,123 tons of material was ejected, 3,886 being of coal ; as much as 450 tons were picked up at the surface. One workman was asphyxiated in the winding-engine house where he had gone to fetch his watch. The CO, which was very concentrated and consequently very heavy, spread across the plain below the pit-mouth, flowing like water and causing inconvenience to the inhabitants of the area, even as high as the first floor of their houses.

Yet another memorable outburst occurred at St. Martin on 25th March, 1925. This outburst, which occurred in a heading ejected 5,028 tons of coal, filling a length of 1 kilometre of roadway. A column of dust was projected from the downcast ventilating shaft which was nearer to the workings than the upcast shaft. This column rose to a height of 45 metres and hid the colliery for some ten minutes. Carbon dioxide continued to flow from the shaft for about 55 minutes, stopping the traffic in the main highway nearby. Unfortunately, in spite of the precautions taken and the application of inducer shot-firing,' from that day onward instantaneous outbursts have occurred during working periods.

Another case of instantaneous outburst, which on this occasion occurred during working, was that which took place on 24th November, 1912, at St. Martin ; 24 men, all the workers in the district, were either asphyxiated or buried under the ejected material, which reached a total weight of 352 tons. The outburst occurred in a heading in the seam which ran along a vertical fault, the heading having coal in the roof. A roadway arch had been affected by the inducer shot-firing and a small cavity opened in the top of the roadway. The abrupt loosening of the coal lying against the dislocation must have provoked the occurrence of the outburst. *The majority of outbursts occurring during the shift and while the miners were still at work, thus took place following upon the sudden fall of the coal, which caused the retaining wall to be broken.* On most occasions it is at the moment when the roof suddenly rises, at a dislocation, that the coal breaks away ; when this happens, if care is not taken to hold up the coal by supporting the front, this breaking out of the coal may occasion an outburst.

The most recent outburst to claim victims was that which occurred on the 20th August, 1943, in the Rochebelle division ; a total of 120 tons was ejected. A mixture of gas, CO, with CH_4 filled the district, asphyxiating five men ; one of the rescue party was lost during rescue operations. The working appeared normal but after it had been cleared it was discovered that there was a dislocation in the roof 0.5 metres high. The survivors indicated that they had heard slight creakings in roof followed by a noise which resembled a burst of machine gun fire.

The last outburst to occur during the working shift took place in the night of 2nd to 3rd December, 1950, when, during the festival of Sainte-Barbe, the engineers of the Rochebelle division were warned and had to leave their meal and go to the colliery. It was discovered that a flow of coal in a rising roadway, occurring against a dislocation in the roof, had occasioned an emission of mixed gas into the working No-one was hurt, as all the men had had time to take cover in the intake airway.

During 1951, there occurred in the southern group of the Cevennes 96 outbursts which ejected a total of 17,319 tons of material, i.e., an average of 195 tons per outburst.

THE INVESTIGATIONS OF THE COMMITTEE ON INSTANTANEOUS OUTBURSTS.

The investigations of this committee have, as we have said been summarised ; a very important document.

In the analysis of the investigations of the committee given by M. Riffaud we frequently find the following names, MM. Audibert, Daval, Jarlier, Laligant, Leprince-Ringuet.

We give below certain other remarks made by this committee. The quantities of gas liberated by an instantaneous outburst are of the same order of magnitude as the total quantity released from the seam by normal gas emission under the effects of working.

This means that an instantaneous outburst of 1,000 tons does not emit more gas than would normally be released slowly by the winning of that 1,000 tons section.

No seams which have a heavy degree of normal gas emission are subject to instantaneous outbursts.

Consequently, the pressure of gas in the seam does not explain the occurrence of instantaneous outbursts, which must be rather attributed to excessive pressure in the ground.

Roof-burst (which occurs in Provence) is, nevertheless, not identical with an instantaneous outburst, since the roof-burst acts on the walls, which are suddenly forced together, whereas the instantaneous outbursts have no noticeable effect on the walls except where a fall of ground follows the outburst. The relationship between gas and coal under excessive pressure is more one of inter-atomic penetration' than of dissolution, chemical combination or absorption.

The committee for instantaneous outburst investigation have disposed of the theory of pockets of gas, as also of the theory of nests of instantaneous outbursts. Consequently, *it has been proved that it is useless to attempt to drain the gas by means of boreholes.*

We must now deal with a practical problem which is always particularly difficult to solve in the southern group of the Cevennes, This problem is the choice of the type of junction to be made between the cross-cut and the seam to be worked.

JUNCTION BETWEEN CROSS-CUT AND A SEAM SUBJECT TO INSTANTANEOUS OUTBURSTS.

When it is suspected that the cross-cut is nearing the seam, exploratory boreholes between 1.5 and 2 metres deep are driven. The cross-cut itself is headed with the help of inducer shot-firing ' from the surface, lest the seam should be reached earlier than expected, in spite of precautions taken.

Two different cases may arise :-

(1) The seam may be entered from the roof or, to put it more precisely, the seam is below the cross-cut, but rising ; it is more accurate to speak of it in the latter way because the seam may be folded at that point and what appears to be the roof may in fact be the floor.

(2) The seam may be entered from the floor, i.e., the seam is above the cross-cut.

(1)-SEAM BELOW THE CROSS-CUT.

Boreholes are drilled in the floor at right angles to the seam, to a depth such that there is always a thickness of at least one metre of rock between the end of the boreholes and seam. The boreholes must be set closer together the greater the dip of the seam.

When the seam has been located by the borehole, provided the layer of rock is thicker than 1 metre, a downward entry into the seam vertical to the latter is begun ; as soon as the layer of rock is not more than 1 metre thick a very large round of shots, considerably larger than an inducer round,' is fired ; this round consists of 12 shots, made up of 6 short shots, and six long shots, set 1.5 metres deep, i.e., 0.5 metres deep in the coal. Each of these shots takes 1 kg. per hole, making a total of 12 kg. for the round.

After having cleared the roadway, should there have been an instantaneous outburst following on this round of shots, heading is recommended and the operation described above is repeated where the protective layer in the floor is found to be 1 metre thick ; the exception to this is if the point is still within the cavity of the previous outburst.

At the point where the line of the seam roof intersects with the line of the heading roof then the heading must be continued upwards in the seam itself ; in doing this the roof is followed in the direction of the cross-cut, to a sufficient height to allow of a protective layer, from 3 to 5 metres thick, according to the strength of the floor, above the level of the future roof-line of the cross-cut.

Before recommencing heading the rising section of drift is stowed or filled with cogs (whether methane is present or not) and, generally at the bottom of the rising section of the drift 2 layers of cogs joined together. These cogs are often blown down or destroyed by subsequent outbursts, which may occur when the next seam in the series is entered by the cross-cut. Experiments are being carried out in the southern group in the Cevennes with concreting these sections of drift.

(2)—SEAM ABOVE THE CROSS-CUT.

Conditions in this case are considerably more dangerous since the seam is in the roof of the cross-cut and there is a very grave risk that a sudden roof-fall may occur, abruptly opening-up the seam and provoking an outburst during the shift. Consequently, wherever it is possible, the seam should be entered through the roof, even if this necessitates heading a longer roadway.

When there is nothing else to be done but to enter the seam from the floor, particular attention should be paid to the exploratory boreholes and a supervising engineer should constantly be present ; as soon as the borehole touches the seam, provided that the protecting layer is more than 1 metre thick, a rising entry of very small cross-section is made. This rising entry is at right angles to the seam and is used to prepare a large round of shot to be fixed as described in case (1).

When the roadway has been cleared after the instantaneous outburst it is almost always found that there exists a cavity reaching the roof, or in some cases, right up into the roof ; this cavity is stowed or filled with cogs.

If this cavity lies in the direction of the cross-cut and reaches up to the roof the heading can be recommenced. If, however, it so happens that it does not extend all the way to the roof, then, after the cavity has been supported, further rounds of shots are fired until the roof is reached.

If the seam is level and is likely to follow the cross-cut for a long time, a heading is begun, under the roof and running in the same direction as the cross-cut ; this heading serves to relieve the seam directly below it until the line of the seam-roof is below the line of the cross-cut roof.

After filling with cogs or stowing, the heading of the cross-cut is recommenced, still making use of ' inducer shot-firing.'

How TO WORK A SEAM SUBJECT TO INSTANTANEOUS OUTBURSTS.

Rather than discuss in detail a long series of regulations, which, in any case, must vary according to the scale and frequency of the instantaneous outbursts and the method of coal-winning used, we shall here simply indicate the essential principles :—

Reconnoitering in the seam by heading *under the roof of the seam.*

Filling with cogs both at the bottom of and inside the ascending or descending section of the drift.

Both the above must, of course, be accompanied by ' inducer shot-firing.'

It is only under the protection of supports of this kind and, provided certain conditions are fulfilled, that we can work seams subject to outbursts as though they were ordinary seams, i.e., without any special precautions.

We must particularly emphasise the importance of the first heading *under the roof.* It is exceedingly dangerous, in a pit where instantaneous outbursts are to be expected, to have any coal in the roof of the roadway by reason of the risk, (already referred to) of the occurrence of a roof-fall, which would provoke an instantaneous outburst.

When the seam is at a steep angle of dip or even quite vertical it is not possible to have the roof across the whole width of the roadway ; in this instance the work of heading is only entrusted to specially skilled workers, who keep a narrow working which is supported at the sides and roof by boards laid edge-to-edge ; the heading face in the coal is supported by a panel which is lowered as loading of the coal progresses.

These workers are very soon reminded of the precautions to take if they should relax them at all, since pressure develops and they must then immediately set up consolidating supports and proceed to fire a round of ' inducer shots' without any delay.

CONCLUSIONS.

Heading cross-cuts through seams subject to instantaneous outbursts or drifting in steeply inclined seams will always set the miner problems which are extremely delicate of solution and which necessitate constant watchfulness.

An important point is to instruct the personnel working in these deposits ; our training centre in the southern group gives us the opportunity of instructing our young entrants on these points since, in addition to all the rules of which we have just spoken, there exist a number of domestic rules regarding misfires, maintenance of shot-firing cable, inspection before firing the shot, the method of connecting up the shots, inspection after shot-firing, special precautions to be taken in using the electrical apparatus and, finally, stray currents.

Before finishing this article we shall try to answer a question which is frequently put, namely ' when should we expect that an instantaneous outburst is likely to occur, and when should we begin to take the precautions which have been outlined above ? '

Experience has shown us that instantaneous outbursts have been known to occur in seams where they had up till then, been entirely unknown ; we could quote for instance the cases of Roche-la-Molier or La Mure. It should be noted that these particular outbursts occurred during exploratory heading at some depth, where the rock pressure is normally higher than elsewhere. We believe that this gives us a criterion and that, in consequence, we can say that instantaneous outbursts are more likely the heavier the roof pressure. Roof pressure is, however, the sum of two different actions :

(1.) The weight of the superincumbent ground, this weight normally increasing with depth ;

(2.) The stresses produced during the periods of mountain formation ; the stresses were produced by movements of the earth's crust and are therefore independent of depth.

In consequence it is impossible to affirm that the deepest seams will necessarily be those which are most subject to instantaneous outbursts ; on the contrary, experience in the southern group has shown us that the seams at the Destival pit, which are considerably deeper than the seams in the Fontanes pit, are far less liable to outbursts than its neighbour. We hope that this proves that the deposits in this district have been less markedly compressed during movements of the earth's crust and that the seams will therefore be more regular.

Further, it may be said that in regular deposits, where the stress due to mountain formation may be assumed to be constant, the degree of likelihood of instantaneous outbursts should increase with depth. Nonetheless, this is not necessarily true for deposits which have been more heavily folded in one region than in another, and in which the most disturbed areas are not necessarily the deepest.

From all this it follows that we should be suspicious of those seams which will be crossed in unrelaxed ground, especially if the roadways approach them from the floor. We must emphasise once again that the greatest risk is that of an instantaneous outburst following on a fall of ground in the roof of the roadway. This has led to the following precautionary measures, which should be applied in seams which have never given rise to outbursts, but in which there is reason to fear their occurrence :-

> Every effort should be made to avoid approaching the suspected seams from the floor ; in any event, whether the seams are approached by the roof or the floor, the actual entry to the seam should be of small cross-section and have a well supported heading-face.

In practice it has been observed that the first occurrences of outbursts in a mine where none have previously occurred are not, or have not been up to the present, very violent. If the heading-face be held with planking as we have just described there should be no trouble whatever. If the working is at all threatened it may be that the miners will bear a certain amount of creaking ; at this moment the last thing they should do is to leave the working, on the contrary, they should immediately set planks across the whole of the heading-face and as soon as possible thereafter carry out inducer shot-firing ' through ' the planking wall ; when this is done the mine, or at least the district should be evacuated.

Our experience with instantaneous outbursts has been disappointing since sometimes a rule which had hitherto always been confirmed in practice is suddenly contradicted by a particular incident and our knowledge of the problem is scarcely advanced.

In this field of knowledge nature has remained stronger than man. Perhaps present advances in science, particularly the forward leap which has been made by nuclear physics will allow us to solve the problem one day.

It may even be possible then to detect and to prevent instantaneous outbursts instead of merely establishing a method by which they can be restricted to occurring when we wish it i.e. when there is no-one in the mine.

Numbers of experiments and measurements remain to be made. The most important is to measure some index of pressure of the ground. Certain measurements of this kind have already been commenced, such as resistivity measurements carried out in the seams at St. Martin in 1932 ; it might be worthwhile to take these up again.

It may also be opportune to refer to an experiment confirming the sudden release of coal which we recently made in the southern group of the Cevennes, (with the advice of M. de Corn). It was shown that coal projected into a tube by a sudden drop in pressure from eight atmospheres to zero was definitely pulverized. Tbis pressure drop corresponds to a speed of 600 metres/second. Is this the mechanism of abrupt release of pressure which produces the powdered coal of the outburst.?

More highly developed apparatus and better measuring equipment would perhaps enable us to decide this question. Many other experiments could be carried out until it is possible, one day, to reproduce artificially an instantaneous outburst in the experimental roadway at Verneuil. When that is possible we shall have made a great deal of progress in the study of instantaneous outbursts and in safety of our mines.

SUPPLEMENT.

WINNING SEAMS SUBJECT TO INSTANTANEOUS OUTBURSTS.

In this supplement we shall give a summary of a number of the regulations which are applied in the southern group ; we shall deliberately simplify matters in this summary because the regulations differ within the group from division to division.

The workings where ' inducer shot-firing ' is practised are called first category workings.

It is not the case that all the coal in a given seam is won by means of inducer shot-firing ' ; when it is quite certain that a panel has been freed ' (we shall indicate further on how this is detected) those regulations are relaxed and we then speak of other categories of working.

In point of fact in those mines where violent instantaneous outbursts are to be expected we have the following different categories :—

(1.) *First category workings* are those in which, as we have just stated, ' inducer shot-firing ' from the surface is practised. In the workings within this category coal-winning with pick or pneumatic pick is completely forbidden. As we have indicated previously the round of ' inducer shots ' consists of a minimum of four shots, containing 700 grams of blasting dynamite B (or equivalent explosive) in a normal-size working (4 to 5 square metres).

In these first category workings a *rock pick* is allowed to be used to make floor-holes for the props, to smooth the walls and to clear away large blocks of rock which are clearly detached from the main mass and which it would be unsafe to leave in position.

The figures given for the round of shots to be fired are minimum figures and must be increased in the case where workings are larger than usual. If the working is in a thin seam but in regular ground, separate ' inducer rounds ' can be fired in the seam and in the rock beds, provided that each round contains at least the *regulation minimum of four shots*.

(2.) *Second category workings* are those in which winning shot-firing is practised. In such workings winning with any type of tool is forbidden ; shot-firing is carried out from the surface but no more than the number of shots necessary to bring down the coal are fired ; that is to say one shot may be fired if desired or more where needed.

(3.) *Third category workings* are those in which winning is carried out without special precautions ; winning can be by coal-pick, pneumatic pick, or shot-firing with cartridges, according to domestic regulations 'approved by the mines inspectorate.

(4.) *Fourth category workings* are those in which the debris of an instantaneous outburst is being cleared away. A miner's lamp is permanently set, at most 1 metre from the floor of the gallery and 2 metres or more behind the point where clearing work is proceeding ; this is to ensure that continuous detection of the state of the atmosphere is provided. Before cap-lamps were introduced one or more electric safety lamps were hung at corners in the roadway behind this point to enable men to get clear if CO, started to flow.

Regulations for work in the seams subject to instantaneous outbursts differ according to the method of working adopted."

Other authorities which we have consulted in addition to those mentioned in Exhibit 45 and. M. Quentin's paper are as follows :-

" Principles and Practice of Mine Ventilation," by D. Penman, C.I.E., D.Sc., formerly Chief Inspector of Mines in India, and J. S. Fenman, Ph. D., B. Sc., of the Mining Department, Barnsley Technical College (Second edition, 1947).

They state :—

" Recent investigations go to show that inflammable gases exist in the coal and adjacent strata as (a) free gas imprisoned in small cavities in the coal under pressure, (b) surface occlusions, and (c) dissolved or absorbed in the coal substance itself. The part (a) comes off continuously as the coal is worked. If the gas is abundant and the seam is slightly wet it may be distinctly heard ' fizzing ' off. Part *(b)* comes off slowly at ordinary temperatures (when placed in vacuo), and part *(c)* only comes off when the coal is heated to 100 deg. C.

Fraser gives particulars of the rate of emission of methane from coal seams in Lancashire. The list shows emissions varying from nothing up to 4,000 cu. ft. per ton of coal extracted ; in 43 seams the rate of emission varies from 1,000 to 4,000 cu. ft. per ton ; in 36 seams 500 to 1,000 cu. ft. per ton ; and in 48 seams 100 to 500 cu. ft.

In addition to being given off steadily at the coal face, the gas may be emitted in large volumes from ' blowers ' at faults and other dislocations and by sudden outbursts. A ' blower ' may persist for long periods, sometimes extending over a number of years.

There are cases on record where very large quantities of gas at great pressures have been confined in cavities in the coal and/or adjacent strata ; for instance, at Valleyfield Colliery, Newmills, Fife, on 9th March, 1911, an outburst of coal and firedamp took place which resulted in the death of three men. The face of the level where the outburst occurred was advanced about 10 ft. to a small fault of about 6 ins. running across the level and the opening made was 8 to 9 ft. wide. About 90 tons of small coal were blown out of the solid by the outburst. At Bedford Collieries, Leigh, on 8th March, 1918, a somewhat similar outburst took place which threw out about 26 tons of coal and about 23,000 cu. ft. of gas. Fortunately there was no-one injured in this instance.

On one occasion in a thick coal seam at the Morrissey Collieries, British Columbia, as much as 3,500 tons of coal were blown out of the solid by an outburst of gas ; and in a highly contorted seam in a Belgian mine 12 million cu. ft. of gases were suddenly liberated, causing the deaths of over 120 persons.

Sir Lindsay Wood, in his famous experiments on gas pressures in coal, records as high as 461 pounds per sq. in. Even higher pressures than this have been recorded.

Prof. H. Briggs has analysed the probable sources and causes of these outbursts and considers that, although there may be cases where the gas is pent up under pressure due to geological and other conditions preventing the usual gradual escape of the gas from the coal, there are also evidences which point to the presence of a mass of disintegrated coal holding by adsorption large volumes of gas under pressure. When the pressure is suddenly relieved, due to the attenuation of the solid coal, this imprisoned mass of disintegrated coal and gas is suddenly shot out. The absence of water is characteristic of such outbursts.

Precautions.—In seams where outbursts of gas are to be feared, the precautions to be taken are :-

(a) Adopt longwall working wherever possible, as with this method the gas from those natural reservoirs will come off through cracks and fissures in roof and floor as the face advances and the pressure may have fallen to a low value before the actual cavity is reached.

(b) Where longwall is not possible keep boreholes considerably in advance of the working face."

In the " Mining Engineers' Handbook ", Volume II., 1941, edited by Robert Peele, Professor Emeritus of Mining Engineering in the School of Mines, Columbia University, G. S. Rice, formerly Chief Mining Engineer, U.S. Bureau of Mines, states (Section 23-05) :-

"Violent CO, outbursts, blowing out highly pulverized coal dust, occur in collieries near Alais, France, and in Lower Silesia. Origin of the gas, though not definitely known, is probably in limestone strata below the coal measures, which have been intruded by igneous magmas that heat the carbonates and form cracks, through which CO, has entered so-called ' nests ' in the coal. CO, is a stable gas but can be reduced to CO by burning coal, or charcoal. Its percentage changes through absorption by percolating water, by disappearance of 0 of the air, by reactions between 0 and coal, or timber (rarely by inflow of CO, from strata), by supplanting of original atmosphere, by ingress of CH, and to a slight extent by absorption of CO, by coal. Water at 0 deg. C. absorbs 1.71 of its volume of CO, sp. gr. 1.529 ; boiling point,-78 deg. C ; may be liquefied at 0 deg. C. by a pressure of 35 atmos. Critical temp., 31 deg. C ; critical press., 77 atmos. If the liquid is allowed to escape freely, evaporation cools the remainder to a solid which passes directly to gaseous state."

He also states (Section 23-09) :-

" Practice in mines near Alais, France, where instantaneous outbursts of CO, occur, is not to pick or cut into the face, but to drill and prepare shots, and, at end of shift when all men are out of mine to fire simultaneously by electricity from the surface. The object is to induce blowouts from any possible high pressure ahead, by concussion due to blasting. In recent years this safer method, termed shock blasting,' was adopted in mines in Belgium, the Ruhr, and Silesia subject to outbursts of CH, and CO,. One theory is that the coal is under great pressure and upon release flies into powder, liberating gas."

Also, in (Section 23-10), he states :-

" Outbursts of CO, from the strata have been of importance in certain coal basins of Central France ; miners smothered, and masses of coal and dust dislodged, and even blown to the surface. As outbursts are especially liable to result from blasting, shots are sometimes fired electrically from the surface ; refuge chambers are also provided. Outbursts are due either to heat of igneous intrusions or to acid waters acting on limestone ; the latter is probably true of 00_2, sometimes found in fissures and crevices, in the S. W. Wisconsin lead and zinc district. Cripple Creek mines have had difficulty with 002 filling fractures of volcanic rocks after drainage, until it could be kept back by bulk-heading and blowing in air under pressure."

" The Institution of Mining Engineers' Journal," Great Britain, No. 3235, 1948—a paper by Mr. R. F. Pescod, Member of the Institution of Mining Engineers.

In this article, Mr. Pescod stated that he had sufficient detail in 62 of the 101 authenticated outbursts to enable them to be classified as follows :—

" CLASSIFICATION OF OUTBURSTS.

A. OUTBURSTS AT CROSS-MEASURE DRIFTS-		
1. In areas affected by workings	4	
2. In virgin strata	7	
		— 11
B. OUTBURSTS AT NARROW DRIVAGES IN COAL-		
1. Places closely in advance of, or between longwall faces, &c.	9	
2. Places in zones affected by workings (not necessarily in the same seam)	9	
3. Others	8	
		— 26
C. OUTBURSTS IN WIDE WORKINGS-		37
1. Longwall faces	3	
2. Stepped or top hole longwall	15	
3. Others	7	
		— 25
Total		62

In six of the cases, namely those at Pentre and Aberbaiden collieries, the issue of gas was not an accompaniment of the burst, and in none of these occurrences was any geological disturbance present or adjacent to the scene. All these cases must be attributed to a method of working (pillar and stall) no longer suitable to mining at increased depth under the remarkably strong roof which exists over the Rock Fa wr Seam at these collieries. In these cases the reluctance of the workmen to set supports close to the face as being likely to impede their immediate retreat from any apprehended burst, together with the traditional practice of cutting props to length by hatchet and setting these with the resultant pointed ends to the floor, fails to provide adequate early prop resistance to the roof, thereby contributing to and concentrating the strain energy at the abutment ahead of the face.

Only 15 of the bursts occurred in circumstances which were not contributed to by the manner in which the mining was conducted. They were entirely of geological origin.

Eight of these were in narrow places being driven into virgin ground, several being in ' soft ' or ' dead ' coal. The other seven were in cross-measure drifts reaching or crossing seams, and in this connection the delayed action of the outburst at Tareni colliery must be noted as complicating the problem of effectively combating the occurrences and the resultant dangers.

Many of the remaining 47 outbursts were probably caused, and the others substantially contributed to, by shortcomings or defects in the system of mining practised.

Geological disturbance of one kind or another, if only the previous presence of ' soft ' coal, was associated with 52 of the 54 cases in which this point could be decided and in which an issue of gas accompanied the burst. Regard must, of course, be given to the possibility of the pre-formation of this ' soft ' coal, or some of it, by mining operations.

Quite frequently there was not *any indication of the presence of geological disturbances until after the event.*

Complicated and complex geological disturbances are commonplace in this area under consideration.

There are very many more disturbances and disturbed areas in which no trace of bursts are experienced. Indeed, the New Dynant, Blaenhirwaun, and New Cross Hands collieries working the same seam, situated amongst and adjacent to other collieries which have experienced bursts, have been entirely free from this phenomenon, although these three collieries mentioned are very much more geologically disturbed.

Basic Conceptions.

It would seem that the following briefly states the conceptions of the scientific aspects held by those so qualified, who have studied the problems involved in this type of phenomenon and who have contributed to our literature.

Gas is thought to be held in normal coal in a State described as adsorption, the higher-ranking coals (which include anthracite) having a very great capacity for so containing gas ; and differences of pressure, such as may result from roof weighting, affect very markedly the ability of the coal to liberate the gas so stored.

AUDIBERT suggested that the gas is adsorbed in the capillary structure of the coal, and that ' soft ' coal is rendered able to liberate the adsorbed gas much more readily than the same coal in its normal state. While many hold the opinion that ' soft coal ' did not exist before the coal was worked, but is produced by the working of the coal, there is very strong reason to believe that in the anthracite coalfield, zones of soft' coal exist which were not all produced by mining, and the consensus of local opinion is that these zones were produced by geological disturbances, particularly thrust faulting. The forces which have caused ' *soft ' coal* are likely also to have liberated the gas from the coal.

Elastic strain energy is stored, not only in the coal, but also in the rocks, particularly some sandstones, adjacent to the seams. This energy may be due to pre-mining forces, it may be due to forces set up as a result of mining, or to a combination of these causes. Many variables enter into the matter, so that the amount of strain energy in different parts may vary between extremes. Of the causes which produce strain energy, that originated by compression and by bending of the strata, whether in the form of cantilever or beam, which is resultant upon mining operations, is to a considerable extent within the control of the mining engineer, in the type of entry, method of working, and the type and quality of support arranged and provided."

Mr. T. A. Rogers, of Cardiff, when discussing the paper by Mr. Pescod, had this to say :-

" Turning to the instances recorded from the anthracite collieries (all of them in geologically highly-disturbed areas) the picture is not quite the same. On a broad view, the stresses existing in the strata at and ahead of the faces seem to be mainly of geological origin, although, perhaps, intensified by mining—and intensified in some instances to a greater degree than they might have been had the method of work been better suited to abnormal conditions, the importance of which, in the light of our present knowledge, we are beginning to appreciate more fully.

Under Basic Conceptions, Mr. Pescod records two fundamentally different possibilities of causation—(l) the pressure of gas held in the coal by adsorption and (2) the roof stresses of geological and/or mining origin. It seems to me that the adsorbed gas-pressure aspect was unduly emphasised in former times and little or no attention given to the consideration of roof stresses. The intensive roof-control investigations carried out in more recent years by, among others, Dr. D. W. Phillips and Dr. A. Winstanley, have given all mining men a much clearer picture of the magnitude of those stresses which may be set up by mining. But, in the cases quoted, it would appear that these stresses were mainly inherent and the result of geological strata movement. This, then, seems to be the broad outline of the problem."

Mr. A. Hudson (Swansea), when discussing the paper by Mr. Pescod, had this to say :-

" We therefore have the natural forces due to depth acting in this way and enormously accentuated by the tectonic forces, the extraordinary forces due to the disturbance and further possibly by the abutment forces. There is little wonder that under such conditions outbursts do occur and are purely of physical origin. The gas is undoubtedly a consequence of the comminuted coal, admittedly occluded until the moment of release by the expending physical forces ; in other words, the gas is much more of an effect than a cause, although in itself it may have high inherent pressure and may be a contributing factor in some cases.

This appears to be corroborated by the estimated quantities of gas released in a number of outbursts being approximately equivalent to the quantity which would normally have been released by the quantity of coal liberated if mined in the ordinary way.

It would, however, be quite understandable if the quantity of gas given off by the outburst were considerably higher than that given off by an equivalent amount of lumpy coal, since the coal is crushed to a fine state, and in that way would be expected to give off far higher quantities of gas. This is a well-known fact. Indeed, a lump of coal which has been exposed almost any length of time and has ceased to give off gas at its free faces will give off further quantities when *broken and more still when crushed."*

Mr. George Roblings (Newport), when discussing Mr. Pescod's paper on rock bursts, had this to say :—

" My intimate experience of such occurrences is confined to areas of soft coal, and not accompanied by severe disturbances, though the ground was not normal. There is one factor to be noted which was evident over the whole area, except one small area where the top coal was absent, namely the regular character of the roof and top coal, the variations both of thickness and quality being entirely in the bottom coal.

This was characteristic also of the Cinque Paulm Seam of the Feztaux No. 4 at Marcinelle Nord, Belgium. On the other hand, the conditions at the Mitsui Mines in Japan were reversed. The lower bed of coal, about 6 ft. thick, was consistently strong, while the upper coal was 8 ins. thick, from which all outbursts took place.

The soft coal at Ponthenry and Plasbach was found in belts and patches but all the areas of soft coal were not in a dangerous state. It was essential, however, that they should be considered in that state.

In no case was there a trace of any danger in the good coals ; neither was there any suggestion of liability to burst out in the soft-coal areas of other seams worked at the colliery. The soft coals were no doubt in situ, and the following remarks made by the late Dr. Briggs in the discussion on one of my papers were on that point :-

' These tracts of soft coal are only found where the strata had been subjected to great compressive stresses and have moved under that stress. They are usually associated with faulted ground or with contortions, distortions, or pressure jumbles, of which the Ponthenry seams furnish plenty of evidence. The soft coal exhibits on almost every face of the fragments, large or small, slickensides which could only have been produced in situ and never could be produced during an outburst.' "

Mr. T. E. Pickering, of Cardiff, when discussing Mr. Pescod's paper, stated :-

" We know that the working of a seam sets the ground in motion, and it might well be that the subsidence of the ground, as a direct result, has the effect of putting into equilibrium some of these pre-mining stresses."

Dr. A. Winstanley, of London, when discussing the same paper, stated :-

"Examination of the plans shows that a larger number of the outbursts occurred in narrow development places, or in leading ends of faces where they would be near intensive abutment-pressure zones caused by the workings themselves. In these circumstances it is now clear that the mining lay-out was conducive to outbursts because the energy stored in the abutment-pressure zone found relief violently in the narrow place like an explosive charge in a gun-barrel. With wide faces this energy expands itself gradually as roof and floor converge slowly and as the coal, roof and floor expand outwards slowly towards the waste behind the working."

He further stated :—

" This means that in exploration drivages in troubled ground it is necessary to put boreholes ahead until it is possible to widen the working face and make at least two outlets from the developing face. Doubtless a technique of development will be evolved on these or similar lines. Even in orthodox bord-and-pillar working, outbursts can be caused by narrow drivages for splitting pillars, especially when the pillars concerned are in the vicinity of wastes which have not been consolidated. The intense pressure is on the core of the pillar and the narrow road being driven towards this high-pressure zone provides the outlet for the energy as the overloaded coal in the core of the pillar expands itself. Examples of outbursts of this kind are given in the paper."

Most of the outbursts in Britain and dealt with by Mr. Pescod in his paper are occurrences in long wall workings, or in narrow places, adjacent to long wall working, but Mr. J. Nicholas of Pontyberem, seemed to sum the matter up generally when he said :-

" It appears to me that in some obscure way an outburst functions as a safety-valve. The stresses in the vicinity must have been very near breaking-point and relief was effected, disastrously, by an outburst.

The main force of the outburst appears to be concentrated immediately under the roof, and the coal ejected—whatever the quality or quantity might be—is invariably in the form of impalpable dust. Even after the affected area has been cleared, the coal remaining in situ in the face, and for some distance each side, retains the same characteristic of being an impalpable mass."

Mr. C. J. Davies, of Ammanford, also had an interesting comment in this regard, as follows :—

" Earth movements involve immense pressures, as characterized in the contorted nature of beds of different strata in the coal measures, associated with crush faulting. A close study of the loci of anthracite outbursts appears to suggest that the cases where coal under intense pressure is loaded to its destructive capacity are in the smaller folds and zones where the coal and soft material have flowed or drifted under pressure from one situation to another. Such pockets of coal can be highly loaded and these are the zones in which the soft or broken coal is found as the inter-strata movement has crushed the material. These main types are more or less readily discernible and will have to be carefully watched whatever method of extraction is employed.

It is quite probable that with mining at greater depth the problem may become more acute, as it appears that the deeper the seams lie the greater will become the tendency to encounter local pressure zones."

Term III B (2).

Outbursts at Metropolitan Colliery, Helensburg, New South Wales.

Coming now to Australia. In Australia we have had four outbursts of CO, ; three at Metropolitan Colliery, Helensburg, New South Wales, and one at Collinsville, so that, compared with outbursts in other parts of the world, in coal mining in Australia we have been fairly fortunate. The three outbursts in New South Wales, which all occurred at the one colliery, were, as stated by Mr. Platt, in conditions similar to those existing at Collinsville, in that they had (1) dykes, (2) igneous sills, (3) burnt-out coal, and (4) faulting. They cannot be accepted as frequent happenings as the first was in 1897, the second in July 1925, and the third on 2nd December, 1954.

Exhibit 12, which is an extract from the Annual Report of the Department of Mines, New South Wales, for the year 1925, gives a description of the outburst of gas on that occasion, and it is interesting to note that the seam, which was 10 ft. thick at the part where the outburst occurred, had 1,200 ft. of cover. A total of 9 ft. of the seam was being worked, the lower foot being splint coal which was left down. Since that outburst, boreholes were kept ahead in all places in the vicinity of the fault, and boreholes continued to give off gas, which proved on analysis to be practically pure Carbon Dioxide. *This is similar to Collinsville.*

The third outburst, which occurred after the Collinsville disaster, had similar indications to what were experienced at Collinsville, in that some of the witnesses saw a big thick cloud of " white haze sort of stuff."

They heard a rumble like splitting timber a long way off. (There is no similar evidence in the Collinsville disaster, but we incline to the view that Parkinson, Peterson, and Logan probably did receive some short warning.)

The Management's plans were to bore holes ahead of the working place in which the disaster occurred and these holes were to serve a three-fold purpose in that—

(a) They could prove any fault or dislocation of the seam ;

(b) They allowed CO, to bleed off ; and

(c) They were used for water infusion.

During evidence at the inquest, the witnesses stated that *mostly the* advance *holes were allowed to run out before new ones were put* in.

According to the Deputy on the day shift inspection there was nothing unusual which would lead them to suspect that an outburst would occur.

Following the last fatal outburst in December 1954, the Metropolitan Coal Company Pty. Ltd. decided that, in the interests of future safety, they should proceed with a policy of practical experimentation and basic research into the problem of control of CO, outbursts.

The decisions were made all the more obvious: from a study of Stutzer's paper " CO, Eruptions from Coal Seams in Lower Silesia," a copy of which was made available to them by Mr. Platt, Chief Inspector of Collieries for Queensland.

From this paper it was concluded that the practice of drilling small diameter boreholes in advance of the working face *could not be considered as affording positive protection against further outbursts,* since it was apparent that if the CO, was held in solid solution it wa•s incapable of being liberated in any quantity because two or three small diameter holes *would provide no significant relief of stress.*

It was apparent also that the only conditions favouring the release of large quantities of CO, were exactly those occasioned by normal mining operations. Hence the practical aspect of the problem was to find suitable modifications of the existing mining operations which would afford a greater measure of protection against further outbursts.

PRACTICAL EXPERIMENTATION.

Since the 1954 outburst at Metropolitan Colliery occurred during the *coal-cutting operation,* initial investigations were concentrated on this phase of the mining cycle.

It had been the practice at the colliery to cut on the floor in the interests of good coal preparation. It was also recognised that large volumes of CO, were emitted from both the floor and the coal during this operation.

It was also evident that the rate of emission of CO, from the floor rose to a maximum after about one third of the cut had been completed, and then it continued at this rate until near the end of the cut, when it diminished to approximately its original rate. This was disclosed by studying the volume of gas bubbles breaking the surface in water lying on the floor at the outbye end of the coal cutter. It appeared, therefore, that *there was a relief of stress in the floor strata in sympathy with the relief of stress in the coal as the cut progressed.*

We can say that this is typical of what was happening in the 3 *West Dip at Collinsville.*

At the present time at Metropolitan Colliery they are shear cutting before shot-firing.

BASIC RESEARCH.

The Geological Department of the University of Sydney are to study the problem of CO, outbursts with particular reference to Metropolitan Colliery, and will proceed on the following lines :—

(a) A study of the physical absorption of CO, with coal.

(b) A study of the solution of gas in solids.

(c) An investigation into possible chemical bonding of CO, and coal.

The above studies will be conducted—

(1) On the coal as a whole ;

(2) On the various plies within the seam ;

(3) On the various types of coal, vitrain, fusain, &c.

To date the University has not reached any conclusions on any of the above investigations.

The Chief Inspector of Coal Mines in Queensland should keep himself well advised of these investigations so that full advantage can be taken of any results which may be beneficial with regard to the working of the mine at Collinsville.

Term III B (3).

Collinsville State Mine.

Dealing now with Collinsville Mine itself, we have already referred to the Deputies' reports as showing the continuing presence of Black Damp and CO,.

The employees would appear to have become accustomed to the presence of CO, or Black Damp in the mine and this fact has been dealt with at length in Term I. of this Report.

We have also referred in Term I. to the samples of air taken within a few hours after the disaster and to the sample taken by the Chief Inspector on 15th October, showing the presence of 76 per cent. Carbon Dioxide.

We have also referred to the samples taken by Mr. Cundith in late October, 1954, showing 96 per cent. and 98 per cent. of Carbon Dioxide near the scene of the disaster, the presence of 82 per cent. of Carbon Dioxide in No. 2 Tunnel and the presence of over 70 per cent. in No. 4 West dip in No. 1 Tunnel.

It is therefore absolutely essential that the management and employees realise that CO, in the mine will be a constant hazard and must be guarded against.

Mr. Fallins, during cross-examination, was asked :-

" Did you notice that on the A side the coal was becoming crushed at the bord face ? No.

I mean finely ground and distorted ? No.

If, after an examination by you or by other competent persons, it was decided that the fault was coming in on the A side, would you continue to work the A side without any precautions against another outburst of gas ? I would. We are doing that every day. We know where there are faults when we are driving down towards them. The precaution we take is for gas coming from the hade of the fault. Any time you strike a fault, you invariably strike gas coming up from the hade of the fault.

What are those precautions ? By not driving too many faces at once down to it, so that you will not have too many faces fouled and so that you can keep it ventilated and extraordinary inspections at that face."

We are not in agreement with Mr. Fallins on this latter point, as more places would provide additional bleeding-off points for CO, in a given area.

Mr. Lightfoot stated :-

" I would say that the possibility of getting another outburst in close proximity to the main heading in that district is very remote. The area is now one that must be regarded as subject to such outbursts ; but after having pierced this trouble once I would be of the opinion that the pent-up gases would be thoroughly drained from the area within a fairly substantial radius of that point. I would be prepared to say that for the width which we are driving, that is, approximately, say, 220 yds. wide, you would be free of a repetition of this trouble for that perimeter."

He also stated :—

" In my opinion, boring is only of value for the purpose of detecting some disturbance in the seam. Boring ahead would obviously give you some early indication of a major disturbance ahead of you. There is no known case that I can find where boring has bled off any such accumulations. The value of boring, in my opinion, is limited to that. Provided the bore or bores were kept a reasonable distance ahead it would prove that you were approaching some major dislocation, and once that was located you could then adopt, probably, more stringent safety measures."

Also, when asked " What stringent safety measures ? ", he stated :-

" The one that is given the most accord in Europe is that when shot-firing in areas approaching a place where you anticipate this trouble, you withdraw all employees from the immediate vicinity on the return side to a point on the outbye side while shots are being fired, and keep them protected behind some form of barrier, which I would say would be a type of brattice door, so that there would be a barrier between them and the ordinary ventilating current. It has been mentioned—I heard Mr. Cundith mention—that you could not work with the pick. I am afraid that was rather badly expressed to you because what they meant by that was that you should not adopt a method whereby you remove the coal very slowly, a bit at a time, and the person using the medium of removing the coal is close to the face. Their intention was that the places would be prepared for blasting and blasted in one operation with all the men outbye at some point where they would be safe in the event of such an outburst."

He further stated :-

" We can all be wise after the event, but using the present case as an example, if boring had shown that up and it was known that it was subject to such outbursts, for a certain distance in that place and only in that particular place approaching it, you would withdraw the men a certain distance on the intake side when you were blasting it down."

He was further asked and replied :-

" Would boring ahead possibly in itself be the last straw breaking the camel's back ? If you have a pocket of gas being held back by barriers of solid coal, you might impair the strength of that barrier by blasting, so that it breaks and lets the pressure through. Could it be impaired by boring ? It could be. If so, the person doing the boring would obviously suffer.

I do not mean in the sense of bleeding through the hole, but weakening the barrier just by the boring itself so that the whole barrier breaks ? It could happen.

You don't think, from your reading, that boring helps in any way whatever so far as bleeding is concerned ? No.

Its advantage would lie in showing trouble country ahead ? Yes.

Which, in a mine, which is known to have this potential danger, would be an asset ? Yes. I do not mean either that the holes should be drilled criss-cross all over the heading. You would reach the stage where it would be more expensive to drill holes than work the mine.

The suggestion is to drill holes ahead and then on the flank every so often ? Yes, on the principal heading, or approaching virgin country."

He was also asked and replied :-

" Have you read about the Helensburg disaster ? Yes.

What was the purpose of the boring there ? Was it to act as a bleeding pipe or for some other purpose ? It would obviously be designed to act in both ways, as an indicator of trouble ahead and as a medium for bleeding it off if you found it. As I read the Helensburg information, the original plan was to bore some 70 ft. ahead, then drive the headings until they got within a reasonable distance of the end of the boreholes and bore again. Over the latter years, water infusion has been practised in this mine, and I think the hole or holes were used for a triple purpose.

That is what I had in the back of my mind ? They bored the hole ahead as an indicator of trouble. It was used for the purpose of a free issue of gas if found, and they made it a utilitarian job by using it as one of the holes for the insertion of water. I could not tell you exactly the distance ahead it was bored at the time of the recent outburst. I have not seen any information on that."

Mr. Lightfoot, while giving evidence, quoted part of a paper by 0. Stutzer, which is as follows :-

" As a rule catastrophes can be prevented *if the eruptions are released before they release themselves.* This is brought about by tremor shots from covered shooting places. These shots can be ignited at different places simultaneously by electricity. The crew of the mine section retreat then behind covers which are connected with each other and with the surface by telephone."

Mr. Lightfoot also gave a quotation from Mr. Lenge, who said :-

" In every case the outbursts have been preceded by one or more of the following symptoms :—Heaviness of the atmosphere ; frequent dull explosions ; pressure in the boreholes ; detachment of plates of coal, with decrepitation, and changes in the physical state of the coal.

The force of the outburst appears to increase with the depth.

Experience has demonstrated that the most useful precautions to be observed when the presence of the gas is suspected are—(1) arrangements for supplementing ventilation ; and (2) entire suppression of the use of the pick, and working solely by means of shot-firing—the workmen to retire behind solid barriers at the moment of firing.

It was found that boreholes were quite useless to drain the gas from the coal."

Mr. Winstanley was asked and replied :-

" You have been there the length of time you have told us and obviously you have had very fine opportunities of seeing the workings of that mine in all its departments ? Yes.

To summarize what you have already told the Commission in concise form, let us put it this way : You have at your command there a mine which is inherently safe ? Yes.

There is no doubt about that ? Yes, a good mine.

There is no doubt about the safety, that is distinct from incidents which may occur in it : As a mine, you say it is an inherently safe mine ? Yes.

Free of dust ? Yes.

Not a gassy mine : That has been stated over and over again ? Yes.

You have the quantity of the coal and the quality of the coal which justifies the conduct of that mine ? Yes.

There is no doubt about its quantity and its quality ? There is no doubt about that.

There is no doubt about its workability ? No."

Mr. T. Platt, Chief Inspector, for the Queensland Government, when being questioined with regard to a visit to Metropolitan Colliery, New South Wales, stated :-

" Generally the coal field at Helensburg, part of the southern coal field of New South Wales, has much in common with the State Coal Mine, Collinsville :-

(i.) Coal Characteristics ;
(ii.) Dykes ;
(iii.) Igneous sills and burnt-out coal ;
(iv.) Faulting.

The likehood of outburst of CO_2, peculiar in Australia so far in these two coal mines at Helensburg and Collinsville, *constitutes a problem and a menace which definitely could recur*. At an opportune time there should be discussions between New South Wales and Queensland Mines Department officers, to seek the establishment of safety precautions."

He was asked and replied-

" Well, this outburst for you was unexpected. You now know that there is that possibility of a blow taking place anywhere where there in an igneous intrusion in the mine ? Yes, I think there is a possibility of eruptions in the vicinities of faults and dykes.

By the Chairman : You do not confine them to igneous intrusions ? No.

By Mr. Barrett : On many of those igneous intrusions, faults and dykes, you have not full reliable information as to when you will meet with one ? No, dykes could come in in that field at any time.

You spoke of necessary precautions to be taken in the future at Collinsville. What do you mean by necessary precautions ' to obviate a further outburst ? (no answer).

By the Chairman : Is that what you mean exactly—to ' obviate ' ? I suppose you mean to try and prevent one and minimise it and take precautions against it when it does occur ? Yes. I was invited by the Under Secretary to co-operate with Messrs. Inspector Roach and Taylor and the Manager, Mr. Winstanley, in drafting recommendations for precautionary measures in future work. I am not very well satisfied with them. I think it is quite a big problem to devise ways and means for them so far as possible protecting mine workers against these outbursts both at Collinsville or in the Bowen field, and also at Helensburg."

He further stated-

" When we get associated with CO_2, we get mixed up with soft coal. Coal that has been ground apparently through faulting becomes pulverised. Then, of course, it becomes a good receptive medium for CO_2, and it will absorb or adsorb a large amount of 00_2, whereas normally hard strata would not absorb or adsorb that, although it might be found in crevices ; it would not be found absorbed with the coal. Actually this is soft. If we put a borehole into it, then the borehole itself might collapse. You might never have a hole. It might coagulate round the drill to the extent that it is tied on the drill. When you pull the drill out the hole has collapsed. You never really had a drillhole, and I think that is one of the points which we have to try and offset.

Of course, if you have solid coal before you get to the pulverized coal in which the CO, is absorbed, or to which it has adsorbed, what about the boreholes bleeding off other than going through the solid stuff ? I think we would bleed a lot of it off. I think one of our troubles here was due as a major trouble, because we had only barred that fault for a distance of about 30 chains. Previously we had barred that and other faults at intervals of a chain, and there was a bleeding-off at the fault line apparently of CO, ; but in this case, owing to mechanization going through with 3 West, I think we were 20 to 30 chains away from the last place where this fault had been met with."

Mr. Barrett stated in his address

Concerning the gases generally and what the witnesses called the normal condition of the mine, I think the bubbling which was there before the disaster, and still continues should have given the General Manager, the Mines Department and all those responsible for the safety of the men, some cause for alarm, or should have set their minds inquiring into the reason, but the evidence shows that there were no analyses of that gas until after the disaster.

In all the teachings of mine managers, one of the first lessons is that untoward signs such as that should be investigated, and I believe that all those who were in charge of the mine, including inspectors, failed in their duty in not having that gas analysed and not taking precautions.

I am not at this stage suggesting it would be known that such an outburst of such a magnitude would take place, but the evidence is conclusive that that gas was coming out for years and nothing was done to try to prevent it, yet the history of mining has many instances of this, and I believe that some such investigation by those responsible would have led them to bore ahead, which probably would have prevented a major blow."

Mr. Paterson during his address stated that if the mine was not safe then it should be closed, but there was no such evidence yet, and, as the colliery was important to Northern Queensland, the mine should continue to operate.

Mr. J. T. Taylor, Inspector of Mines, made certain recommendations in the Mines Record Book (Exhibit 9) on 3rd December, 1954, in regard to precautions to be taken against future outbursts. He also annexed a plan of working.

His scheme envisaged boring ahead and on the flanks.

As we have stated elsewhere, we adopt the view that in future operations in the mine the only advantage that would be obtained by boring ahead would be to discover some disturbance of the seam, and the steps, which we advocate should be taken presuppose that such trouble does lie ahead in certain areas and this intermediate step is therefore unnecessary.

RECENT REPORT BY MR. CUNDITH.

We have recently received a report dated 28th October, 1955, from Mr. Cundith, who at our request again visited Collinsville and made inspections of both the State Mine and Bowen Consolidated and made certain tests of gas conditions. In the No. 2 Tunnel Dip faces and bords off the Dip, the working places being about 150 yds. from the fault, there was no evidence of gas emissions up to 11th October, 1955, but on 12th October he discovered gas emissions in boreholes in the faces, but the pressure and flow were not significant.

The temperatures were slightly higher than those obtaining near the face.

Pressures ranging from three to eight pounds per square inch were met between 14th and 17th October in the fresh holes which were bored, but the pressures decreased on 21st October to from nil to five pounds per sq. in.

Boreholes, he stated, " do not ensure the location of potential outburst areas and their limited number, whilst revealing faults, dykes, sills, only gives a more or less 50-50 chance of locating high-pressure areas in the seam."

He suggested for consideration the following technique :-

(a) Three boreholes in the face, one being in the centre and an angular hole at each corner ;

(b) Reducing the area of the advancing face ;

(c) Firing shots by exploder from distances in the main intake at not less than second level and deferring entry to the face for a time ;

(4) Waiting till pressure drops.

With regard to the No. 1 Tunnel, he stated that the position at the dip face in No. 3 West is reassuring. Ventilation is good, with 27,000 cu. ft. per minute with the booster fan shut off. The analyses of the air show on the intake side a CO_2 content of .2 per cent., on the return side .3 per cent. and 6 ft. from the face, 15 ins. from the floor, 1.2 per cent., and under the staging 4 ins. from the floor •6 per cent. He stated that there are a number of downward pitching boreholes in the floor and face and that noises and bubbling sounds can be heard in the holes and, although containing CO_2, the gas pressures are negligible.

He states now with regard to the outburst that it is difficult to determine whether the pressure area was located in the broken roof material or chiefly resident in the seam.

From this last report of Mr. Cundith, it will be observed that he now advocates, as one of the safeguards to be taken, that shots should be fired from a distance.

Nothing in his report inclines us to depart from our plan, which does not envisage a boring ahead programme.

Term III B (4).

Conclusions and Recommendations.

On this aspect of the term, which is the most important factor for consideration—i.e., the possibility of future outbursts of CO_2—we realise that it will be impossible to devise any method which would eliminate such possibility.

It is essential, therefore, that the operation of the mine be such that, if such outburst does occur, the employees will be, as far as is reasonably practicable, adequately protected.

The authorities which we have cited, particularly the more recent ones, *indicate that boring ahead is of no practical advantage except to discover if there is trouble ahead.* It does not in itself provide any safeguard against an outburst nor enable the gas to effectively bleed off.

We think that, if the precautions which we recommend are adopted, such precautions will ensure a reasonable degree of safety in the operation of the mine.

We recommend that in all main development places in addition to places known to b e approaching a proved fault, dyke, or sill, that grunching with mini-second delay detonators should be resorted to, with no employees allowed within the area which would be affected in the event of an outburst, and the person engaged in the operation of shot-firing to be no closer than 300 ft. on the intake side when the shots are fired.

We are of the opinion that inducer shot-firing, as suggested, will provide maximum safety for employees by including outbursts when employees are absent from any area likely to be affected in the event of an outburst.

These precautions are framed on the basis that, when a known fault, dyke or sill is being approached or when virgin country is being developed by the driving of main development places, trouble is assumed to be ahead.

We further recommend that as much of the shooting of all places, as is reasonably practicable, should be done at a time when the least number of employees are in the mine and that as many shots as possible should be fired at the one time whether by inducer or simultaneous shot-firing.

Further details of the method of working in the future, which we recommend, are found in Term II D.

These recommendations are made to provide maximum safety for the employees and are made after the most careful consideration of which we are capable, of various authorities and other matter which have been placed before us and which we have ourselves discovered.

Term III B (5).

General.

We have almost entirely confined ourselves to the questions of outbursts of CO, in the future.

As to CH,, Methane, we recommend that precautions be taken as have been taken in the past and as are provided for in *"The Coal Mining Acts,* 1925 *to* 1952."

We believe that the danger of likely outbursts is not sufficient to warrant any conclusion that the mine should be closed on this ground.

Finding.

On the whole, therefore, with regard to this heading, i.e., regard being had for the safety, health, and protection of the miners from the angle of the mine being inherently unsafe by reason of a likelihood of an outburst of CO, or any other cause, we are of opinion that the use of the mine should not be discontinued.

Term III.

Whether, Regard being had for the Safety, Health, and Protection of the Miners, the Use of the Said Mine Should be Discontinued.

Conclusions.

1. In relation to the general aspect of ventilation, no evidence was put before us to support the belief that the safety, health, and protection of the employees are likely to be imperilled or endangered in the future working of the mine.

2. Nevertheless we believe that the second intake should be completed at the point in 3 West as shown on Annexure No. 35.

3. As it is almost certain that continuous emission of CO, will result in accumulations of Black Damp in the working places in the Bowen Seam, we recommend vigilant inspection and all the ventilation reasonably possible.

4. We do not believe that coal dust is a menace at the mine and we see no reason why it should constitute one in the future. Nevertheless it is necessary of course to see that the Coal Mining Act is adhered to and complied with and the ordinary precautions taken after shot-firing with stone dusting carried out when required.

5. In relation to simultaneous shot-firing, we believe that detonators should be grouped as to resistance and only those of the same resistance used in the same operation. In these circumstances, simultaneous shot-firing could be continued.

6. Where we have recommended grunching in place of coal cutting, delay action detonators should be used. In the Report we have recommended the use of milli-second delay shooting in certain places and this may require amendment to the Queensland Coal Mining Act, Clause 69, Schedule 2. We recommend that such amendment be made.

7. We recommend that shot-firers should be the holders of at least a Deputy's certificate.

8. We are of the opinion that a rescue station should be set up in the district under the Act, to serve the State Mine and Bowen Consolidated Mine, such station to be equipped with the necessary apparatus. The trainees should be properly trained, including training underground.

9. Consideration should also be given to the organisation of a fire-fighting group among surface employees to deal with all surface fires and underground employees for trouble underground.

10. The Chief Inspector of Coal Mines in Queensland should keep himself well advised on investigations being made by the Geological Department of the University of Sydney in relation to the problem of CO, outbursts.

11. We recommend that in all main development places in addition to places known to be approaching a proved fault, dyke, or sill, that grunching with milli-second delay detonators should be resorted to, with no employees allowed within the area which would be affected in the event of an outburst, and the person engaged in the operation of shot-firing to be no closer than 300 ft. on the intake side when the shots are fired.

12. We are of the opinion than inducer shot-firing, as suggested, will provide maximum safety for employees by inducing outbursts when employees are absent from any area likely to be affected in the event of an outburst.

13. We further recommend that as much of the shooting of all places, as is reasonably practicable, should be done at a time when the least number of employees are in the mine and that as many shots as possible should be fired at the one time whether by inducer or simultaneous shot-firing.

GENERAL FINDINGS.

Regard being had for the safety, health, and protection of the miners, the use of the mine should not be discontinued, either from the angle of unsafe practice, usage, custom, or condition, or from the angle of the mine being inherently unsafe by reason of the likelihood of an outburst of CO, or any other cause.

TERM IV.

" WHETHER, REGARD BEING HAD TO THE PUBLIC INTEREST, THE USE OF THE SAID MINE SHOULD BE DISCONTINUED."

1. Conditions affecting public interest.
2. The future supply and demand position.
3. The employee and human relations aspect.
4. Alternatives to Government Control.
   (a) Sale of the mine.
   (b) Lease of the mine.
5. The arguments for and against continuance.
6. General consideration of the position.

(1) CONDITIONS AFFECTING PUBLIC INTEREST.

There is no doubt that the Collinsville State Coal Mine has contributed greatly to the development of North Queensland. For example it has—

(a) Developed the coal resources of the State.

(b) Helped to develop North Queensland industries by making coal available at reasonable prices.

(c) Obviated extra strain on the Railways by minimising haulage of coal.

(d) Saved the State and/or North Queensland consumers large sums of money by the development of coal resources close to points of usage.

(e) Given employment to anywhere between 200 and 400 men over a long period of years.

Indeed the one major adverse factor is the losses which have operated. There is also by inference the thought that with extra production of coal the benefit to North Queensland could have been even greater than it was. The export of coal or coke to Noumea and coal to Korea or other overseas markets was also a distinct possibility.

These various factors must be considered to see whether they still apply ; In other words, if it is not necessary for coal to be produced in North Queensland by the State Mine, then there is no argument in favour of keeping the mine going in the public interest, even if there is no argument against it. Any consideration of this kind is best interpreted in relation to the general consideration of the future supply and demand position in relation to coal.

2. THE FUTURE SUPPLY AND DEMAND POSITION.

Any repetition of the past supply and demand position projected into the future is of the utmost importance in considering the future of the mine. If supply and demand in the future corresponded with the position in the past, the case for making certain that coal production in North Queensland should be increased rather than reduced would be beyond doubt, and probably only two questions would remain to be solved :-

(a) Whether, and how, this production could be increased, and

(b) Whether the mine should continue under the direction of the State Mines Department, or whether some other means of control should be found.

The Secretary of the Queensland Coal Board gave us valuable advice in relation to what the future supply and demand position was likely to be. What follows in this connection is, therefore, largely a summary of his evidence concerning this matter, which will be found particularly on pages 4658 and 4671. This evidence has been supplemented by a little additional, and later, information to bring the figures up to date.

Mr. McCarthy commenced by analysing the changes likely to take place in future demands for coal by the Railways, Electric Authorities, Meat Works, Coke Works, Gas Works, Cement Works, Mining Projects, and Colliery usage itself. He then went on to say that he did not anticipate any violent fluctuations in the calls for coal by the other consumers listed, i.e., Sugar Mills, Shipping, Harbour Boards, Breweries, and Miscellaneous, although he expected some slight upward trend in the demand of these consumers. His analysis of the 1954 position appears on pages 4658-60.

He felt that the demands on the Northern mines for 1954, would be as shown, and his later figures for 1955 have been added. The figures are for calendar years :-

Consumer.	Tons.	Tons.
	1954.	1955.
Railway Department	148,000	149,774
Mining Projects ..	110,000	106,725
Coke Works	54,000	33,834
Electricity Authorities	40,000	61,322
Sugar Mills	21,000	16,543
Cement Works	24,000	14,437
Meat Works	20,000	34,546
*Colliery Usages	8,000	13,590
Gas Works ..	4,000	12,602
Harbour Boards and Shipping	9,000	8,248
Brewery ..	3,000	3,166
Sarina Distillery ..	6,000	
Miscellaneous ..	4,000	2,347
	451,000	457,134

* Calculated on the basis of no requirement for Colliery coal by the Collinsville State Mine.

Mr. McCarthy added-

" I would expect this demand to show an upward trend of some 4 per cent. to 5 per cent. per annum, as the natural growth of industry for the next four or five years, after which it may materially increase by the extra consumption by Mount Isa Mines Ltd. " (page 4660).

In order to obtain a true picture of the position, it is necessary to compare the Usage of Coal and the Production of Coal by North Queensland consumers. The following table sets out these figures for calendar years as shown in tons :-

Year.	Usage.	Production.
1949	352,829	217,455
1950	366,053	238,885
1951	392,433	237,965
1952	408,652	256,597
1953	413,340	249,035
1954 . ..	435,931	299,669
1955 (estimated)	457,134	351,594

The above figures converted to financial years would be :-

Financial Year.	Usage.	Production.
1949-50 ..	328,154	220,396
1950-51 ..	386,263	227,639
1951-52 ..	396,751	242,891
1952-53 ..	406,239	264,464
1953-54 ..	422,345	259,084
1954-55 ..	445,364	313,038

It will be readily seen that there has been a continued and important lag in coal production from North Queensland sources when compared with North Queensland consumer requirements.

Mr. McCarthy then turned to the possibility of meeting the demands. He pointed out firstly that the Mount Mulligan Field could be expected to produce about 30,000 tons per year, and on the basis of present output from the Bowen Consolidated Underground Mine, that mine could be expected to produce in the vicinity of 100,000 tons per year.

These two sources would therefore provide 130,000 tons of the expected demand of approximately 450,000 tons, leaving 320,000 tons to be produced by the Bowen Consolidated Open-cut or from other sources, in the event of the State Coal Mine closing down and producing nothing.

He estimated that this 320,000 tons could be cut down to 300,000 tons as far as requirements from the Bowen Field are concerned, because the Railways Department and some northern sugar mills show preference for Blair Athol coal for specialized purposes, whilst Mount Isa Mines draw some coal from the Bluff Field.

The usual practice which would be adopted by the Queensland Coal Board would be to allow an open-cut mine belonging to Bowen Consolidated to produce sufficient coal to make up the *deficiency* between the balance of 300,000 tons required and the output of the State Mine.

The Board's policy was to endeavour to obtain sufficient coal to meet the requirements of the region without running into over-production. Over-production would provide difficulties in North Queensland in particular, because it would be quite uneconomic to endeavour to ship northern coal to southern ports.

The open-cut at Scottville commenced as the result of a request from the Chairman of Bowen Consolidated Mines Ltd. on 30th March, 1953, to the Deputy Chairman of the Queensland Coal Board. In this application the company indicated that it would continue to produce at the rate of 400 tons per day from the underground mine, thus giving 92,000 tons from this source for 230 working days, but would like to obtain an open-cut production of 52,000 tons for the same period.

It can be appreciated that this application was made at a time when the expected extra production from the State Mine as a result of mechanization was not being realized. No harm to underground mine producers and considerable good to North Queensland coal consumers would, at that stage, result from the granting of the application.

The request by the Chairman of Bowen Consolidated Mines Ltd. was submitted by the Queensland Coal Board to Cabinet on 29th April, 1953, with a recommendation that the company be granted permission to commence open-cut operations, the output to be restricted to 50,000 tons per year, the whole of which was to be consigned to Mount Isa Mines Ltd., and with the further proviso that the existing underground mine of Bowen Consolidated would be continued. The recommendation was approved by Cabinet on 30th June, 1953, and was returned to the Board with the following notation :—

> " Approved by Cabinet, subject to rigid enforcement of conditions set out in application by Mount Isa Mines to Coal Board and that open-cut coal be for the exclusive use by Mount Isa Mines."

By June, 1954, it became apparent that North Queensland consumers were experiencing considerable difficulty in obtaining their coal requirements from the Bowen Field and the following recommendation was submitted by the Queensland Coal Board to Cabinet and was approved by Cabinet on 24th June, 1954 :—

> " (a) That Cabinet decision of 30th June, 1953, be amended to permit Bowen Consolidated Coal Mines Ltd. to increase the production from its open-cut above 52,000 tons per annum to such an extent that it may supply Mount Isa Mines Ltd. with coal at the rate of 2,000 tons per week and that it may assist in meeting the requirements for graded coal of the Railway Department and other consumers who are unable to obtain their supplies from the Bowen underground mines, subject to :-
>
> (i.) Operations at the company's underground mine being continued at a minimum output of 400 tons per day, with the employment of at least the existing personnel and no retardation being made to the development programme at the underground mine.
>
> (ii.) Coal produced at the open-cut and treated on the company's screening plant and sold to consumers other than Mount Isa Mines Ltd., being sold at the present prevailing district prices, subject to any review of such prices warranted on an examination of costs supplied by the company to the Board.
>
> *(b)* That the position be reviewed at the end of the present year, and an allocation be then determined for the open-cut in the light of the then output from the two underground mines on the field, and in the light of the then requirements of North Queensland consumers."

Mr. McCarthy, in his evidence, page 4671, then went on to recount the subsequent history of the open-cut :—

> " On 13th December, 1954, the Board reported to the Minister for Mines on production from the Bowen field and consumer requirements, and permission was granted for the Bowen Consolidated Company to continue its production of open-cut coal above 52.000 tons to such an extent that it might meet the requirements of those consumers in the Northern Division who were unable to obtain their full coal requirements from the underground mines on the Bowen Field.
>
> Some months elapsed before a definite allocation of coals of the required grades could be made to the company, but an allocation was finally made on 11th May, 1955, which provided for an output from the open-cut of 4,400 tons per week."

The table hereunder shows the production from the open-cut in half-yearly periods since 1st July, 1953 :—

Half-Year ended.	Tons.
31st December, 1953 ..	5,265
30th June, 1954 ..	18,953
31st December, 1954 ..	48,800
30th June, 1955	49,291
31st December, 1955 (estimated)	94,294

Fortnightly production from the Bowen open-cut, in fortnightly periods commencing with fortnight ended 16th April, 1955, was :-

Fortnight Ended.	Tons.
16th April, 1955 ..	5,040 (8 working days)
30th April, 1955 ..	6,205 (9 working days)
14th May, 1955 ..	6,849 (9 working days)
28th May, 1955 ..	3,745 (6 working days)
11th June, 1955 ..	7,311 (91 working days)
25th June, 1955 ..	3,229 (4 working days)
9th July, 1955 ..	3,437 (5 working days)
23rd July, 1955 ..	7,048 (10 working days)
6th August, 1955	5,517 (10 working days)
20th August, 1955 ..	7,131 (10 working days)
3rd September, 1955	5,566 (10 working days)
17th September, 1955	6,812 (10 working days)
1st October, 1955 ..	6,496 (8 working days)
15th October, 1955	6,118 (10 working days)
29th October, 1955	6,479 (10 working days)
12th November, 1955	6,970 (10 working days)
26th November, 1955 ..	12,720 (10 working days)
27th November to 31st December, 1955 (estimated); ..	20,000

At the time of giving evidence and based upon an estimated requirement of 450,000 tons, the position was, according to Mr. McCarthy :-

(a) A daily production of 350 tons from the Collinsville State Mine.

(b) daily production of 500 tons from the Consolidated underground mine.

(c) A daily production of 800 tons from the Consolidated open-cut.

(d) From Mount Mulligan district, 30,000 tons annually.

This left 81,000 tons to be supplied from outside fields.

The following table sets out the position :-

	Tons.
ox Mount Mulligan district ..	30,000
ex Collinsville mine	73,000
ex Consolidated underground mine	100,000
ex Consolidated open-cut ..	166,000
ex Outside fields ..	81,000
	450,000

Mr. McCarthy pointed out that the drawing of 81,000 tons per year from outside sources such as Blair Athol, Callide, and Bluff is much less than that purchased in previous years, but still a substantial quantity, which, because of the higher delivered cost as against Bowen coal, would still mean a fairly heavy burden to coal users. He estimated that taking the Townsville Regional Electricity Board as a typical example, the delivered prices of these outside coals would exceed the delivered cost of Bowen underground coal by amounts ranging from £2 9s. 2d. per ton to £4 Os. 5d. per ton, and this would mean an additional cost of something between £200,000 and £325,000 for the 81,000 tons of coal from other fields.

As Mr. McCarthy indicated, portion of this would be offset by the saving in the purchase of Bowen open-cut coal at 15s. per ton lower than underground coal and such saving would reduce the figures stated above by £125,000, making a net additional cost to consumers of something between £75,000 and £200,000 per year, depending on the outside field from which the additional coal was supplied.

In order to arrive at some picture of the position as it would be if the State Mine ceased to function completely, we asked Mr. McCarthy what position would be reached in this eventuality. As will be seen from the evidence, in answering this, Mr. McCarthy also informed us of a recent application by the Bowen Consolidated Mines Ltd. to step up open-cut production to such a figure as would approximate 1,300 tons per day and at the expiration of open-cut supplies in four years at this rate, Bowen Consolidated would have coming into operation a new underground mine which would produce ultimately the same as the open-cut, viz., 1,300 tons per day.

This programme would then give the following tonnages :-

	Tons.
ex Mount Mulligan district ..	30,000
ex Consolidated underground mine ..	100,000
ex Consolidated open-cut ..	300,000
ex Other fields ..	20,000
	450,000

Mr. McCarthy went on to analyse the economic position so far as North Queensland was concerned on such a programme :-

"Such a production would give to consumers a two-fold advantage-

(a) It would provide an additional quantity of 134,000 tons of open-cut coal per year at a price of 15s. per ton below the present underground price-a further saving of £100,000 per year in addition to the £125,000 shown above from the present open-cut production. In addition, the saving might be considerably greater as with increased production, the price of open-cut coal may fall by a further 6s. to 8s. per ton.

(b) It would reduce the purchase of outside coal by 61,000 tons per year, and as shown above, such coal costs between £2 9s. 2d. and £4 Os. 5d. per ton more than Bowen underground coal."

Taking into account the pithead price per ton, the rail freight per ton, and the landed price per ton of coal at Townsville, the total annual consumer coal bill, if the whole of the coal were delivered to one consumer would be :—

	£	*s.*	*d.*
73,000 tons ex Collinsville at £5 7s. 8d.	392,983	6	8
100,000 tons ex Consolidated at £5 7s. 8d.	538,333	6	8
166,000 tons ex Open-eut et £4 12s. 7d.	768,441	13	4
40,000 tons ex Blair Athol at £9 4s. Od.	368,000	0	0
41,000 tons ex Collide at £7 16s. 10d.	321,508	6	8
420,000 tons	£2,389,266	13	4

This does not take into consideration any fluctuations in calorific value between the two coals, but for the purpose of these calculations this could probably be excluded. To the extent that it is a material factor, it would react in favour of savings from Bowen district coal to the extent of and as affected by the provision of Callide coal. If the open-cut production was extended as previously suggested, that is to the extent of 1,300 tons per day, the position would be as follows :—

	£	*s.*	*d.*
100,000 tons ex Consolidated at £5 7s. 8d. ..	538,333	6	8
300,000 tons ox Open-cut at £4 12s. 7d. ..	1,388,750	0	0
10,000 tons ex Blair Athol at £9 4s. Od.	92,000	0	0
10,000 tons ex Callide at £7 16s. 10d. ..	78,416	13	4
	£2,097,500	0	0

As can be seen, the latter scheme would suggest a saving of nearly £300,000 per year apart altogether from any additional saving which would come if the open-cut price was further reduced as the result of increased output.

The obvious question which arises from this latter statement is whether the open-cut production can be expanded to 1,300 tons per day and what would be the life of the open-cut at this increased tonnage. In any suggested scheme of this kind, this is the most vital factor of all.

Mr. McCarthy advised us that as the result of information received, the Queensland Coal Board did not believe that any great difficulties would be presented in accomplishing a target output of 1,300 tons per day and that at this rate there would be sufficient coal reserves available to permit of such production for " probably four years ahead." As this matter is so fundamental, we quote Mr. McCarthy's own words :-

> " The present daily output from the Bowen open-cut is something like 800 tons, but such output is restricted to that figure largely by the machinery being utilised, which, of course, is regulated by the orders held by the operating company. Given a definite output target for any substantial time ahead, and provided with definite orders, the company should very quickly step its production up to 1,300 tons per day or even greater, if required.
>
> The known available reserves of exploitable coal capable of economic open-cut extraction on the Bowen Consolidated Company's leases were established at 1,500,000 tons, of which approximately 124,000 tons have been already won, leaving further reserves at present of 1,376,000 tons or sufficient to last on the basis of an output of 300,000 tons per year for nearly four years.
>
> I have not taken into account the possibility of proving by drilling further deposits of coal on the field capable of open-cut extraction. However, if such deposits are proved, it may be that they will not be of coking coal. The present open-cut coal is not suitable for coke manufacture.
>
> It would therefore appear that excluding the State Mine, Collinsville, there is on present information a potential source of an adequate supply of Northern Division coal to North Queensland consumers, for some four years ahead, and it is believed that the types of coal available would be suitable for the requirements of consumers.
>
> For example, Mount Mulligan coal would continue to be sent to its present users, Bowen Consolidated underground coal could be allocated to the Coke Works, to the Gas Company, to Shipping, and Harbour Boards and to small sugar mills and to various other users, leaving the output of the open-cut for disposal to railways, Mount Isa Mines, electricity generating stations, meat works and other steam-raising establishments." (pp. 4661-2.)

It seems a reasonable conclusion, therefore, that if it was decided in the public interest to close down the State Mine, even to the extent of completely ceasing production, the necessary supplies for North Queensland could be, and would be, adequately catered for, for the next four years, and indeed consumers in North Queensland would receive a substantial economic benefit as the result of this. It should, of course, be noted in passing, that the same benefit would be established to North Queensland consumers if the State Mine produced the 100,000 tons of underground coal in place of the Consolidated Mine.

In the life of a community a mere matter of four years, however, would give no true picture for the future, and in like fashion no conclusion upon which policy for the State Mine can be based.

A completely new and very important factor has, however, entered into the future picture by reason of a new proposal by Bowen Consolidated Mines Ltd., who have now informed the Queensland Coal Board that they are now planning :—

> ,`. . . in the advanced stage a new large-scale modern underground mine which, subject to some assurance of a continuity of orders and demands, they are prepared to undertake. The company's leases are at present being drilled to determine the precise disposition of the exploitable reserves and the Company has in contemplation a mechanized multiple entry mine laid out in units of 250 tons per day production capacity and capable of meeting all demands for all types and classes of coal required. Several discussions have already taken place between the Coal Board and the Company on the project and the Company awaits only an assurance of future orders of sufficient magnitude to advance its proposal further.
>
> Such a mine would be in the producing state before the exhaustion of the resources in front of the present open-cut and the existing underground mine, and should assure the complete satisfaction of all North Queensland demands for coal for many years ahead." (p. 4662.)

We have given very serious thought to the implications of the foregoing because as indicated earlier, this new and highly important factor must be considered when dealing with the subject of the future of the State Mine.

Before the suggestion of Bowen Consolidated Mines Ltd. in relation to the new underground multiple entry mine was made, it appeared that it was essential to carry on the State Mine (whether it be by Government control, sale, or lease would be a separate matter) because—

(a) The short life of the open-cut could well mean that the State Mine's production would be vital in four years' time ;

(b) As an ecomonic asset in the life of North Queensland, its preservation would have been essential.

If, on the other hand, the proposal by Bowen Consolidated. Mines Ltd. did actually eventuate, and both mines kept producing, it would mean either an over-supply of coal in the North Queensland area, or a restriction of production on the part of one or both of the mines in order to dovetail production and demand as well as possible.

Two further factors arise in this connection. The first is that presumably Bowen Consolidated would commence its underground mine preparation early enough to co-ordinate underground with open-cut production. If this co-ordination took the form of an underground timetable to commence as open-cut production ended, it would mean that five units of 250 tons each would have to be ready when the open-cut gave out.

This is not, however, likely to happen. Presumably as units became available in the underground mine, particularly after, say, the first two years or so, underground production would commence, and open-cut production would either ease off proportionately or would be carried on at the old rate if the demand warranted the extra production. As more units were in use, so there would be further reductions in open-cut production. Under these circumstances, the open-cut would last longer than four years. This would, of course, be no barrier, and indeed may have its advantages.

This brings us to the second factor. Mr. McCarthy, on behalf of the Queensland Coal Board, said that in his view there would probably be an increase of some 5 per cent. in the requirements of the Northern area each year. Even on a simple rather than a cumulative calculation, this would mean that at the end of five years, the 450,000 tons for, say, 1955-56 would in 1960-61 have become 560,000 tons, and presumably, instead of a production of 100,000 tons from the underground mine, and 300,000 tons from the open-cut, a total of 510,000 tons would be necessary from the underground mine when the open-cut production ran out. This would require, on a unit production of 250 tons per day, calculated on a 230-day year, nine units. This is very important, because, it was suggested that only five units in the new mine would be necessary Admittedly, if the present Bowen Consolidated underground mine continued, then the nine units would drop to an additional seven or eight.

A supply of 500,000 tons per year is, of course, by no means impossible, yet it is no easy task. It is admitted that the Bowen seams are good seams and the coal very acceptable coal, yet it is equally true that mining is at all times problematical, and the experience in this Collinsville area does seem to suggest that the future will not be without its problems. In the first place, once a disaster has occurred, more elaborate precautions must be taken to prevent a recurrence. Secondly, the geological surveys indicate beyond doubt that faults and sills abound in the area, that some seams run out, that there is a good deal of pulverised coal and a lot of burnt-out coal. It is not to be wondered at, and is a matter for congratulation, that Bowen Consolidated is carrying out an extensive drilling programme to minimize the risks. It can never eliminate them..

Summing up, the evidence seems to suggest that, subject to certain contingencies and imponderables, North Queensland coal consumers could become quite independent of any coal production by the Collinsville State Mine, providing the plans of Bowen Consolidated in relation to an open-cut production of 1,300 tons and the existing and future underground plans, (taking into account the 5 per cent. increase) materialise on that basis.

It appears to us, therefore, that, looking at these matters in the public interest, the following factors emerge :-

(1) Any plan which would finally obviate any future losses of the magnitude of those sustained by the Collinsville State Mine during the last two years and still procures the necessary coal to preserve the economic advantage of northern coalfields supplying northern coal requirements in full, must be examined most carefully.

(2) An output of 500,000 tons per year is a major proposition, and whilst it is not suggested that it would be beyond the accomplishment of an organisation like Bowen Consolidated, nevertheless it does represent a very great increase on anything yet accomplished, or even attempted as yet. Large outputs raise problems and any falling-down on this programme would simply mean that the shortage would have to come from southern mines. It is noted that latest figures suggest that the open-cut has now almost reached its allowed output. Whilst it may well sustain this rate, it is too early to indicate any permanent results.

(3) Coal mining is accepted as always having difficulties, particularly in the Collinsville area, having in mind not only human and industrial relations factors, but also the geological weaknesses known to exist in the coal seams in the area.

(4) The closing down of the State Mine and the development of the Bowen Consolidated project would have the effect of " putting all eggs in one basket," with the consequent economic and industrial dangers of such a policy.

(5) When the present emergency arose with the State Mine, part of the adverse effect was overcome by stepping-up production of the Bowen Consolidated Open-cut. It would be, we believe, optimistic to envisage no setbacks at any time to the Bowen underground position, and whilst these may not be of long duration, the fact that the State Mine may be able, temporarily, to increase its production may be of most material economic advantage to North Queensland coal consumers. The value of having some quick method of boosting production to overcome the sudden emergency is sound practice—and is also in the public interest when dealing with a commodity like coal—and any scheme which envisaged the closure of the State Mine to the extent that production could not become speedily available may prove in the future to be a catastrophe.

(6) As virtually the only supplier of North Queensland coal, Bowen Consolidated would be in almost a monopolistic position, and with any possible southern competitive coal suppliers, on very much higher costs, it would have the opportunity to take advantage of its favourable position. (We hasten to add that we are not in any way suggesting that Bowen Consolidated would take such an advantage, but we must point out that two suppliers are probably better than one and more in the public interest where such an opportunity for price fixing exists. The fact that one of the mines would be State-controlled merely strengthens this argument.)

To sum up, therefore, it seems that the plans of Bowen Consolidated could, if carried out in their entirety, clear the way for a cessation of production of coal from the State Mine, but it is considered that the hazards and disabilities of such a position seem to indicate that it would not be in the interests of the public for the State Mine operations to be discontinued, simply because an alternative source of coal supply could be made available. Further consideration is, however. given to this subject after an examination of the position of the mine employees.

3. THE EMPLOYEE AND HUMAN RELATIONS ASPECT.

No consideration of the future of the Collinsville State Mine could possibly be complete without taking into account the position in which the employees of the mine may find themselves in the event of discontinuance. This would be true with any organization, and is even more so in the case of a Government-owned mine. In the latter case, there seems to be a closer relationship between employee and public interest than would normally be so.

The Collinsville township is generally stated to have a population of about 1,900, and serves the State Mine, the Bowen Consolidated Underground Mine, and the Open-cut. The numbers of employees at the State Mine as at June, 1955, was 235.

The township is well laid out, reasonably well serviced, and has been the subject of activity by the Housing Commission in the provision of houses.

It is, however, completely dependent upon the coal mining activity in the area, and it seems factual to say that without this activity there would be no Collinsville. Indeed, even without one of the underground mines, the present population would be seriously depleted. If, however, open-cut production was extended to the 1,300 tons per day production previously indicated, this would probably mean an extension of the numbers required for the open-cut to say, 130 people.

To determine the effect of closure of the State Mine upon employees, it is necessary to consider what consequential changes there would be in the lives and conditions of those employees. If, for example, it was decided to lease the State Mine and the employees were required as at present, the only difference being that their employer would be the lessee instead of the Government, presumably no difficulty would ensue. There would, of course, be some hardship accrue to some if the lessee required less employees than are engaged at the present time. There would, however, seemingly be two safeguards here. The first would be that the mine employment being already fairly low, it is unlikely that there would be anything much in the way of dismissals. Secondly, it is conceivable that the State Government may be prepared to make it a condition of any lease that dismissals be not allowed for any other than stipulated reasons, at least for a stated period.

These conditions could also apply in the event of a sale of the mine to private interests.

The real question of any effect upon employees, therefore, arises only if the State Mine is closed down or production curtailed to such a degree that dismissals become inevitable. If the State Mine closed down, it would presumably be forced to terminate all employment except a caretaking gang.

It has already been indicated that Bowen Consolidated is prepared for the next four years to expand its open-cut production and will presumably, therefore, need more employees. If it be assumed that, if the State Mine closed down, there could be some 200 people available for employment elsewhere, it becomes simply a matter of arithmetic to say that if a number of them could obtain employment in the open-cut, the remainder would find, of necessity, that they must either (a) find other pursuits in or around Collinsville that would give them a living, or *(b)* leave Collinsville and seek work elsewhere. Thus, the very nature of the isolation of Collinsville becomes a very important factor, because the distance and rail service would preclude any opportunity of commuting. It is unlikely that the extension of the open-cut operations would require more than 100 of the State Mine employees.

That this could be a very serious factor for the people not required by the open-cut and could create great hardship is, we think, beyond dispute. The difficulty and hardship may be perhaps minimized if preference in the new employment at the open-cut was given to those who own their own houses in Collinsville or have essential family ties there. We were told by several witnesses that numbers of people owned their own homes and that many of them have all their worldly possessions wrapped up in Collinsville. With a major exodus of this kind from Collinsville, it is extremely doubtful whether many, or perhaps any, of these people would be able to sell their homes and they could well find that the greater part of their savings would vanish overnight. From a humanitarian aspect this makes the problem much more acute.

There is in this neither the magnitude nor the effect of another Glen Davis, but there would be, for some people at least, the same elements therein and *for them* it would be Glen Davis over again. As indicated above, this could happen to something of over half of the State Mine employees. There is little doubt that in agreeing to any proposal for the supply of coal, the Queensland Coal Board could make terms and conditions which would presumably alleviate and minimize the hardship and suffering inevitable in the transplanting of people, but they certainly could not obviate all of it.

It is conceivable that because of the longer term plans for the provision of a new multiple entry underground mine by Bowen Consolidated, some additional employment on underground developmental work may be available to displaced State Mine employees. It is impossible for us to conjecture to what extent this would operate or when. It must be realised that an hiatus period of even six months between the closing of the State Mine and the availability of other work could be a catastrophe to displaced employees and may force their departure from Collinsville.

There is a further matter to which reference should be made. It has already been indicated that open-cut production would continue as far as is known at present for some four years on a speeded-up production policy. When that open-cut ran out, presumably the underground mine production at Bowen Consolidated would take its place, and if the State Mine had been closed, this would mean the necessity of having five underground units (250 tons each) operating, and in course of time perhaps up to nine. This would necessitate a minimum of 350 employees, which would be considerably more than were required for the open-cut and it is quite likely that some proportion of people prepared to work in open-cuts may not be prepared to work underground.

It is realised that the preparation work for the underground mine would have meant the employment of a number of people, as has the operation of the present underground mine. It may be felt that this would be the nucleus for the new underground mine workers and by supplementing these with the open-cut workers prepared to transfer to underground working, sufficient personnel would be available to man the underground mine. At least some of the people engaged in preparation of the underground mine would, however, be required for subsequent operations, and all-in-all it is quite likely that as the different units in the underground mine became available for working, more staff would be required.

Bowen Consolidated Mine Ltd., would therefore have a similar problem to that faced in the immediate future by the State Mine, if it is decided that the State Mine should continue operations and require more men. The problems of Bowen Consolidated, however, would be more acute, firstly because greater numbers may be required, and, secondly, because if there were dismissals and transfers from Collinsville as the result of the State Mine closing down, it may well be a case of " a dog with a bad name " and getting employees to transfer to Collinsville in the future may be more difficult at that stage than with more immediate transfers to the State Mine This may particularly apply to skilled tradesmen.

One other subsidiary factor intrudes. Some of the trades people in Collinsville have found that with decreasing numbers employed, their trade has been adversely affected and their equities have suffered accordingly. This is not as serious a factor as others that have been mentioned, and if this were the only one involved, there may be little alternative but to disregard it. It, of course, suffers by comparison with the larger problem of the more complete and possibly devastating results to a section of State Mine employees.

One further consideration follows as a result of the disaster. The consideration as to whether it is wise, *from an employee angle* to continue with the mine in view of the outburst, needs no argument from the standpoint of public interest, in view of the fact that *from a safety angle* we have already indicated that there is no reason why production should not be continued.

From a human relations angle, therefore, it does appear that the future of the State Mine should take into account the problems involved in adopting any future course which does not envisage the retention and employment of the present State Mine employees. Nevertheless, ways and means could no doubt be found of minimizing adverse effects if other considerations became paramount in suggesting a future which countenanced the dismissal of some, most, or all, of the State Mine employees.

From their standpoint, it would appear to be very much more in their interest to have a continuity of employment at the State Mine as even the proposed scheme for open-cut increased production would still leave a human relations social problem of not inconsiderable magnitude.

This is, to our minds, an important aspect to be seriously considered in finally determining what course to adopt as far as the future of the State Mine is concerned.

It seems to us that two further comments are necessary. The dismissal of employees in the way and to the extent as outlined herein and likely to follow a discontinuance of mining operations at the State Mine would be serious enough if it was occasioned by some closing down plan of private industry. When it is the result of the actions by a State Government, there is little doubt in the minds of many people the same action becomes more callous, more cold-blooded and more unnecessary, despite the fact that another section of the community would applaud closing a State enterprise where losses had reached mammoth proportions.

4. ALTERNATIVES TO GOVERNMENT CONTROL.

It seems advisable, at this stage, to consider whether there are any alternatives which would preserve the advantages of continuing production, whilst avoiding the disadvantages attaching to large losses being sustained by the Government. The question asked of us was whether it would be in the public interest for the mine to be discontinued. This reference is not completely free from ambiguity, because the question arises as to whether a sale or lease of the mine can be construed as being included in the words " Whether, regard being had to the public interest, the use of the said mine should be discontinued."

(a) SALE OF THE MINE AS A GOING CONCERN.

The first of these alternatives is that the mine could be sold as a going concern. This would give many of the advantages of carrying on, and yet may aviod the possibility of making further recurring losses, though admittedly, some capital loss (possibly large) may be sustained in the sale. It would not be possible to be dogmatic about what should be done in this connection unless it were known what kind of price could be obtained. Irrespective of the matter of price, however, it would seem to be a paramount condition that the new owners should agree to carry on the mine and, subject to some reasonable safeguards, to do everything possible to produce coal above a stated minimum tonnage. In such a case the question of whether the mine should be sold or not would, in our view, depend entirely upon the price which it would realise. If the Government could :-

(i.) Sell the mine at such a favourable price as to go far towards recouping it for all the funds it has put into the mine ;

(ii.) Could obtain the necessary guarantee regarding production, and

(iii.) Could ensure security of employment for all or most present employees,

we believe it would be wise to sell.

We do not believe, however, that the Government would secure a satisfactory price. It would, in our view, be expected to sell at a sacrificial price, and the losses of the last two years would be cited as a reason for such low price. As the price comes down, so the attractiveness of selling lessens, and if in selling, still further capital losses in addition to those already sustained are likely to be encountered, we think the Government would be wise to carry on the mine on its own account. Furthermore, we believe that the prospective buyer would do nothing unless he received some coal price guarantees from the Queensland Coal Board. This factor in itself could seriously complicate the work of that Board, and reduce the economic advantages at present being obtained by North Queensland consumers.

(b) LEASE OF THE MINE.

The next alternative would be for the Government to lease the mine, and we understand that there are lessees who are willing to negotiate, though this was not brought out in evidence. This solution also has attractions inasmuch as it :—

(i.) Preserves the asset as a coal-producing mechanism.

(ii.) Should not only eliminate losses, but should presumably take care of Interest and Depreciation, and perhaps some additional return by way of income.

(iii.) Cover satisfactorily the insurance aspects of a second underground mine to provide coal for North Queensland.

(iv.) Provide employment for existing employees.

(v.) Avoid the economic waste of pulling down one mine, whilst another is prepared.

(vi.) Give a breathing space to the Government to decide whether at the end of the lease it would desire to recommence running the mine in its own right, further lease the property, or sell it outright.

The major difficulty (and disability) would be the framing of clauses which would protect the Government in relation to its plant, so that such plant was not " worked out " in a short period. If this was allowed to happen, the Government may only have been recouped itself through the price for the lease, enough to cover the deterioration in its plant. A further factor involved would be the obtaining of guarantees in relation to the amount of coal to be produced, the employees to be employed and generally the conditions of the lease to protect both lessor and lessee in a fair and equitable manner. None of these appear difficult except the problem of ensuring that the plant is fairly treated and is returned at the end of the time in good condition, subject at all times to fair wear and tear.

Here again the question as to whether this is the best alternative depends upon the amount which can be secured by way of lease rent, the calibre of the lessee, and the general terms and conditions of the lease. In coimection with such a lease (and indeed such a consideration cannot altogether be excluded from the terms and conditions of a sale) it may be considered fit and proper for the Government to feel that it has in the past, in fair and upright manner, provided a mine which has played a most significant and worthy part in the development of North Queensland, and, whilst sustaining losses itself, has provided an economic profit of considerable amount to North Queensland coal consumers as against what would have been the position if the Government had not provided the mine. In the event of a lease (or possibly sale) therefore, the Government may feel that it may be fair and equitable to give consideration to including in the sale of coal from the State Mine by the Lessees, an impost for a stipulated number of years, designed to recoup to the Government over a period of years, the total amount of its losses. If, for example, it be argued that the losses in the last ten years have been £450,000 and the lessees agreed to produce 120,000 tons per year as a minimum, an impost of 10s. per ton would mean recoupment of this amount in about seven years. Alternatively, if it were felt that there was justification for recoupment over a shorter period, this could also be considered. Of course, if the production was boosted to 1,000 tons per day, the amount would be repaid in approximately four years.

There appear therefore to be four major difficulties in the way of leasing :-

(1) There is always the problem of what happens when the plant has to be replaced. It may well be that the Government may be expected to replace plant worn out or obsolete, in which the Government would still have finance commitments but, under a lease, it may have much less control over them.

(2) The price problem which it is believed would be encountered if the mine was sold, also operates in the case of a lease. It is unlikely that a lessee would not want severe price guarantees and if he did not get them and losses ensued :-

(a) maintenance of the Government plant might be unsatisfactory, and

(b) the lessee may ask for reduction in the lease rent even to a degree which would be completely uneconomic for the Government.

(3) The Government still would have to face the problem of what would happen at the end of the lease and this could well be a much more difficult problem than the one which faces them at present.

(4) The problem of an equitable lease rent seems an insuperable one. Interest and Depreciation amount at the present time to £100,000 per year and this total is in itself, we believe, sufficient to highlight the magnitude of the problem of the amount of consideration for the lease.

Careful consideration of all factors relating to possible sale or lease have inclined us to the view that neither of these two courses of action are really workable solutions. If this be so, it does not appear that a case can be substantiated in favour of discontinuance by the State, because of the advisability of a sale or lease.

5. THE ARGUMENTS FOR AND AGAINST CONTINUANCE.

We are now in a position to summarize the position reached in our consideration of whether it is in the public interest that the mine be discontinued. Taking the reference as it stands, and from the foregoing detailed discussion, we have arrived at the following position :-

A. In favour of discontinuance-

1. There would be an end to the trading losses, which have plagued this mine and the Government and which have culminated in the catastrophic amounts of the last two years, and are likely to cause a further large loss for the 1955-56 year.

2. What may have been the original purpose of the mine—to produce coal for the North Queensland area and thus to avoid the economic loss of transferring foreign coal to the area—may now equally well be served by existing and prospective mines in the area.

3. The closing down of the State Mine may allow consumers in North Queensland to reap considerable economic advantage, because it would clear the way for an increase in open-cut output at reduced prices.

4. Bowen Consolidated would be encouraged to spend large sums, with all the benefits which would come from private investment in such an area.

5. If the Government discontinued the mine and desired to sell, it may be able to make some favourable deal with Bowen Consolidated or, alternatively, in view of the widespread interest in Queensland in mechanization at the present time, it may obtain favourable prices for the plant.

6. At least a substantial amount would be returned to the State Treasury and would thus reduce the Interest bill, which at the present time is not really being paid by the mine, but simply figures as part of the loss.

7. Continuance for a few years with a recurrence of present losses would rapidly eat away the value of assets purchased, and the Government may find that it has nothing to show for its expenditure. Alternatively there would be a constant drain upon Consolidated Revenue. In such a case, the first loss may be the best loss.

8. There would be no possibility that, by carrying on in order to safeguard money already spent, the Government would be asked to engage in more capital expenditure, and thus get even further into trouble.

9. Considerable doubt has been thrown upon (a) the wisdom of mechanizing No. 1 Tunnel, *(b)* the ability of the machines to do the job required, and (c) the development of a constructive and helpful attitude by the men to the job at hand. These place the future in jeopardy, and, apart from anything which the Management might do, might result in future losses.

B. The arguments against discontinuance of the mine are-

1. Such a policy would prevent any opportunity of recouping in the future the losses of the past.

2. It should be possible, in view of all the circumstances, to work out schemes not unfair to North Queensland consumers, whereby losses are recouped to the Government over a period through a pricing policy fair both to the mine and the consumer.

3. There is a greatly lessened possibility of North Queensland consumers being stranded for coal supplies from the Bowen area in the event of Bowen Consolidated either not proceeding with its plans or changing them considerably, and resulting in a consequent limitation of output.

4. The existence of the State Mine does provide an insurance policy in the case of the Bowen Consolidated Mine experiencing trouble such as that encountered by the State Mine, particularly once the open-cut has been exhausted. (Each of the two underground mines is an insurance for the other, because output could probably be increased in one at least to help cover a temporary deficiency of the other.)

5. A similar insurance may well operate in the case of serious or prolonged industrial trouble in either of the two underground mines, providing that such trouble can be limited to one mine.

6. It is likely that a straight-out sale of the mine may not be possible, or alternatively could be effected only at a ruinous price, particularly in view of the fact that there would be few if any buyers.

7. Whilst there is an interest in mechanized plant at the present time, because of the comparative isolation of Collinsville, one prospective buyer, Bowen Consolidated, would have a great advantage over every other prospective buyer, because of the very great freight differential involved. This may well mean that the plant may thus realise only what Bowen Consolidated (if anyone) would be prepared to pay.

8. A great deal of social difficulty would be engendered by the wholesale dismissal of employees.

9. If it was decided not to sell, but to hold the mine " in grease," there would be some not inconsiderable expense involved, and it may be virtually impossible to start it up again, because of the difficulty of attracting labour, once it was dispersed.

10. The closing of the State Mine at this stage may soon mean that Bowen Consolidated may have difficulty in ultimately obtaining the labour it requires when it is required.

11. The closing of the mine on a projected future date, so as to hold labour for the Bowen Consolidated Mine, may prove to be impossible, because many people would not stay with a mine when the future was so clouded and uncertain.

12. With no district average price to guide it, the Coal Board would be forced to accept the price of the one mine in the area, because, irrespective of what that price was, it would be the only one operating in the area.

13. If the Queensland Coal Board ceased to operate at any time, withdrawal of the State Mine would create a monopoly in the district, and we believe this is not good, whether that monopoly be the State Mine or a private company.

6. GENERAL CONSIDERATION OF THE POSITION.

There is no clear-cut answer in the foregoing arguments. The position from a supply and demand aspect and from that of the employees is, in our view, reasonably clear in favour of the mine carrying on but there is the uncertainty of whether, despite the plans for the future outlined in Terms of Reference 2D and 3, the losses under mechanization can really be turned into acceptable profits for the future. Furthermore even if this can be done, it will mean the provision of further considerable sums of capital expenditure.

In our outlined plans for the future and our consideration of the possibility of profitable trading being restored, we indicated that no single factor was likely to bring this about. As so frequently happens however where there are a number of factors contributing to unsatisfactory results, some improvement in each of these could give completely different results. We do not therefore believe that the difference between a good profit and the great losses of the last two years is as wide apart as might justifiably be thought at first.

There is no doubt that an easing of the grades would have a wonderfully beneficial effect, but whether this does really eventuate or not, the Management and the men in the mine still have it within their own hands to turn this into a profitable unit. There must be a greater will to work on the part of the men and they must realise that they have a very important stake in the success of the mine, and that no Government can continue sustained raids upon its Treasury to the extent that this mine has raided the Treasury in the last two years. If therefore the Government takes into account the position of its employees and adopts a humanitarian attitude because many of the employees would lose their assets if the mine closed, then it is up to those employees to make sure that they reciprocate not only by making their own work effort commensurate, but also by endeavouring to lift the morale amongst the whole of the employees. This is surely no more than justice.

Similarly as far as the Union is concerned it surely is no part of the Union's policy to close the branch by closing the mine, and we do not underestimate the part which the Union can play in helping to establish better relationships between Management and Men.

In this we would draw the attention of the Union to its counterpart in U.S.A., where there is a complete acceptance of the fact that the men comprising the Miners' Union can only prosper according to their production. There is an acceptance of the fact that only by raising productivity can wages and conditions be improved and wages and conditions *have improved* in line with the improved productivity.

In the final analysis many of the things which will turn failure into success must be found, must be practised by and must begin with Management. If Management can find the secret of raising the morale of the employees it will have gone a long way towards overcoming production lags. We refuse to believe that this is by any means an impossible task. That the task is heavy is not disputed and therefore it seems to us that Management must be given all the aid possible.

In that regard we do not believe that the present relationship between the Department of Mines and the Mine Management is the best available. In saying this we are not criticising one or the other. We do believe however that a more specialised type of advice and help should be available to Mine Management at any time. It is true that the State Mines are an important part of the work of the Department of Mines, but they are still only one part and it is not to be expected that a busy Department can be of any great assistance in a practical workable timely fashion that is constantly required in a difficult proposal such as the Collinsville State Coal Mine.

Furthermore we believe that the operation of the mine must suffer somewhat because of dual functions which would often appear and any scheme which would avoid these we believe must have merit.

We believe also that where the Department and the management of a mine operate in the way this has operated over a period of years, red tape and rule of thumb is bound to occur and these result in dual decisions, misunderstandings and defeatism. We believe that this is almost inevitable under the system though we stress again we are not criticising individuals.

We think however that there are much better forms of control than exist at present and we suggest one or two alternatives for the future organization of the mine

(1) Form the venture into a private company whose shares are held by the Government. Appoint a Board of Directors comprising at least one, possibly two technical men, well versed in mechanized mining, one financial man, one business man with general (all round) management experience and one representative of either the Mines Department or the Treasury. Give the maximum degree of control to the Board and, of course, make it completely subject to the Minister for Mines. The control by the Under Secretary for Mines, the Chief Inspector of Mines, and the Queensland Coal Board should be exactly the same as with privately-owned mines. Divide the present indebtedness into two parts—one the amount of permanent capital represented by assets on the one hand and on the other the balance between this amount and total indebtedness. The first of these can be covered by capital with ordinary shares issued accordingly and the latter part covered by Debentures. An assessment can be made of extra funds required to carry out certain specified and approved capital projects together with any extra working capital and this amount should be provided. The mine should then be expected to work within these financial limits This method can best be summed up by saying that the mine could be treated exactly as a private company but the Government would provide funds specified within defined limits and there would be complete responsibility of the Board to the Minister (who would in any case be the representative of the shareholders).

(2) Even if a company status be not approved, it is suggested that an advisory board be appointed and that it be of such a nature that its duties, functions, and responsibilities be exactly the same (or as close to it as different conditions allow) as with a Board of Directors.

Of these two forms, we prefer the former as we believe the measure of competent assistance and advice to Management is increased and the chances of success are greatly improved. With this additional aid to help Management in the task before it and taking into account all the suggestions which have been made in this Report we believe that there is a sufficiently reasonable chance of this mine becoming profitable in the next two or three years to justify the Government in carrying it on accordingly, and as a mechanized unit.

This leads us therefore to the last judgment which we have to make—that we believe that though there is a risk of some future losses occurring and thus requiring recoupment from Consolidated Revenue or some other Fund (and the year 30th June, 1956, will most certainly produce another very serious loss) we are of the opinion that the Government should continue the operation of the mine, but the effect upon Government revenue consequent upon any losses should be closely watched. If there is not considerable improvement by 30th June, 1957, and a reasonably profitable year not obtained by 30th June, 1958, we are of the opinion that the whole matter should be raised once more to examine afresh the question of continuance or discontinuance of the mine either altogether or as a mechanized mine.

Term IV.

Conclusions.

Our Conclusions therefore are :-

1. The Collinsville State Mine has in the past made an important contribution to the development of North Queensland.

2. The coal demands of North Queensland were in the region of 450,000 tons for the calendar year of 1955 and an increase of 5 per cent. per annum on this figure is expected for the future.

3. This would ensure the acceptance of all the coal which the State Mine could produce were it not for plans by the Bowen Consolidated to expand open-cut output to a figure which, with its underground mine, would virtually ensure meeting all demands for the next four or five years which would be the open-cut life. The introduction of a new mechanized underground mine of like output would replace the open-cut at the end of that time. This would mean that North Queensland consumers would become independent of the State Mine supplies.

4. There are, however, serious disabilities in the scheme, as, for example, one company would virtually obtain a monopoly for the supply of all North Queensland coal with all the weaknesses and problems that such a monopoly might bring.

5. The closing of the State Mine would almost certainly mean great hardship upon the employees many of whom may well lose their assets by being forced to look elsewhere for work. There may be a further indirect result wherein it may become difficult of entice labour to Collinsville for future requirements.

6. As a result of a careful assessment of the arguments for and against discontinuance, we believe the mine should, in the public interest, be continued.

7. On balance, we believe that sale of the mine as a going concern at an acceptable price or leasing at an acceptable rent are impracticable at this stage and would create many problems.

8. We believe that the Government should give consideration to the future organisation of the mine, preferably turning it into a company with the Government holding all the shares and appointing a Board of Directors which would give expert assistance to Management.

9. Finally, if profitable operation of the mine is not reached for the year ended, 30th June, 1958. we believe the question of the future of the mine should be examined afresh.

TERM V.

ANY OTHER MATTER OR THING APPERTAINING TO THE AFORESAID MATTERS WHICH, TO US SHALL SEEM MEET AND PROPER IN THE PUBLIC INTEREST.

We have dealt with the terms so exhaustively that little requires to be said under this heading.

We do however make the following suggestions :-

1. The position of the Overmen as to status duties and qualification requires clarification. We have referred to this matter in Term 1.

2. The Overmen should have at least the qualifications of a Deputy. This appears to have been the usual state of affairs, but there was evidence that Mr. Stansbury on occasion acted as an Overman.

3. The Overmen should at all times while on duty carry an oil safety lamp and an electric safety lamp.

4. It is undesirable that Deputies should belong to the same Union as the miners. Of necessity their duties imply a measure of authority over the miners and discipline must suffer if the Deputies belong to the same Union as the men over whom they must exercise such authority.

5. There is much to be said for the New South Wales practice of submitting aspiring Deputies to a written examination.

6. The township of Collinsville is isolated. In bad weather the road to Bowen is untraffi cable and at the best of times is very poor. The only dependable connecting link is by railway. We think there is a psychological result in such isolation which factor has played some part in the whole unhappy picture. We realise of course that the provision of a better road is within the province of the Local Authority, but we feel that the Management should give such support as lies in its power to such project.

Conclusions.

1. We believe that the Overmen should at least have the qualifications of a Deputy and their status, duties, and qualifications require clarification.

2. The Overmen should at all times while on duty carry an oil safety lamp and an electric safety lamp.

3. Consideration should be given as to whether it would be wise to submit the Deputies to a written examination.

4. Full support should be given to any project which has as its objective the building of an all-weather road between Bowen and Collinsville.

CONCLUSION.

We desire to record our appreciation of the assistance given by Mr. W. E. Ryan, Solicitor-General, Counsel assisting the Commission, and of the valuable services rendered by Mr. J. F. Power, Secretary of the Commission, and by Mr. R. J. Humphries, Acting Secretary, during the temporary illness of Mr. Power.

We wish to thank also :-

The Auditor-General, who made available to us the back copies of his Annual Reports ;

The Queensland Coal Board, and in particular its Secretary, Mr. McCarthy, who readily and speedily supplied us very valuable information and figures ;

The officers of the Department of Mines, who complied without hesitation with every request made by us ;

The staff of the Chief Government Geologist, and in particular Mr. Cribb, for the important data furnished us in reference to the nature of the seam disturbance and other matters ;

The New South Wales Joint Coal Board, for information supplied to us ; and

Members of the staff of the Chief Secretary's Department and of the State Reporting Bureau, for typing and other office assistance.

We are,

Your Excellency's obedient servants,

JOS. A. SHEEHY, Chairman.
S. FLOWERS, Member.
W. SCOTT, Member
J. F. POWER, Secretary.

APPENDIX A.

LIST OF WITNESSES.

1. ATHOL LIGHTFOOT	ex General Manager, State Coal Mines and Coke Works, Queensland.
2. ALBERT WINSTANLEY .	Manager, State Coal Mine, Collinsville.
3. THOMAS PLATT . .	Chief Inspector of Coal Mines, Queensland.
4. FRANCIS WALLACE STANSBURY	Chief Electrical Engineer, State Coal Mines and Coke Works, Queensland.
5. JOHN FALLINS . .	Mining Expert, New South Wales.
6. VICTOR REGINALD CUNDITH	Senior Analyst, Government Analyst's Office, Brisbane.
7. EDWARD MCCARTHY	Secretary, Queensland Coal Board, Brisbane.
S. LLOYD MOLLOHAN	Sales Engineer, Jeffrey Manufacturing Company's Australian representative, Sydney.
9. HUGH MACLENNAN . .	Engineer, State Coal Mine, Collinsville.
10. LEONARD ARTHUR ROGERS	Assistant Surveyor, State Coal Mine, Collinsville.
11. MATTHEW CROZIER . .	Superintendent, Queensland Mines Rescue Station, Booval.
12. MYLES JOSEPH MCENIERY	Medical Practitioner, Collinsville.
13. THOMAS HENDERSON ALLAN	Overman; State Coal Mine, Collinsville.
14. JACK HUBERT MORGAN	Overman, State Coal Mine, Collinsville.
15. WILLIAM WHYTE	Overman, State Coal Mine, Collinsville
16. VINCENT DAVIS . .	Deputy, State Coal Mine, Collinsville.
17. DOUGLAS ARCHIBALD HECTOR MCPHERSON	Deputy, State Coal Mine, Collinsville.
18. JOHN HENRY CURRIE . .	Shot-firer, State Coal Mine, Collinsville, and President, Queensland Colliery Employees' Union, Collinsville Branch.
19. JAMES ALEXANDER NISBET	Employee, State Coal Mine, Collinsville, and Secretary, Queensland Colliery Employees' Union,
20. HORACE ROY NUTT	Mechanical Fitter, State Coal Mine, Collinsville.
21. ROLAND JOSEPH MCDOWELL . .	ex Electrician, State Coal Mine, Collinsville.
22. AU BREY CLARENCE JAQUES . .	ex Machine Man, State Coal Mine, Collinsville.
23. HERBERT KITCHENER WILLIAMS	Machine Man, State Coal Mine, Collinsville.
24. JAMES PETER HJORTSHOJ	Macy ,.ne Man, State Coal Mine, Collinsville.
25. VINCENT CHARLES PRASSER	Machine Man, State Coal Mine, Collinsville.
26. JAMES ALFRED BAKER . .	Machine Man, State Coal Mine, Collinsville.
27. CECIL JAMES DUNLOP . .	Timberman, State Coal Mine, Collinsville.
28. WILLIAM BUCHANAN	Spare Machine Man, State Coal Mine, Collinsville.
29. JAMES CLEMENT HILL . .	Employee, State Coal Mine, Collinsville.
30. ROBERT CONRAD MUNRO	Employee, State Coal Mine, Collinsville.
31. JOHN EDWARD THOMAS	Horse Driver, State Coal Mine, Collinsville.
22. RAYMOND SEPTIMUS BRUNKER	Horse Driver, State Coal Mine, Collinsville.

APPENDIX B.

LIST OF EXHIBITS.

Exhibit.

1. Plan of workings of State Coal Mine, as required by provisions of Section 68 (1) of " *The Coal Mining Acts,* 1925 *to* 1952."
2. Plan of scene of disaster, in mechanized section, showing various details.
3. Mines Deputies' reports for month of October, 1954.
4. Copy of Certificate of Government Analyst, 19th October, 1954, as to results of examination of three samples of mine air, taken after disaster by T. H. Allan, R. S. Spiers, and T. Platt on 13th and 15th October, 1954, respectively.
5. List of men trained in rescue work, and their training hours.
6. Copy of report, 12th March, 1954, by P. Conway and J. H. Currie, Miners' Inspectors, as to conditions of and practices in mine.
7. Deputy Logan's report, 7th May, 1954, as to installation of blower fan in Dip.
8. Plan of mine, showing various features, e.g., drive heads, pit bottoms, &c.
9. Photo copy Mines Record Book for year 1954, as required by various sections of the Act and Schedule 2, Clause 66.
10. Mine Deputies' reports for year 1954.
11. Mine Overmen's reports for year 1954.
12. Copy extract from Annual Report, Department of Mines, New South Wales, 1925, pages 60, 83, and 84, as to outburst of gas at Metropolitan Colliery, Helensburg, New South Wales, 27th July, 1925.
13. Copy part booklet issued by manufacturers, showing particulars and illustrations of L. 600 C. Loader and 61 W.H. Gathering Conveyor.
14. Ditto as to 29 U.C. Coal Cutter.
15. Blank form—Fire Boss Record Book—as used in certain coal mines in the United States.
16. List of men who received machine training at the State Coal Mine before mechanization, and particulars of dates and type of training.
17. Plan of mine, immediately prior to mechanization, showing proposed layout of bords and proposed electrical installation.
18. Copy letter 4th January, 1955, from A. J. Winstanley, Mine Electrician, to Manager, Estill damaged machine cables and when changed, for the period from 30th November, 1953 to 4th September, 1954 ;

    Also extracts from Overmen's reports of additional damaged cables in same period.
19. Schedule of comparative earnings of employees of Mine before and after mechanization ;

    Also schedule showing for a period from 27th January, 1953, to 16th October, 1954, a daily record of the number of employees at the mine, and where working ; the daily production for that period ; and the various stoppages for the period, due to industrial disputes or other causes.
20. Certificate, 21st October, 1954, by M. Crozier, Superintendent, Mines Rescue Station, Booval, as to certain Proto Sets kept at the State Mine.
21. Summary of Overmen's daily reports from 19th January, 1954, to 13th October, 1954, showing particulars of work done on each shift as to loading, cutting, boring, timbering, and shooting.
22. Summary of Overmen's daily reports from 10th January, 1954, to 13th October, 1954, showing particulars as to delays in operation.
23. Two plans—one distorted—showing sections of levels—grades—in mechanized section. No. 1 Tunnel 3 West.
24. Copy report, 28th October, 1954, of John Fallins, Mining Engineer, of inspection of mine and machinery made on 29th and 30th September, 1954 ; and three plans annexed.
25. Driller's log, 5th October, 1940, to 8th March, 1941, as to boring of Bore 1.A.
26. Plan of section of strata exposed, following induced fall, in fault area, No. 2 Tunnel No. 3 East level.

Exhibit.

27. Plan, 21st October, 1954, of erupted coal as result of disaster, 13th October, 1954, and proposed method of ventilation in reclamation work.

28. Copy extracts from diary V. R. Cundith, Senior Analyst, as to various tests and inspections made at the mine between 22nd October, 1954, and 2nd November, 1954.

29. Coloured plan of Machine Section, showing sea levels, grades, and progressive working at given periods ; also Table showing proportionate distances of workings in the Dip, levels, and cut-throughs, based upon the plan.

30. Copy " Common Cause," 25th April, 1953.

31. Notice, 5th June, 1942, by Manager of mine, expressing appreciation of efforts of men in national effort.

32. List of times docked from various named employees on account of sickness and leaving early, for period 14th November, 1953, to 13th November, 1954.

33. Copy Communist publication " Vanguard," April, 1953.

34. Schedule of air measurements taken by L. Rodgers and S. Bulloch in No. 1 Tunnel between 20th December, 1954, and 29th December, 1954.

35. Copy Rules of Miners' Federation.

36. Summary of daily workings in A.13, from 2nd September, 1954, to 13th October, 1954.

37. Copy " Common Cause," 5th March, 1955.

38. Copy " Common Cause," 12th March, 1955.

39. Copy " Common Cause," 9th May, 1955.

40. Copy Miners' Award as at 10th January, 1955.

41. Plan showing boundaries of State Mine area and Bowen Consolidated Mining Lease ;

    Also areas worked out in both mines as at 1951 ;

    Also projected workings under mechanization.

42. Plan of mine, showing correlation of levels and anticipated grades.

43. Copy Schedule of output of mine for various fortnightly periods between 8th January, 1941, and 5th February, 1955.

44. Copy schedule of equipment recommended by A. Lightfoot on 14th December, 1951, for the State Mine.

45. Extracts from various technical works, relating to outbursts of CO_2 in coal mines.

46. Copy letter dated 23rd March, 1955, from Acting Manager to Under Secretary, Department of Mines, relating to installation of power borers in mine.

47. Photographs of coal cutter in A.3.

48. Photograph of loader in B.3.

49. Photograph of drive head.

50. Estimate of volume of gas released on 13th October, 1954.

51. Copy letter dated 26th August, 1954, from Minister from Mines.

52. Copy rules Richmond Main Colliery Lodge.

53. Copy agreement signed 11th November, 1952, but not ratified, between Manager and Q.C.E.U., Collinsville Branch.

54. Copy " Common Cause," 29th January, 1955.

55. Letters re and tenders for machinery and electrical equipment.

56. Copy letter dated 9th May, 1955, from Solicitor-General to Secretary Bowen Consolidated Mines Limited ;

    Copy reply, dated 14th May, 1955 ;

    Schedule showing output of Bowen Consolidated Mine for various fortnightly periods between 8th March, 1941, and 28th June, 1952, also dargs imposed and average weight per skip.

57. Schedule of output of State Mine for same periods.

58. Schedules, taken from Overmen's reports, showing progress of work in A.10 down, A.11, A.11 down, B.11, and A.12, between 27th August, 1954, and 13th October, 1954 ;

    Also summaries of such progress.

Exhibit.

59. Copy letter dated 5th May, 1953, from Secretary, Collinsville Branch, Q.C.E.U., to Minister for Mines regarding Korean Contract.

60. Copy letter dated 13th May, 1953, in reply.

61. Copy letter dated 6th May, 1953, from Manager, Industrial Department, Vacuum Oil Company, Brisbane, to General Manager, State Coal Mine, as to oiling of loaders, modification of machines, and other matters.

62. Copy letter dated 12th June, 1952, from Manager to Secretary, Collinsville Branch, Q.C.E.U., as to restriction of output.

63. Copy letter dated 9th July, 1952, from Manager to Secretary, Collinsville Branch, Q.C.E.U., as to late starting, restriction of output and other matters.

64. Copies four letters dated 23rd January, 1953, 23rd March, 1953, 7th April, 1953, and 7th April, 1953, from Manager to Secretary, Collinsville Branch, Q.C.E.U., as to production and the " 8d. extra " agreement.

65. Schedule showing particulars of quarterly Cavils in Contract Mining from 15th March, 1946, to 16th March, 1955 ;

Also particulars of variations in darg, horse and hand wheeling, and installation of power borers.

66. Two books of record, showing particulars of production and output per man shift under hand mining from 1st January, 1951, to 2nd April, 1955, before and after mechanized mining.

67. Record of daily production in terms of average per miner and average weight of skip under contract mining from 28th July, 1952, to 31st October, 1953, and 15th November, 1954, to 2nd April, 1955 ;

Also stoppages and holidays.

68. Copy letter dated 7th April, 1955, from Acting Under Manager to Manager ;

Also schedule covering period from 15th November, 1954, to 1st April, 1955, showing non-filling of darg by various employees.

69. Copy memorandum, 25th March, 1954, by Manager to Deputies as to sighting of bords.

70. Copy memorandim dated 30th July, 1954, by Manager to Overmen as to timbering.

71. Copy report 5th August, 1954, from Under Manager to Manager as to poor effort in timbering work.

72. Copy of Overmen's daily reports from 27th September, 1954, to 13th October, 1954, showing on new form additional particulars to those on old form, of names of loader and cutter crews, number of machines used, work done and further particulars.

73. List of employees, in order of seniority, given by Union, to operate machines.

74. Copy of instruction, 28th November, 1953, given by Manager to Under Manager, as to trailing cables and power borers.

75. Copy memorandum 8th May, 1954, to loader and cutter crew men as to Electrical Special Rules 164 and 239 ;

Copy letter 8th May, 1954, from Manager to Secretary, Collinsville Branch, Q.C.E.U., in same connection.

76. Schedule showing daily record from 17th April, 1954, to 16th October, 1954, of operations in each section and place ;

Also fortnightly summary in same period of number of places loaded out and average tonnage per loading out.

77. Coloured plan of Machine Section. Similar to Exhibit 29, but showing more accurate details of the workings, projected workings and heights of seam at various points.

78. Copy notice 2nd November, 1953, by Manager to employees as to starting and finishing times as from 2nd November, 1953.

79. Copy letter 2nd November, 1953, from Manager to Secretary, Collinsville Branch, Q.C.E.U., as to finishing time

80. Copy Notice 12th July, 1954, by Manager to employees as to times of leaving Machine Section.

81. Copy instruction 28th November, 1953, by Manager to certain employees as to riding on belt.

82. Copy notice 15th December, 1953, by Manager, suspending H. Mowbray.

Exhibit.

83. Copy memorandum 10th January, 1954, by Under Manager to Overmen, as to timbering, cutting, boring, shooting, discipline, rest periods, and leaving early.

84. Copy letter 23rd March, 1954, from Under Manager to Manager as to dispute regarding a I shift.

85. Copy letter 16th July, 1954, from Manager to Secretary, Collinsville Branch, Q.C.E.U., as to cutting on night shift and other matters.

86. Copy letter 2nd August, 1954, from Secretary, Collinsville Branch, Q.C.E.U., to Manager, as to light cabin attendant.

87. Copy letter 15th December, 1953, from Under Manager to Manager as to theft or loss of tools of a fitter ;

Also list of employees working in Mine at the time.

88. Memorandum 20th July, 1954, as to stealing and loss of tools and other equipment.

89. Copy letter 6th April, 1951, from Manager to Secretary, Collinsville Branch, Q.C.E.U., as to theft of certain tools.

90. Copy memorandum regarding theft from W. Skellern's tool box on 31st July, 1954.

91. Copy memorandum 10th May, 1954, from Manager to L. C. Rose as to lubrication of machines.

92. Copy Industrial Agreement dated 27th October, 1953, between Mines Department and Q.C.E.U., Collinsville Branch.

93. Copy letter dated 17th September, 1954, from T. Platt, Chief Inspector, to Manager, as to miners rescue station.

94. Copy minutes of meeting 7th October, 1954, Management and men, as to mines rescue work.

95. Copy draft agreement September, 1952, between Management and men as to " 8d. extra," packed skips, darg, floaters, bathroom, mines rescue work, power borers, equipment, Saturday work, amenities, and other matters.

96. Two letters, 31st January, 1950, and 8th February, 1952, from Joy Sullivan Machinery Company to Manager and Amalgamated Colliers Ltd., respectively.

97. Copy publication " Iron and Coal Trades Review," as to hydraulic bursting of coal.

98. Lists of considerations paid to miners at State Mine, and consideration proposals to miners at Bowen Consolidated.

99. Copy alternative scheme as to Mechanization and Surface Installation using heavy-type trackless mining equipment and troughed belt conveyors proposed by Manager, 22nd July, 1950, in opposition to scheme proposed by Powell Duffryn Technical Services Ltd.—No. 2 Tunnel.

100. Various letters and reports dealing with bores Nos. 27 and 28.

101. Extract of report, Mount Isa Mines Ltd., 24th December, 1952, as to Bowen seam, fire areas, faults, &c.

102. Copy pamphlet, " Bowen Coalfield," by J. H. Reid.

103. Blank form to be filled in and supplied by owners of coal mines to Queensland Coal Board showing particulars of production in fortnightly periods.

104. Memorandum 18th October, 1950, from T. Platt to Under Secretary as to mechanization of mine.

105. Plans and particulars of various bores on the Collinsville field.

106. Plan of Collinsville Coalfield, showing bore sites selected by J. H. Reid, District Geologist, September, 1950.

107. Geological plan of anticlinal structure at eastern side of State Mine, prepared by J. H. Reid.

108. Letter from J. H. Reid, 27th September, 1940, to Chief Geologist as to seams and drilling on the Collinsville Field.

109. Letter 4th April, 1950, from Assistant Superintendent, Amalgamated Collieries of Western Australia Ltd., to T. Platt, Chief Inspector of Coal Mines, as to performance of Joy machines ;

Also plan of suggested method of extraction of coal.

Exhibit.

110. Letter 11th April, 1950, from Chief Mine Manager, Griffin Coal Mining Company Ltd., Collie, Western Australia, to T. Platt, Chief Inspector of Coal Mines, as to types of machinery and methods used in that mine with grade of 1 in 4 ;

Also plan of proposed method of working in that mine.

111. Letter 6th April, 1950, from Government Chief Coal Mining Engineer, Western Australia, to T. Platt, Chief Inspector and Supervisor, Coal Mines, Queensland, as to plant and grades.

112. Copy proposed scheme for mechanization, August, 1950, by K. D. Crowley and Powell Duffryn Technical Services Ltd.-Two volumes and one volume of maps.

113. Copy memorandum 31st July, 1950, as to immediate programme at Collinsville State Coal Mine.

114. Comprehensive report, July 1949, by Powell Duffryn Technical Services Ltd. as to Coal Industry of Queensland-Three volumes.

115. Letter 14th February, 1950, from Manager to Supervisor, State Mines, as to inspection of various types of equipment in different coal mines in New South Wales, arid other matters.

116. Copy memorandum, 18th September, 1950, signed by Under Secretary, Supervisor, and Chairman and Members of State Coal Board, as to comparative schemes of mechanization. (See Exhibit 182.)

117. Letter 8th April, 1943, from Manager to Supervisor as to opposition of Union to mechanization.

118. Copy letter 21st March, 1944, from Secretary, Q.C.E.U., Collinsville, to Manager, as to resolutions of Union regarding the " Token System," " Slab timbering," and mechanization.

119. Copy minutes 29th June, 1944, of deputation from Q.C.E.U. to Minister for Mines as to mechanization and fear of unemployment.

120. Logs of bores at Collinsville.

121. Manuscript of log, and rough notes of Bore 1.A.

122. Plan of logs of bore holes, showing sections of strata.

123. Map of Bowen Consolidated Coal Mining Lease, showing location of bores.

124. Copy memorandum 24th December, 1952, by R. N. Spratt as to exploratory work by Bowen Consolidated Coal Mines for year ending 31st December, 1952.

125. Shot-firing records for September, 1954.

126. Two photographs of stay-in strike celebrations.

127. Particulars of variation of darg from 23rd October, 1948, to 20th September, 1952.

128. List of mechanical staff as at 30th June, 1951.

129. Copy statement H. MacLennan, 20th November, 1954.

130. Three minute books of meetings of Q.C.E.U., Collinsville Branch.

131. Copy letter 15th June, 1955, from Manager to Mr. Cormack, enclosing particulars as to idle days due to floods, &c., from pay ending 16th March, 1946, to pay ending 20th September, 1952, and particulars as to skips, dargs, industrial stoppages, and other matter.

132. Copy letters (two), 9th June, 1955, and 16th June, 1955, from Under Secretary to Manager and reply as to clearing of Dip.

133. Extract pages 75 and 76 from undated publication " Left Wing (an Infantile disorder) Communism."

134. Schedule of labour turn-over at mine from 31st August, 1948, to 11th June, 1955.

135. Extract from Mr. Justice Davidson's Report in transcript page.

136. Half-yearly Balance Sheets and Directors' Reports of Bowen Consolidated Mine from 1940 to 1954.

137. Profit and Loss Accounts of State Mine and Bowen Consolidated Mine from 1940 to 1954.

138. Queensland Coal Board Report, 1953-54.

139. Report Joint Coal Board, New South Wales, 1953-54.

140. Copy " Common Cause," 2nd July, 1955.

141. Copy report 16th June, 1955, by Under Secretary as to " foreign work " done in workshops.

Exhibit.

142. Maintenance manuals as to Loader and Cutter.

143. Korean contract dated 2nd April, 1953, and copy document relating to dates of deliveries.

144. Copy letter 2nd August, 1954, from Secretary, Q.C.E.U., Collinsville Branch, to Minister for Mines, suggesting methods of increasing production.

145. Copy letter 23rd August, 1954, in reply.

146. Copy of submission, 14th December, 1951, by Under Secretary and General Manager to Cabinet as to mechanization ;

Also copy Executive Minute approving purchase of machinery recommended.

147. Original reports of Mechanical Staff from March, 1954.

148. Original reports of Electrician from 22nd January, 1954.

149. Industrial Agreement 14th October, 1953, between Management and A. E.U.

150. Copy Managers scheme, 5th August, 1947, for mechanization of No. 1 Tunnel, with Supervisors' comments.

151. Memoranda embodying evidence of Secretary, Queensland Coal Board, as to various aspects of coal production in Northern Queensland.

152. Two reports of Queensland Coal Board, 1st January, 1949, to 30th June, 1952, and 1st July, 1952, to 30th June, 1953, respectively.

153. Various letters as to power and other matters—Original letter 21st December, 1951, from General Manager to Manager ;

Copy letter 31st December, 1951, from Manager to General Manager ;

Copy letter 14th June, 1951, from Manager to Supervisor ;

Copy letter 6th June, 1951, from Mine Engineer to Manager.

154. Copy Collinsville " Star," 22nd June, 1951, containing statement J. Nisbet as to miners' viewpoint as to mechanization and decline in production.

155. Statistics as to Profit and Loss, Costs, Sales, Prices, Depreciation, Wages, Freight, Production, &c.

156. Copies letters as to performance of Jeffrey machinery-6th April, 1954, from General Manager to Underhill Day & Co. Ltd. ;

7th April, 1954, from Under Secretary to Overseas Manager, Jeffrey Manufacturing Co., Ohio ;

Also letter 6th May, 1954, from L. Mollohan to General Manager.

157. Letter 22nd June, 1953, from Underhill Day & Co. Pty. Ltd. to General Manager, forwarding drawings relating to L. 600 C. Loaders.

158. Copy letter 23rd June, 1953, from General Manager to Manager, enclosing drawings relating to L. 600 C. Loaders.

159. Copy letter 2nd July, 1953, from General Manager to Chief Electrical Engineer, forwarding Spare Parts list and drawings relating to 29 U.C. Cutters.

160. Letter 27th July, 1953, from Underhill Day and Co. Pty Ltd. to General Manager, enclosing Lubricants Manual for Jeffrey machinery.

161. Copy letter 29th July, 1953, from General Manager to Manager, enclosing Lubricants booklet for Jeffrey machinery.

162. Letter 5th August, 1953, from Underhill Day and Co. Pty. Ltd. to General Manager, containing copies of Jeffrey instruction booklet as to operation of 29 U.C. Cutting Machines also drawing of motor.

163. Copy letter 7th August, 1953, from General Manager to Chief Electrical Engineer, containing Jeffery instruction booklet as to operation of 29 U.C. Cutting Machines, also sectional drawing of machine.

164. Copy letter 7th August, 1953, from General Manager to Manager, containing three copies of Jeffery instruction booklet as to operation of 29 U.C. Cutting Machines, also sectional drawing of machine.

165. Letter 10th August, 1953, from Underhill Day and Co. Pty. Ltd., containing set of drawings relating to 29 U.C. Cutting Machines and L. 600 C. Loading Machines manufactured by Jeffrey Manufacturing Company of America.

Exhibit.

166. Copy letter 10th August, 1953, from General Manager to Manager, forwarding set of drawings relating to 29 U.C. Cutters and L. 600 C. Loaders.

167. Letter 9th September, 1952, from Manager, Caltex Oil, Brisbane, to General Manager, forwarding chart of lubrication for Cutters.

168. Letter 2nd August, 1955, from Under Secretary, Department of Mines, to Solicitor-General, containing particulars of production in No. 2 Tunnel after mechanization.

169. Report, 3rd August, 1955, of Under Secretary as to drilling of new bore.

170. Copy extracts from General Manager's diary as from 15th October, 1951, to 4th August, 1954.

171. Copy Press statement by Minister, 5th March, 1952.

172. File of correspondence relating to cables.

173. Telegram 13th May, 1952, from Secretary, Q.C.E.U., Collinsville, to Minister regarding Manager ; Copy letter 15th May, 1952, from Minister to Secretary, Q.C.E.U., Collinsville, in reply.

174. Copy report 13th February, 1950, A. Crowley, Engineer Member of State Coal Board, and K. D. Woolley, Powel Duffryn Technical Services Ltd., as to production at the State Mine.

175. Copy extracts from Exhibit 72, showing history of No. 1 and No. 6 Loaders from 4th October, 1954.

176. Extracts from Overmen's reports for 1954 relating to damaged cables.

177. Copies various reports from Under Manager and Manager to Under Secretary, Department of Mines-progressive reports as to clearing out of the Dip and showing materials loaded out and what has been found-29th March, 1954, to 19th December, 1955.

178. Report by Geologist Cribb dated 14th October, 1955, with plans showing nature of disturbance.

179. Copy memorandum from General Manager to Under Secretary, dated 26th August, 1954.

180. Report by Mr. Senior Geologist Cundith as to condition of mine-dated 28th October, 1955.

181. Report by Geologist Cribb and plans, including report of Assistant Geologist Cameron as to new bore N.S. 1-15th November, 1955.

182. Approval of Cabinet to recommendations contained in Exhibit 116.

183. Press statement of the Minister for Mines (The Hon. W. Power, M.L.A.) announcing appointment of General Manager and stating reasons for mechanization-19th July, 1951.

184. Copy letter from Under Secretary to Mr. Lightfoot, notifying him of his appointment-19th July, 1951.

185. Copy letter from Under Secretary to Mr. Lightfoot, forwarding mechanization scheme, data and plans-19th July, 1951.

186. Copy letter from Under Secretary to Mr. Lightfoot, in reply to letter of 10th August, 1951, re mechanization equipment-13th August, 1951.

187. Copy memorandum from Mr. T. Platt, Supervisor, to Under Secretary, commenting on Mr. Lightfoot's suggestions as to equipment-21st August, 1951.

188. Copy letter from Under Secretary to Mr. Lightfoot, forwarding Mr. Platt's suggestions-22nd August, 1951.

189. Plan of workings of State Coal Mine, Collinsville, showing basic data available 1st October, 1951.

190. Press statement, Minister for Mines, 20th December, 1951.

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14.	Crowley-Woolley Report (Exhibit 174).
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16.	Third Winstanley Report (Exhibit 99).
17.	Joint Scheme by Powell Duffryn Technical Services Ltd. and Mr. A. Crowley (Exhibit 112).
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22.	Letter from Under Secretary, Department of Mines to Mr. A. Lightfoot (Exhibit 188).
23.	Letter from Mr. A. Lightfoot to Under. Secretary, Department of Mines, dated 29th August, 1951.
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36.	Plan showing position of borehole N.S. 1.
37.	Reports by Mr. J. B. Cameron, 9th November, 1955, and Mr. H. Cribb, 15th November, 1955 (Exhibit 181).
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ANNEXURE No. 1.

" 14th October, 1955.

MEMORANDUM.

The Under Secretary for Mines,

Brisbane.

RE INSPECTION No. 3 WEST DIP FACE, No. 1 TUNNEL, STATE COAL MINE, COLLINSVILLE.

As instructed, I visited Collinsville during the period 27th-30th September to record geological evidence exposed in No. 3 W. dip, No. 1 Tunnel, by removal of debris from the face and to assess the results of test boring carried out to prospect ahead. I was assisted in the inspection by Messrs J. B. Cameron, Assistant Geologist, and L. A. Rogers, Mine Surveyor.

The stage reached at the end of my visit in clearing the dip face and the location and results of boring as at that date are shown on the accompanying plan and sections.

Since previous inspection on 1st June, the right hand rib has been cleared, but the left hand rib and part of the face remain completely obscured by a broken mass slumped from the upper section of the seam and roof measures, including the two bands of the Little Bowen Seam. To the right of the centre line, the unfaulted upper part of the seam, with the exception of the uppermost foot, is hidden by finely broken loose coal. The roof measures to the right of the centre line have fallen, the limit of the fall being a vertical fracture plane striking N.N.W.—S.S.E. This plane is exposed to a height of some 15 ft. above the top of the seam and in its lower part shows the two bands of the Little Bowen Seam continuing to the dip.

The dip floor has now been formed at a slightly steepened grade to within 18 ft. of the limiting fracture preparatory to timbering. The ledge so formed consists of friable coal and shale, irregularly intruded by dyke material and in parts coked.

The opinion has been expressed that the feature exposed at the limit of the dip is the main fault plane hading vertically but such is not tenable in that (1) the roof of the Bowen Seam and Little Bowen bands are exposed in the face ; (2) a section showing in the right rib shows only minor movement of the strata on this plane and minor tensional effects on further fractures on its up-dip side ; (3) no dyke or crushed material is present, while elsewhere in the dip such are characteristic features of the fault line ; and (4) it would be difficult to explain a sudden change in hade from relatively flat to vertical. This feature is to be regarded as a tensional fracture complementary to overthrust faulting. Its strike is parallel to the direction of faulting extended from No. 3 E level, No. 2 Tunnel workings to the dip face, to the strike of the slickensided surface previously observed in the right rib, an extension of which was located 18 ft. up-dip from the face just beyond the centre line and also to the direction of numerous fractures exposed in the roof measures.

The opportunity was taken on this occasion to drill in the floor at right angles to the fault, a line of vertical holes to enable plotting of a section through the disturbance. The drill used was equipped with pressure water return and allowed examination of cuttings as drilling proceeded. The work revealed pronounced drag in the overthrust section of the seam, with a most irregular fault surface at this point, as indicated by the course of the dyke. A further complication in structure is introduced by lateral intrusion of the seam, accompanied by coking. This section is in contrast to that exposed in a fall near the face of No. 3 E. level, No. 2 Tunnel, where the fault hades uniformly at 70 deg. and is not intruded.

At no point has the fault been penetrated by the dip, but prior to my visit three depressed boreholes (Nos. 1-3) had been drilled through the dyke, stone and coaly material occupying the fault. These were reported to transect a thick section of coal, considered to be the downfaulted continuation of the Bowen Seam.

Results obtained by the Management were approximately duplicated by a further three depressed boreholes drilled between and beyond them in a direction at right angles to the strike of the fault. While its full thickness as worked up-dip of the fault (14 ft. 6 ins.) was not recorded in the bores, there can be no doubt that the coal transected is to be identified as the Bowen Seam, its reduced thickness being due to disturbance adjacent to or truncation by the fault. Plotting of the results indicates a downthrow on the fault of 14 to 16 ft.

Further drilling is to be undertaken as work proceeds, to gain additional information where the seam is unaffected.

H. G. S. CRIBB, Senior Geologist."

ANNEXURE No. 10.

COAL RESERVES IN STATE RESERVES Nos. 1 AND 2 AREAS.

We quote from Mr. Reid's publication already referred to :-

" *State Reserve No. 1.—Area* 4,570 acres, situated between Collinsville, Scottville, and Sonoma. Of this area the north-eastern strip about 60 chains wide, and containing about 1,100 acres, is much folded and faulted, and most of it will certainly be found to be too highly disturbed for the seams to have much value there. As this strip is followed to the south-east corner, the disturbance becomes less acute. This crushed area can be detected, at the surface, to start about 18 chains east of the State Colliery, and the effects of it have been noticed underground in No. 1 East level at 11 chains east of the State Colliery tunnel, where the quality of the coal is adversely affected, and where the seam changes its direction of strike and dips more steeply (up to 25 degrees), these being the first underground indications of the very acute fold-over towards the east. The remainder of the reserve, about 3,470 acres, will be found to be unaffected by this disturbance, and dips of the order of 1 in 6 to 1 in 10 will be found throughout it. Of this area about 1,800 acres between Scottville and Collinsville have been tested by diamond drill bores, and the anticipated reserves of coal are as follows :—

Seam.	Area.	Average Thickness of Seam.	Total Tonnage.	Available Tonnage.
	Acres.	Feet.		
Garrick	1,000	6	9,000,000	6,000,000*
Scott	1,500	5.5	12,375,000	Probably smallt
Denison	1,500	5	11,250,000	Probably smallt
Bowen	1,800	14	37,850,000	25,200,000*

* No deduction made for tonnage affected by intrusions, which probably will be slight.

t Much affected by instrusions.

The balance of the reserve, 1,680 acres, lying in the south-western corner appears to be a very suitable area for future working. The Garrick Seam should be found there varying between depths of 450 ft. and 1,150 ft., and the Bowen Seam between 800 ft. and 1,500 ft. This area has not been bored at all, so that the thickness of each seam is not known ; but assuming that the two principal seams continue to dip through this area without diminishing in thickness, it would contain the following additional total tonnages based on those figures :-

Garrick Seam .. .. 15,120,000 tons.
Bowen Seam .. .. 35,280,000 tons.

The risk of coal not being available on this area for future mining is mainly confined to (1) the thinning or deterioration of the seams ; (2) the destruction of coal by intrusive rocks. As to the first, it is considered improbable that the seams will seriously thin out in view of the boring data available on other areas in this portion of the field. As to the second, this can always be considered a possible menace in this district which must be guarded against in an area like this, where the seams occur at moderate depths, by a considerable amount of drilling before the sinking of any shafts to win coal is undertaken. There is little, if any, surface evidence of intrusive rocks in this area, which is certainly in its favour, but this can be misleading and, despite its absence, the seams underneath may be considerably destroyed or affected.

State Reserve No. 2.—Area 2,558 acres. The centre of this reserve lies 51 miles south-west of Collinsville. There are three widely spaced bores (Nos. 24, 25, and 26) in the northern half of it, so that the southern half remains so far untested. The Blake Seam was reached in bores Nos. 24 and 26, but was found to be almost entirely destroyed. The Bowen Seam is almost entirely destroyed in the three bores, and the Garrick is destroyed in Nos. 24 and 25, while in No. 26 there is only a section of coal 3 ft. 4 ins. thick with thin coal bands above and below that. Both the Scott and Denison Seams are destroyed in No. 25 bore (the most northerly), but in Nos. 24 and 26 they have workable thickness of coal unaffected by intrusion rocks. The respective thicknesses in these two bores are Scott Seam, 5 ft. 10 ins., and 4 ft. 6 ins. ; Denison Seam, 5 ft. 9 ins. and 3 ft. 6 ins. The reserve on this evidence appears a most unfavourable area on which to attempt to develop either the Blake, Bowen, or Garrick Seam. There is insufficient boring evidence to indicate whether the Scott and Denison will be worth working in the future, but a bore in the centre of the area and one near the south-eastern boundary should be sufficient to determine that question in the future.

The coal measures are only very slightly tilted and occupy a slight trough which dips south-east at about 1 in 12. Consequently, the seams will be found at shallow depths, and these can be approximately determined at their deepest points owing to the outcrop of the key horizon of the seams—the Big Strophalosia bed—occurring close to, and parallel with, the south-eastern boundary. The Garrick Seam, it is anticipated, will be found in this reserve within the depths of 100 ft. and 500 ft., and the Bowen Seam from 330 ft. to 380 ft. deeper."

TABLE D/XVII.

Sample No.			Proximate Analysis.					Ultimate Analyses.						Nature of Ash.	
															F.Pt.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

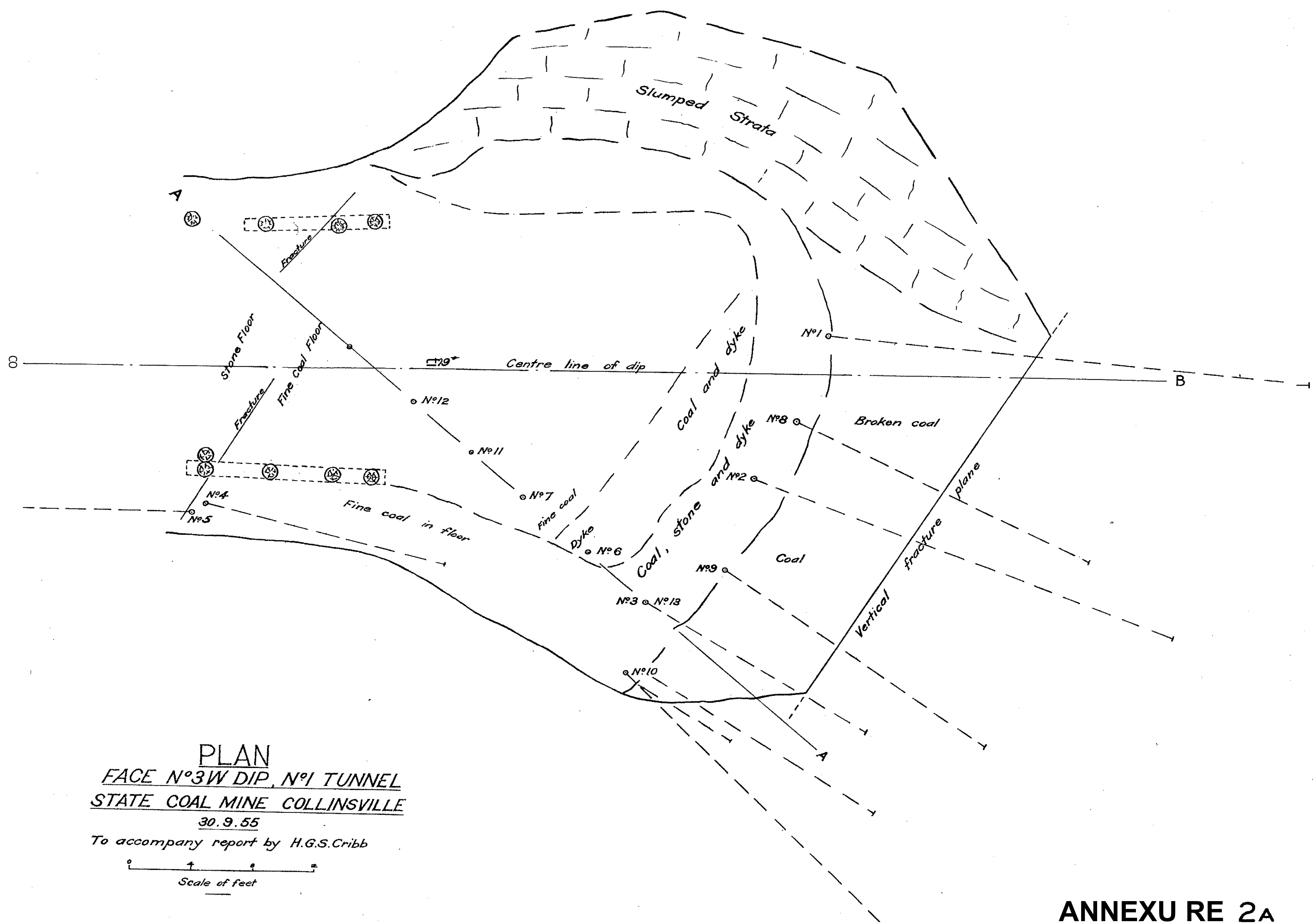
* 1. Air-dried basis. † Probably weathered.
2. Ash-free-dry basis.

ANNEXURE No 12.

k

ADDITIONAL PROXIMATE ANALYSES OF COALS FROM THE COLLINSVILLE COALFIELDS. (CARRIED OUT IN BRISBANE.)

Sample No.	[illegible]	[illegible]	[illegible]	Floor.	[illegible]	Thickness.		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
						[illegible]	[illegible]					
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Nothing discarded
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Nothing discarded
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Nothing discarded
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Nothing discarded
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Nothing discarded
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Nothing discarded
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Nothing discarded
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Nothing discarded
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Stone band discarded in sample
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Nothing discarded
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Nothing discarded
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Nothing discarded



PLAN

FACE N°3W DIP, N°1 TUNNEL

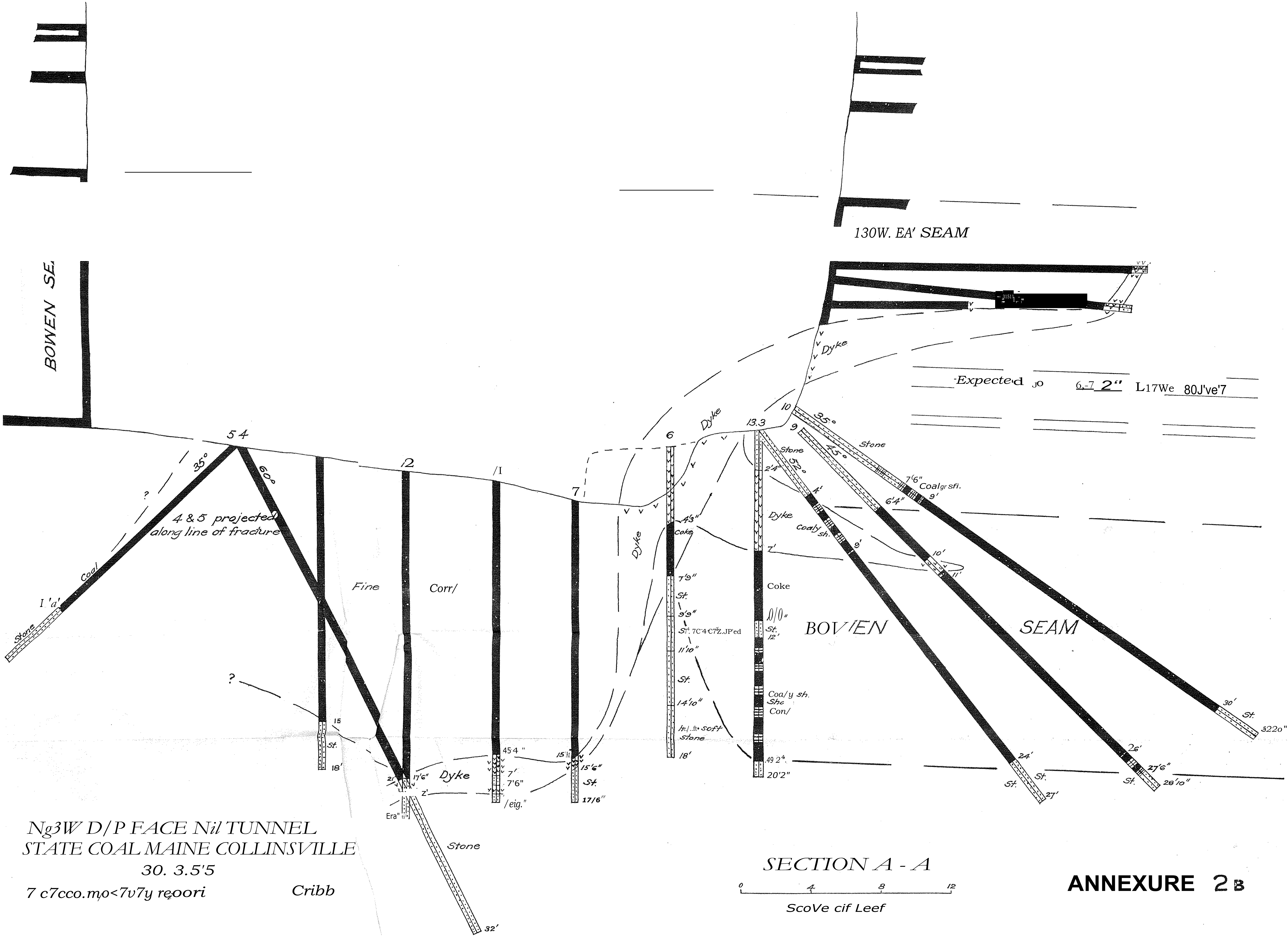
STATE COAL MINE COLLINSVILLE

30.9.55

To accompany report by H.G.S.Cribb

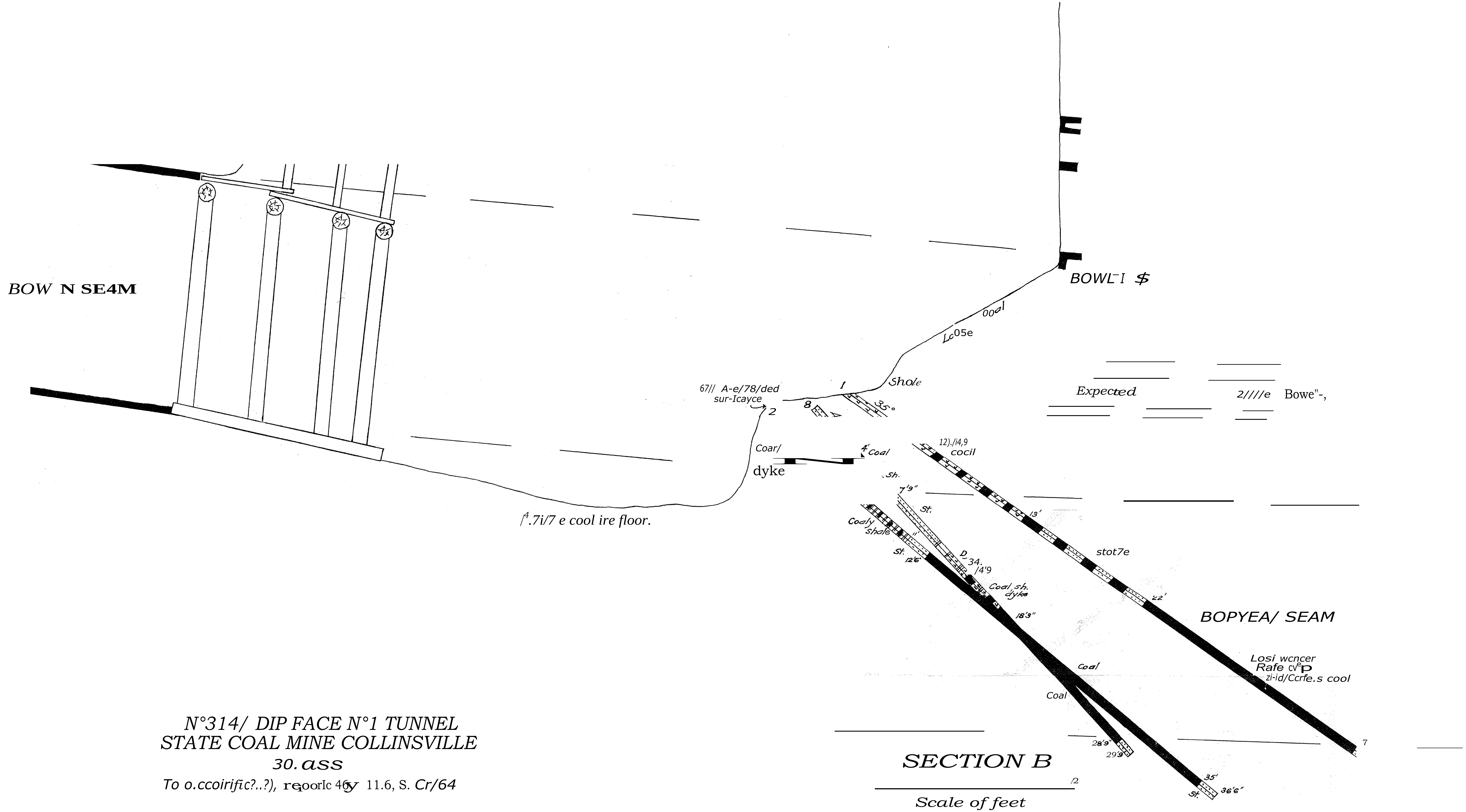
Scale of feet

ANNEXU RE 2A



130W. EA' SEAM
BOWEN SE
Dyke
Expected
BOWEN SEAM
4 & 5 projected along line of fracture
Coal
Stone
Fine
Coke
Coaly sh.
St.
Dyke
Stone
Ng3W D/P FACE Nil TUNNEL
STATE COAL MAINE COLLINSVILLE
30. 3.5'5
Cribb
SECTION A - A
0 4 8 12
ScoVe cif Leef

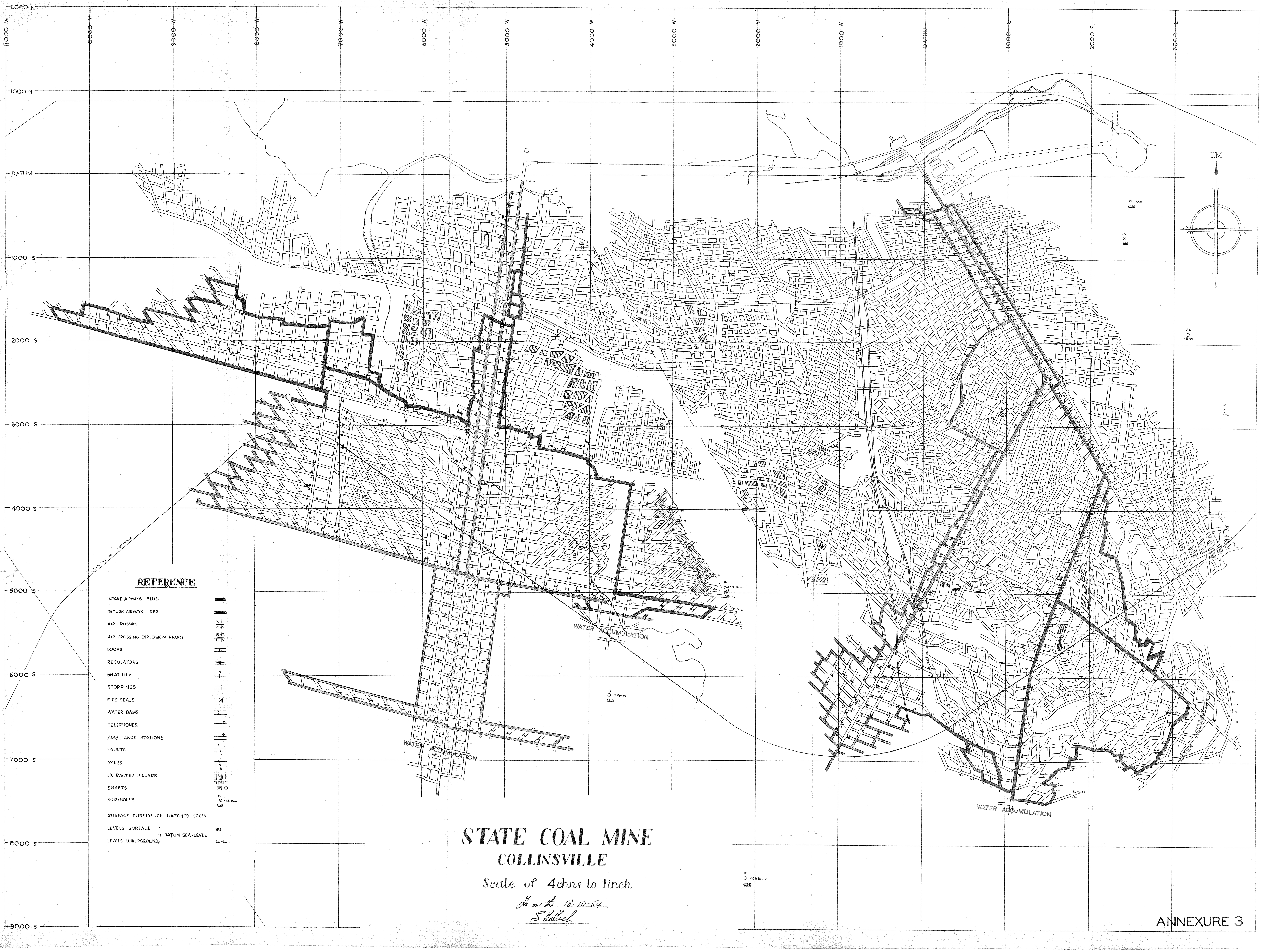
ANNEXURE 2B

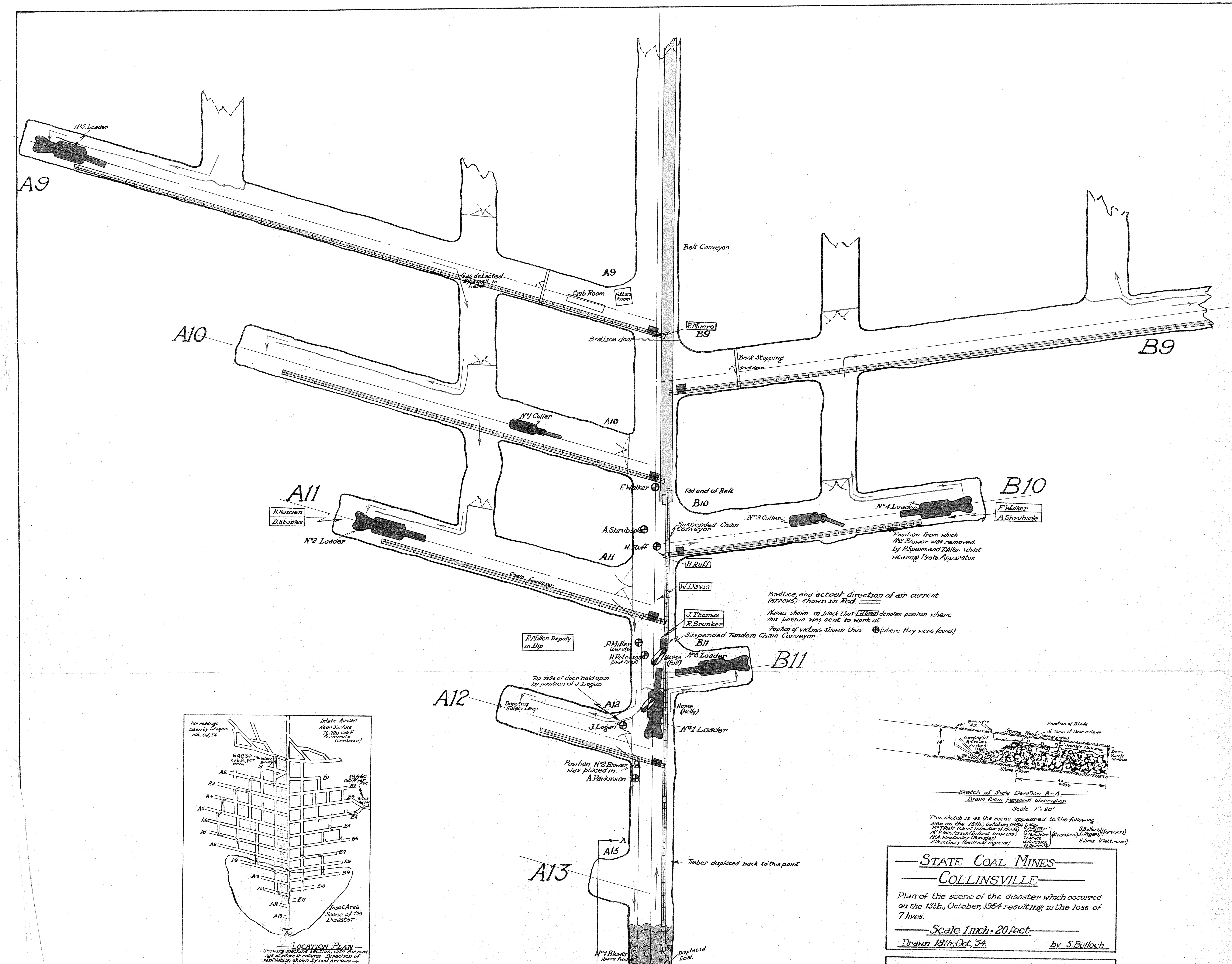


N°314/ DIP FACE N°1 TUNNEL
STATE COAL MINE COLLINSVILLE

ANNEXURE 2c

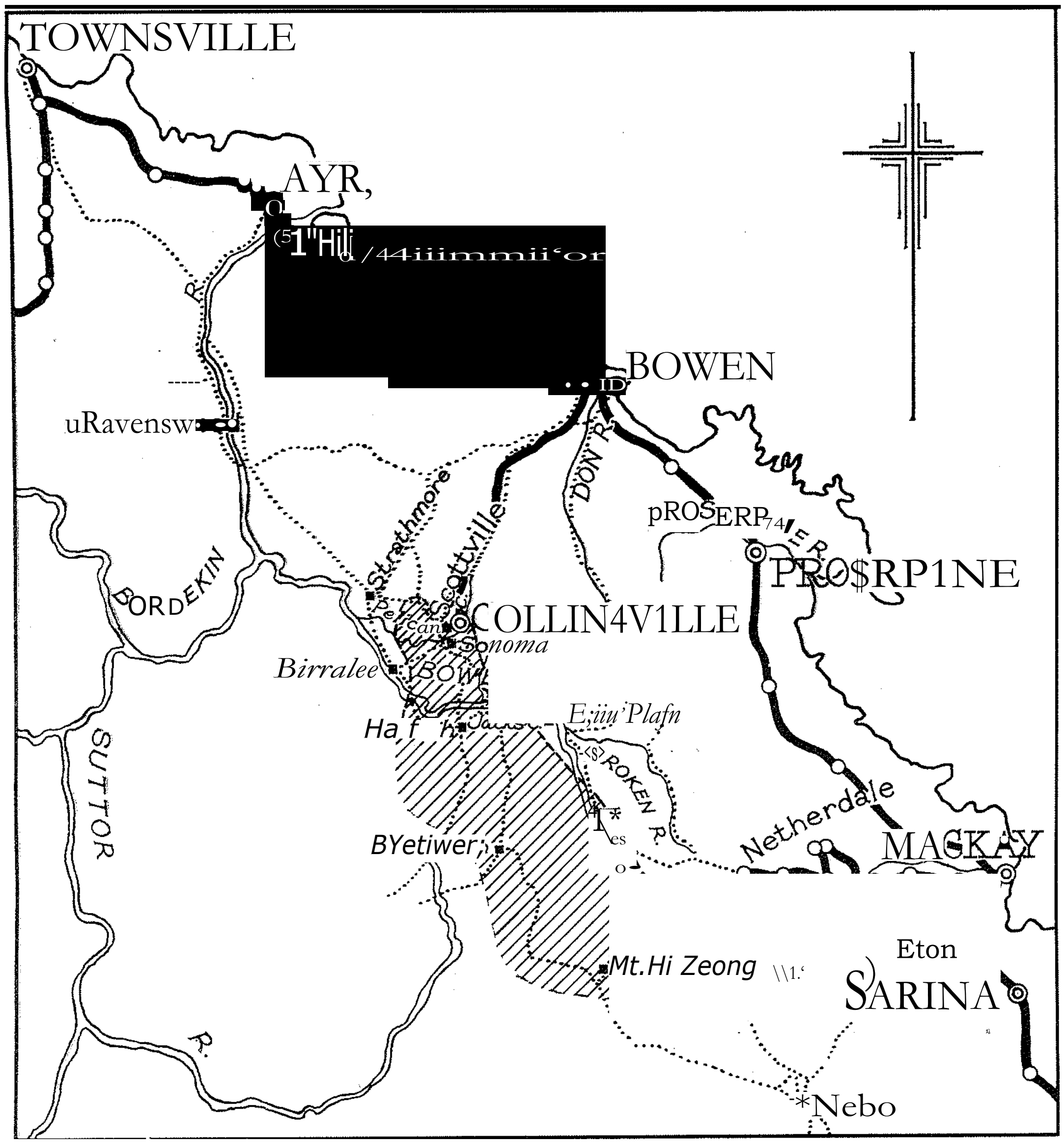
ANNEXURE 3


STATE COAL MINE
COLLINSVILLE
Scale of 4chns to 1inch
REFERENCE
INTAKE AIRWAYS BLUE.
RETURN AIRWAYS RED
AIR CROSSING
AIR CROSSING EXPLOSION PROOF
DOORS
REGULATORS
BRATTICE
STOPPINGS
FIRE SEALS
WATER DAMS
TELEPHONES
AMBULANCE STATIONS
FAULTS
DYKES
EXTRACTED PILLARS
SHAFTS
BOREHOLES
SURFACE SUBSIDENCE HATCHED GREEN
LEVELS SURFACE
LEVELS UNDERGROUND
DATUM SEA-LEVEL
WATER ACCUMULATION
RAILWAY TO SCOTTVILLE
T.M.
2000 N
1000 N
DATUM
1000 S
2000 S
3000 S
4000 S
5000 S
6000 S
7000 S
8000 S
9000 S
11000 W
10000 W
9000 W
8000 W
7000 W
6000 W
5000 W
4000 W
3000 W
2000 W
1000 W
1000 E
2000 E
3000 E



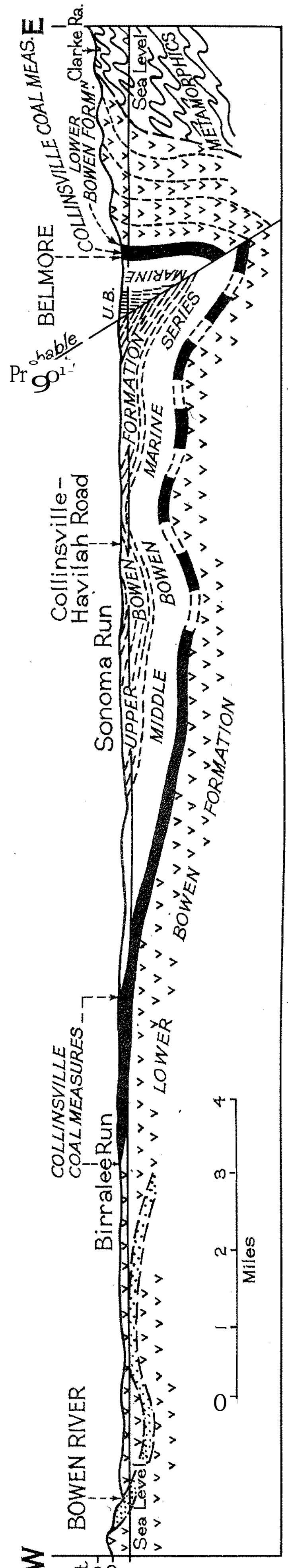
STATE COAL MINES
COLLINSVILLE
Plan of the scene of the disaster which occurred on the 13th., October, 1954 resulting in the loss of 7 lives.
Scale 1 inch - 20 feet
Drawn 18th., Oct., '54.
by S. Bulloch
We the undersigned have examined this plan and find that it appears to be a true representation of the scene of the disaster.
Sketch of Side Elevation A-A
Drawn from personal observation
Scale 1" = 20'
This sketch is as the scene appeared to the following men on the 15th., October, 1954
Mr T. Platt. (Chief Inspector of Mines)
Mr R. Henderson (District Inspector)
Mr A. Winstanley (Manager)
R. Stansbury (Electrical Engineer)
T. Allan
G. Templeton
H. Morgan
W. Templeton
W. Whyte
J. Harrison
W. Owens (S)
(Oversmen)
S. Bulloch
L. Rogers
(Surveyors)
H. Jinks (Electrician)
Opening to A13
Position of Birds at time of their collapse
Stone Roof (normal grade)
Carrying set & Crowns Knocked Down.
14'
2' average clearance
Stone Visible at face
Stone Floor
40 to 50 ft
Brattice, and actual direction of air current (arrows) shown in Red.
Names shown in block thus W.DAVIS denotes position where this person was sent to work at
Position of victims shown thus (where they were found.)
Position from which No 2 Blower was removed. by R. Speirs and T. Allan whilst wearing Proto Apparatus
A9
A10
A11
A12
A13
B9
B10
B11
No 5 Loader
No 1 Cutter
No 2 Loader
No 2 Cutter
No 4 Loader
No 6 Loader
No 1 Loader
No 3 Cutter under coal.
No 1 Blower
Belt Conveyor
Gas detected by smell to here
Crib Room
Fitters Room
R. Munro
Brattice door
Brick Stopping
Tail end of Belt
Suspended Chain Conveyor
Chain Conveyor
Suspended Tandem Chain Conveyor
F. Walker
A. Shrubsole
H. Ruff
W. Davis
J. Thomas
R. Brunker
H. Hansen
D. Staples
P. Miller Deputy in Dip
P. Miller (Deputy)
H. Petersen (Shot Firer)
Horse (Bill)
Horse (Kelly)
Top side of door held open by position of J. Logan
Deputies Safety Lamp
J. Logan
Position No 2 Blower was placed in.
A. Parkinson
Timber displaced back to this point
Displaced Coal.
A. Parkinson
J. Logan
H. Petersen
W. Buchanan
DIP FACE (Approx)
LOCATION PLAN
Showing machine section, with Air readings at intake & return. Direction of ventilation shown by red arrows
Scale 1 inch - 4 chns
Inset Area Scene of the Disaster
Intake Airways Near Surface
Main Dip

ANNEXURE 4

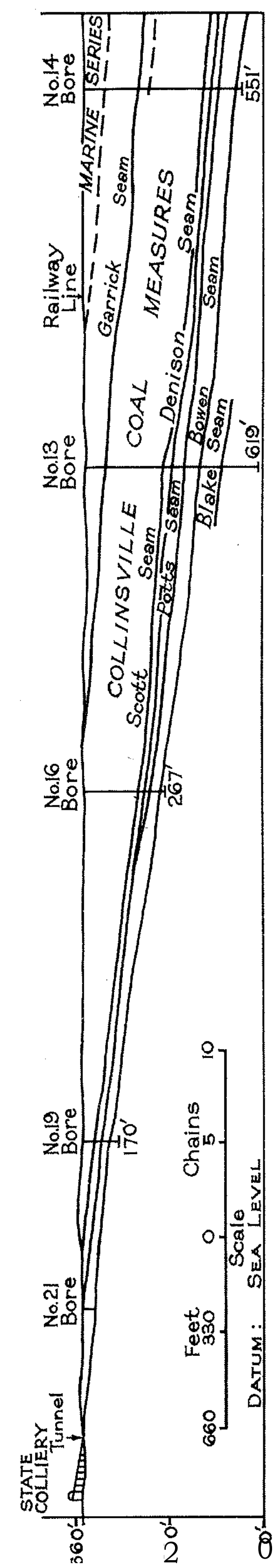


LOCALITY MAP
OF
BOWEN RIVER COALFIELD
SCALE OF MILES
30 15 0 30 60

AN NEXURE 5

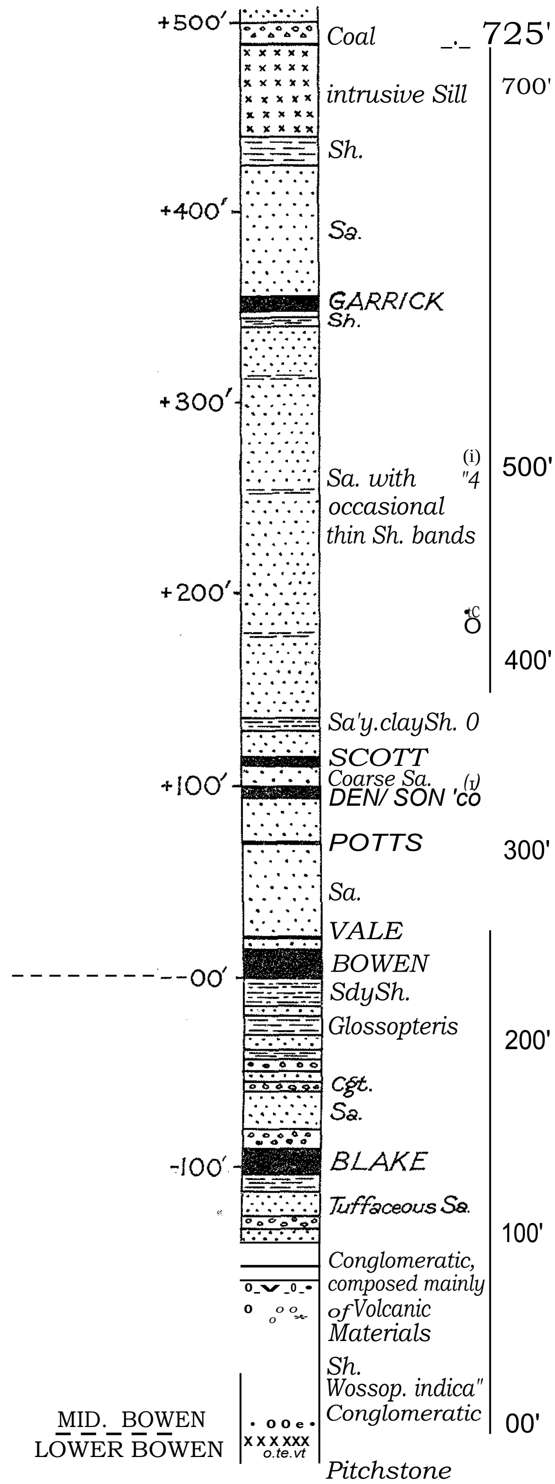


GEOLOGICAL SKETCH SECTION ON LINE E-W ACROSS BOWEN RIVER COALFIELD (AFTER J.H. REID)



SECTION ON LINE OF No. I

SHOWING

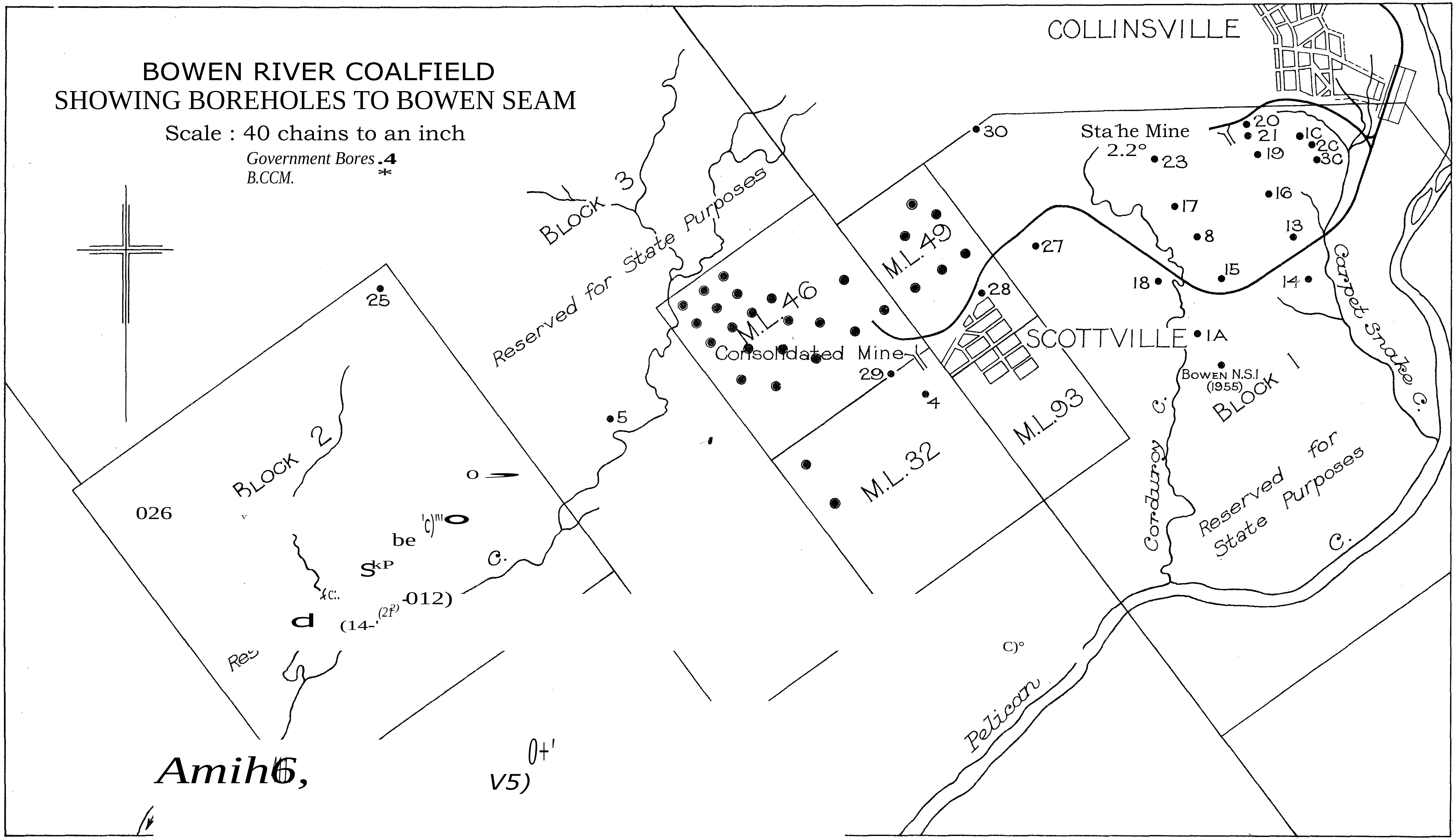


VERTICAL SECTION OF COLLINSVILLE COAL MEASURES

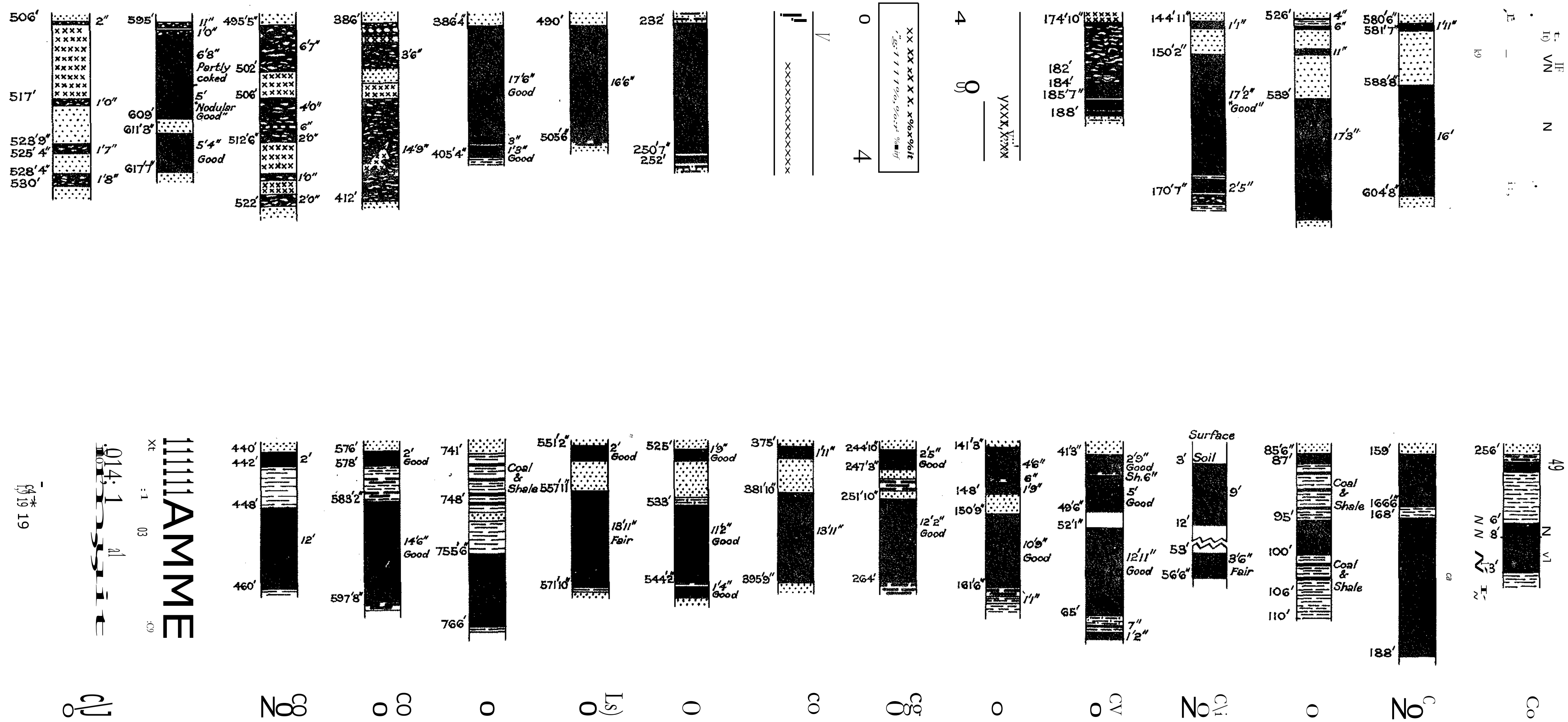
STATE MINE AREA

VERTICAL SCALE : 100 FT TO AN INCH

AN N EXU RE 7


BOWEN RIVER COALFIELD
SHOWING BOREHOLES TO BOWEN SEAM
Scale : 40 chains to an inch
Government Bores .4
B.CCM. *
COLLINSVILLE
Stahe Mine
2.2°
SCOTTVILLE
Consolidated Mine
BLOCK 1
BLOCK 2
BLOCK 3
M.L.46
M.L.49
M.L.32
M.L.93
Reserved for State Purposes
Reserved for State Purposes
Bowen N.S.I (1955)
Carpet Snake C.
Corduroy C.
Pelican
C.
30
20
21
1C
2C
3C
19
23
16
17
8
13
27
15
14
18
28
1A
29
4
5
25

AN N EXURE 8



SECTIONS OF BOWEN SEAM IN BORES

VERTICAL SCALE: 20 FEET TO AN INCH

LEGEND

Sandstone
Clays
Clay Shales

Carbonaceous Shale

Coal

Intrusive Porphyrite
Coal "coked" or burned"
by intrusion

ANN EXURE 9

ANNEXURE No. 13.

2nd September, 1947.

MEMORANDUM.

The Under Secretary for Mines.

PROPOSED MECHANIZATION—STATE COAL MINE, COLLINSVILLE.

The Mine Manager, Mr. A. Winstanley, subsequent to discussions with me, has co-operated with Messrs. Glazebrook and Caster of Noyes Bros. (Sydney) Ltd. in examining the practicability of using modern mechanical equipment in the production of coal at Collinsville. I attach the report and plans and make the following comment and recommendations :-

(1) In 1931 a Sullivan D.C. electric coal cutting machine was installed at the mine. Its operation was finally suspended in 1935 on account of opposition by mine workers, mostly based on the reduction of the hewing rate to miners of 2s. 3d. per ton. Hand loading was carried out after the machine had cut the coal.

(2) Since my appointment to the Department I have consistently requested various managers at the mine to consider the use of scraper loaders to increase output. Certain factors militated against that proposal.

(3) In adopting mechanization for production, years of practice have proved conclusively that full conversion to mechanical units with total abolition of the contract method of payment to workers is preferable to partial mechanization.

(4) The general scheme now suggested is broadly on approved lines, but further close scrutiny and technical examination appears necessary in regard to :-

(a) The lack of provision for completion of coal extraction from the workings in lieu of leaving pillars of coal. Failure to accomplish this in New South Wales has created one of their gravest problems. Successful methods have been adopted in New South Wales under like conditions to Collinsville,

(b) Battery storage shuttle cars are not favoured by me in the circumstances,

(c) Estimated cost of production is too low and not possible of realisation.

(5) Further consideration is required to the advisability of creating a new more direct drive through which the whole production from the mine can be obtained for many years.

I RECOMMEND urgent consideration be given to the following :-

(i.) The provision of £100,000 for partial mechanization along the lines suggested by the manager ;

(ii.) Discussions with the New South Wales—Commonwealth Joint Coal Board and its officers pertaining to the scheme, augmentation, and implementation ;

(iii.) Discussions with New South Wales mining engineers who have recently visited U.S.A. ;

(iv.) Authorizing a consultant mining engineer, the Mine Manager or Supervisor of State Coal Mines to carry out (ii.) and (iii.) and to concentrate on the production of a complete detailed scheme for the earliest partial mechanization and subsequent total mechanization of the means of production of coal at the State Coal Mine, Collinsville.

Supervisor, State Coal Mines.

State Coal Mine, Collinsville, 5th August, 1947.

The Supervisor,
State Coal Mines,
Mines Department,
Brisbane.

Dear Sir,

PROPOSED MECHANIZATION.

Following the inspection Underground of No. 3 West and No. 1 East Sections, No. 1 Tunnel, State Coal Mine, Collinsville, on the 10th July, 1947, accompanied by Mr. Glazebrook and Mr. Carter representatives of Noyes Bros. (Sydney) Limited, and the discussions later held in the Colliery Office regarding the most practical method of introducing mechanization at Collinsville as per the plan submitted to you by Mr. Glazebrook on his return to Brisbane, I have to advise that I have now received from Mr. Glazebrook an estimate of costs for the proposed installation of all equipment required underground, exclusive of weighing machine and gravity tippler required to be installed at No. 4 pitbottom for the pick-mining section.

MAIN HAULAGE SYSTEM.

The Main Haulage System is to be composed of Troughed Belt Conveyors from A. to B., from B. to D., and B. to C., as shown on plan. The size of belt for mechanized section A. to B., and B. to D. will be 30 ins. wide, and from B. to C. 24 ins. wide belt to handle all coal from the pick-mining sections.

The estimated costs of same are £33,500.

PRODUCTION UNITS.

The production units shall consist of two (2) complete units, each un it to comprise a crawler-mounted coalcutter and crawler-mounted loading machine. The secondary transport of one unit to consist of a scraper-type conveyor, and the secondary transport on the other unit to comprise battery-driven shuttle cars, at an estimated total cost of both production units of £34,500.

The daily output per unit recommended by Mr. Glazebrook to be 220 tons per day, or a total daily output of 440 tons from the two (2) units. Personally I am convinced that a greater daily output can be obtained from both units after the mechanical sections have been fully developed and correctly organised.

ELECTRICAL EQUIPMENT.

The estimated total costs of all Electrical Equipment required, such as Main Surface Switch, other switchgear cables (H.T. and L.T.), also trailing cables, &c., four (4) 100 kW portable mining-type substations, gate-end boxes, flit plugs, and battery charging equipment capable of charging four sets of shuttle car batteries is £20,500.

OTHER EQUIPMENT.

Installation of a weighbridge and gravity tippler is required at the No. 4 pitbottom, for the delivery of coal from the pick-mining section to the 24 ins. Troughed Belt conveyor B. to C., the estimated cost of same being £400.

The following is a summary of total underground estimates :-

	£	*s.*	*d.*
Main Conveyor Haulage System	33,500	0	0
Two Face Production Units	34,500	0	0
Electrical equipment (Cables, &c.)	20,500	0	0
Weighbridge and Tippler Installation—No. 4 pitbottom	400	0	0
Spare parts required for production units, &c...	2,500	0	0
Total	£91,400	0	0

Total estimates of surface plant are as follows :—

	£	8.	*d.*
Construction of Steel Storage Bin, capacity 400 tons, on steel structure	1,900	0	0
Two (2) Coal Conveyors from Storage Bin to feed Coal Screens	1,000	0	0
One (1) New Screen	350	0	0
Miscellaneous ..	125	0	0
Total .	£3,375	0	0

The following is the Grand Summary of estimated amounts :—

	£	*s.*	*d.*
Underground ..	91,400	0	0
Surface ..	3,375	0	0
Grand Total ..	£94,775	0	0

The total personnel required to operate the two (2) production units for a daily output of 440 tons, and wages amounts will be as follows :-

	£	s.	d.
Loading-4 men @ 32s. 5d.	6	9	8
Cutting-4 men @ 32s. 5d. ..	6	9	8
Drilling-6 men @ 32s. 5d. ..	9	14	6
Shot-firers-2 men @ 31s. 6d.	3	3	0
Shuttle car Drivers-3 men @ 32s. 5d. ..	4	17	3
Scraper-Conveyors-3 men @ 32s. 5d.	4	17	3
Shiftmen, Timber, &c.-12 men @ 31s. 6d. .	18	18	0
Loading Points-2 men @ 31s. 6d. .. .	3	3	0
Greasing Conveyors, &c.-2 men @ 31s. 6d. ..	3	3	0
Electrician and Mechanic-2 men @ 33s.	3	6	0
Deputies-2 men @ 32s. 10d.	3	5	8
Total employees 42 men. Total wages ..	£67	7	0

The total average number of working days per year, taken over a period of five years, is 230 days.

Total yearly output= 230 days x 440 = 101,200 tons ;

Average selling price of coal = 24s. 5d. per ton ;

Total selling price 101,200 tons @ 24s. 5d. = £123,548 6s. 8d.

The following is an estimate of daily costs for a production of 440 tons :-

	Cost per ton. s.	d.
Labour, £6 7s.	3	0.70
Explosives		6.00
Wet Work		1.02
Timber ..		1.16
Stores ..	1	0.00
Oils & Greases		1.80
Brattice		6.00
Payroll Tax and other Oncost ..	5	0.00
Total ..	10	4.68

Total daily cost 10s. 4-68d. per ton ;

Yearly Output = 101,200 tons ;

Total Wages Cost, &c. 101,200 x 10s. 4.68d.

		£	s.	d.
	=	52,573	8	0
Total Value Coal Sales	=	123,548	6	8
Wages Costs, &c.		52,573	8	0
Gross Profit	=	70,974	18	8
Less 20 per cent. Depreciation of Plant, &c.	=	14,194	19	9
Nett Profit	=	56,779	18	11

Annual percentage gain on Capital Investment of £94,775 :-

$$\frac{\text{Nett Profit £56,779 18s. 11d. x 100}}{\text{Capital Invested £94,775}} = \text{59.91 per cent.}$$

In conclusion, I have pleasure in recommending the above Capital Expenditure required. for installation of the Mechanical Units, and trust that after your careful consideration same will be submitted to the Minister for Mines. If decided upon and after installation of the above, another mechanical unit is to be purchased for No. 1 East Section, No. 1 Tunnel, for operation in the new area.

Yours faithfully,

A. WINSTANLEY, Manager.

ANNEXURE No. 14.

To: The Honourable THE SECRETARY FOR MINES AND IMMIGRATION.

Memorandum on The Problem of Obtaining an Immediate Increase in Production

AT

The State Coal Mine, Collinsville

By:

A. CROWLEY, ENGINEER MEMBER, QUEENSLAND COAL BOARD, and K. D. WOOLLEY, MINING ENGINEER, POWELL DUFFRYN TECHNICAL SERVICES LIMITED.

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MEMORANDUM

ON

THE PROBLEM OF OBTAINING AN IMMEDIATE INCREASE IN PRODUCTION

AT

THE STATE COAL MINE, COLLINSVILLE.

INTRODUCTION.

' 1. Following discussions held at the Mines Department at Brisbane relating to the working of the State Coal Mine, Collinsville, instructions were given by the Minister at the meeting of 6th December last, that an investigation be carried out to determine the steps necessary for obtaining an immediate increase in output and for eradicating a number of complaints put forward by the local Union Committee.

2. It was arranged that we, the undersigned, should commence the investigation as soon as the Manager, Mr. Winstanley, returned from his annual leave and the mine had settled down to normal production following the Christmas holiday recess. Owing to the scheduled itinerary for the Minister's tour, the investigation had to be carried out prior to the Manager's return from leave.

TERMS OF REFERENCE.

3. Although no specific terms of reference were laid down, the general objects of our visit were to carry out an inspection of the State Coal Mine, Collinsville, and to report upon the steps which should be taken with a view to obtaining an immediate increase in production.

4. This memorandum deals with the salient points which, as a result of our investigation, we consider should be brought to the notice of the Honourable the Minister, as they must have a considerable influence on output, and we submit a number of recommendations designed to bring about the desired results with the minimum of delay.

5. In addition to matters referred to at the meeting held at the Mines' Department on 6th December, 1949, the local Mine Management obtained an agenda from the Union Committee which lists a number of outstanding complaints that the employees at the mine desire to place before the Minister. These points are dealt with in a separate memorandum, the substance of which was discussed with the Honourable the Minister in his coach at Bowen on 6th February, 1950.

PROCEDURE.

6. We have, between 31st January and 4th February, 1950, examined the whole of the surface installations and visited every working section of the mine at both No. 1 and 2 tunnels.

7. We have also discussed all matters which we considered relevant to our terms of reference with the Acting Manager, Mr. Steele, and with other officials at the mine, and also certain aspects were raised with Union representatives and the individual workmen, both underground and on the surface.

8. In the following paragraphs we have grouped together those aspects of the problem which are primarily concerned with the behaviour of the employees, and, in a second group, those which are mainly technical. We have dealt with them in this order because we are convinced that technical improvements will be of little avail without a marked alteration in the attitude at present adopted by the majority of the workmen.

GENERAL.

9. In our many discussions with officials and workmen, and from our knowledge of the records of Collinsville as far as disputes and stoppages are concerned, we are satisfied that one of the principal aims at the mine should be the obtaining of a more contented labour force.

10. Amongst officials and workmen there exists an atmosphere that is altogether unpleasant, and is one of the things about Collinsville that is immediately found by any outsider visiting the locality. It is an atmosphere of discontent, dissatisfaction, and unrest, apparently bred by jumbled politics, the isolation of the township and its lack of amenities and reasonable communications with the outside world, and the fact that customs and practices have been allowed by the Management to grow over a period of years, which are against all the best principles of business practice and of establishing sound control of labour.

11. Everything possible must be done to overcome this atmosphere by eradicating the many petty disputes that arise, and by dealing now with a number of the more important matters simmering in the minds of almost all employees. In saying this we do not mean that further concessions should be made by the Management, either locally or in Brisbane, but, on the contrary, that a firmer attitude should be adopted towards the many frivolous complaints which are now almost a daily feature of the operation of the mine ; at the same time more serious complaints must continue to be given the consideration that they deserve. By this means the workmen will quickly learn that the bringing forward of frivolous complaints is a waste of time, without losing c onfidence that just grievances will receive proper attention.

12. If the recommendations made in this memorandum, and in the separate memorandum referred to in paragraph 5, are carried out, we are satisfied that a considerable step forward will have been taken in improving not only the output of the mine, but also the general mental outlook of all employees, thus enabling the Management to maintain discipline and plan development with the confidence that the maximum co-operation will be obtained.

THE ATTITUDE OF THE EMPLOYEES.

TH.6 UNION COMMITTEE.

13. The Committee is exerting an undue influence on all persons and operations at this mine. We found that discussions with many workmen became a farce, because it was clear the man with whom we were talking was afraid to commit himself to any statement which might be at variance with Union policy, even though in numerous cases it was apparent that the man himself was not clear what that policy might be.

14. A number of miners informed us that they disagreed with the darg, and wished to fill more coal to earn more money. At the same time they said that if they did so, their lives and those of their families would become intolerable in Collinsville.

15. An excessive number of disputes, many unreasonable, are brought daily to the Manager's office by Union committeemen. This practice must be stopped, and we recommend that the Union Committee should submit an agenda, not more than once per week, to the Manager in such time that he may have a reasonable opportunity of investigating the matters in dispute, after which he can meet a deputation, say, once each week. Any matters of extreme urgency should, of course, be dealt with by the Manager as soon as they arise.

THE DARG.

16. The Union Committee at this State Mine have fixed a darg upon a number of operations. Miners are not permitted to fill more than 18 skips per pair per day. This is a limitation of a miner's earning capacity, and results in many men working only some four to five hours each day including stoppages and breaks for meals and smoking A number of men informed us that they disliked the darg and wished to be able to fill more skips since they wanted more money. They thought it most unfair that they should have their wages restricted by Union instructions, but at the same time they informed us that they could not disobey and ignore the darg, because if they did they would be fined by the Union and their lives made miserable.

17. Shiftmen timbering are limited to erecting two sets of timber per day, irrespective of the size of the working place and the fact that they do no brushing or filling of dirt. This is patently absurd, since although these men are paid a day-wage rate and have to remain in the mine for the whole shift, they can erect two sets of such timber, under normal conditions, in about one and a-half hours. The result is that they sit about smoking and talking and doing nothing most of the shift.

18. Surface hands employed on manufacturing concrete bricks are instructed by the Union Committee not to produce more than 50 bricks each per day.

19. Skips filled by miners average about 17 cwt. of coal each, and packing up is not permitted by the Union, who impose fines where it is found to have been done. The lowest fine is 12s. 6d. for a first offence, and cases have occurred where a second fine of £2 10s. has been imposed. Since a leading member of the Union Committee is the check-weighman at the colliery surface, close supervision of this matter is exercised by the Union.

20. One argument that has been advanced by the Union Committee is that the packing of skips leads to greater spillage of coal upon the floors of the haulage roads ; it is clear to us, however, that the filling of " slackers " (skips filled only to the level of their tops), as practised, results in greater spillage, owing to the fact that coal thus loosely filled is thrown off the tops of the skips by the frequent sudden stopping and starting of the haulage system, whereas in packed skips the coal is more carefully and rigidly placed in position.

21. The problem of how such dargs can be eliminated is one of extreme difficulty. Three obvious methods are :-

(a) Persistent propaganda,

(b) A complete change in the method of working, such as by mechanization, so that all old customs and practices become obsolete.

(c) A stand-up fight.

22. We are satisfied that the Management has made attempts to persuade the men to listen to reason and to realize that increased production is in the best interests of all parties, but without success, such overtures on the part of the Management being treated with ridicule by the Union Committee.

23. A complete change in the method of working must take a considerable period, and in our opinion the elimination of the darg, or at least its raising by a considerable margin, is a matter of such urgency that it must not be long delayed. Furthermore, the introduction of machinery in an atmosphere of restrictive practices is unlikely to achieve any great success, and it would therefore be advisable to deal with this problem at the earliest opportunity.

24. There should obviously be no slackening of the Management's efforts to obtain the desired results by peaceful means, but we are forced to the conclusion than an open clash may well be inevitable. In such a case the occasion for such a clash would of course require careful consideration, both as regards the timing and the manner in which it is brought about.

THE DEPUTIES.

25. All deputies at the mine are members of the Miner's Union, and one is in fact president of that body at the present time.

26. These officials, who are supposed to exercise discipline over the workmen, can obviously not perform their duties in a proper manner. They are, for example, not permitted by the Union to give any written statement to the Manager relating to disputes or disciplinary matters affecting workmen.

27. Both the Manager and the Deputies themselves are placed in an extremely invidious position by this arrangement, and some alteration is clearly of vital importance to the success of the mine.

28. There is no Deputies' Association in the State at the present time, although attempts are being made by groups of Deputies to form an organization.

29. Until such time as a suitable association is formed, we recommend that, say, two of the present Deputies be classed as Overmen, with the status of salaried officials, and a remuneration commensurate with their new position.

ABSENTEEISM.

30. The following figures show the percentage absenteeism amongst workers over the period of six months ending 14th January, 1950.

Cause.	Contract Miners.	All Underground.	Surface.
	%	%	%
Compensation	1.37	2.90	1.53
Sickness	3.79	5.51	4.50
Permitted	·97	1.54	3.97
No reason	6.00	8.07	4.01
Total	12.13	18.02	14.01

31. The loss of coal directly attributable to the absence of contract miners for no reason is thus of the order of 40 tons per day ; this is not the total loss caused by absenteeism however, for it will be appreciated that a further loss, less easily calculable but no less serious results from the disorganization caused by having to find substitute labour often inexperienced, for the various non-productive operations.

32. The contribution which the employees can make towards reducing this loss consists of reducing their " no-reason " absences and agreeing to the employment of " floaters " so as to reduce to a minimum the disorganization caused by unavoidable absences.

DELAYS IN REFERENCE BOARD FINDINGS.

33. There are a number of matters which, having been disputed at the colliery, have been submitted through the normal channels for a decision by the Reference Board.

34. Certain of these cases have been awaiting decisions for nearly two years, and we found that the Union Representatives in particular are becoming impatient and state that these delays are aggravating the position at Collinsville as far as the workmen are concerned.

35. We recommend that the Minister requests the Reference Board to clear off all outstanding cases at this and other mines at the earliest possible date, and inform the Board that undue delay in dealing with matters submitted causes unrest amongst mineworkers and almost certain adverse effect upon production.

THE IMMEDIATE TECHNICAL PROBLEMS.

BORING OF SHOT-HOLES.

36. At the present time there are 47 pairs of contract miners working at the coal face, and every pair has to bore some five to six shot-holes each shift by utilising antiquated types of hand-operated machines.

37. The miners informed us in no uncertain terms of a fact which was quite clear to us at this time, namely, that the hand boring of these shot-holes was the hardest work they had to perform in a normal shift. They stated that if power borers were introduced, they would uphold the States Union's undertaking to fill one extra ton per miner per day.

38. Since electricity is readily available in every working section of the mine, and the reticulation system is of sufficient capacity to carry the small additional load that would result, it is to say the least of it, surprising that the present hand-operated boring machines are employed at the State Mine, and that no adequate steps have so far been taken to replace them by power borers.

39. We found that one power borer and two flexible cables are held in stock at the mine. A control panel is required, and this should be obtained forthwith and the machine put to work.

40. M. employers throughout the State are being pressed to introduce power boring at mines where it is not being used, and it is clear that the State Mine should set an example by taking appropriate action.

41. The introduction of power borers should result in an immediate increase of about 400 tons of coal per week, and we recommend that the installation should be proceeded with immediately as a matter of urgency.

HAULAGE SYSTEM.

42. Although a darg is operated at the mine whereby the output of each miner is limited to 18 skips per day, not all sections of the workings in fact receive even sufficient skips to complete the darg regularly every day.

43. This shortage of skips definitely exists in the Dip Section. We are satisfied that this can be overcome provided the haulage hands clear all full skips away after the miners have left and place empties in each bord and on the appropriate lyes. This can be done without any overtime, since on normal working at this mine, the miners fill off their darg well within shift time and in numerous cases are out of the mine by 12.30 after having entered at 8.0 a.m. and reached their working places by about 8.30 a.m. In other words, there are numerous cases where a pair of miners fill their darg of 18 skips each day in about four hours, and then leave the mine.

44. The present practice is for all haulage hands to leave a section as soon as the darg of empties is issued, which means that the traffic men are often leaving before the miners.

45. We recommend that haulage hands should not be allowed to leave their work until they have completely " faced up " their section with empties, which would give a clear start on the following day, the miners coming into their places and finding empty skips waiting to be filled.

46. The delay in sending the first rake into this Dip Section each day should be carefully followed up by a competent official.

47. We further recommend that every effort should be made to extend the main tunnel haulage system as soon as possible to serve the Dip Section and release the present direct rope haulage for use elsewhere. The installation of condensers, which are available in the stores, should be immediately applied to the Dip Section Haulage, which is now adversely affected by voltage drop and is loaded up to capacity. Further, the other haulages in No. 2 Tunnel workings should be fitted with condensers which may be obtained from No. 1 Tunnel.

48. There have been recent stoppages of production at No. 2 Tunnel due to the balance wheel system pulling out. A suitable safety chain, together with adequate girders at front and rear of the system, should be fitted together with improved warning signals immediately, to prevent such stoppages.

49. The clip used for coupling the skips to the haulage ropes is of a type which is difficult to manipulate, and it should be replaced by an improved type as soon as is practicable. A reduction in the manpower employed on clipping will result when a sensible type of clip is introduced.

50. We recommend that a steel pinion be made at the colliery workshops and fitted to the haulage engine on 2 West Level. This plant has been standing idle for some time awaiting delivery of a fibre pinion for the second motion shaft, the previous one having been stripped within a few days of the haulage first working in its present situation. The fitting of a fibre pinion on the second motion drive of a haulage expected to work under conditions such as this one is in is not good practice.

DEVELOPMENT.

51. The Management have 26 men employed on a programme of work at No. 1 Tunnel which is intended to cater for future intensive mechanization.

52. We agree that a reasonable amount of development work is an essential feature of any well-planned mining scheme. We consider, however, that in the present instance some concentration of this development work would be possible, as a result of which several men would be released for production.

53. We also recommend a considerable degree of concentration in the workings of No. 2 Tunnel. There is already more than sufficient face room in the three sections of the mine, other than the Dip Section, and concentration in these three sections would ease the work of haulage and supervision, with a resultant increase in output.

EMPLOYMENT OF AN EXCESSIVE PROPORTION OF NON-PRODUCTIVE LABOUR.

54. Of the total of 354 persons employed at the mine, 136 are working at the surface. As we have previously recorded, there are at present 94 coal producers underground, which means that there are almost 3 non-productive workers for each coalgetter. This is an excessive ratio, and is largely due to the number employed on the surface.

55. There are certain places, for example, where a slight mechanical re-arrangement would enable one person to carry out the work now done by two. In some places, the introduction of automatic skip controllers, of retarders, and similar appliances, would enable a further reduction of personnel to be obtained. An improvement of considerably greater magnitude can be obtained as far as the whole surface haulage system is concerned. Skips from No. 2 Tunnel have to be transferred from their local Tunnel rope on to the main cross country rope leading to the screens at No. 1 Tunnel. We are satisfied that the two haulage systems with their two different rope sizes necessitating a change of haulage clip at their junction at No. 2 Tunnel, can be substituted by a single system. A reduction of probably about 12 persons would result if this was done, and we recommend that it is a step that should be taken at the earliest possible moment.

57. For the output of the mine, an excessive number of men appear to be employed in the various machine and fitting shops. We found that a certain amount of outside work is done for the township, and the Manager is now in the course of preparing a Schedule from which it will be possible to see what proportion of this surface labour should be allocated to the outside work. We do not propose to comment further upon this subject until we receive the relevant information from the Manager.

CONCLUSION.

58. It will be seen from the above that a considerable contribution towards an immediate increase in output can come from the workmen themselves, and we estimate that if the restrictive practices now operating throughout the mine were removed, and avoidable absenteeism eliminated, an increase of approximately 1,200 tons per week could be obtained. We base this estimate on our knowledge of the underground working conditions, which are better than anywhere else in Queensland, and in which, even with the present methods and facilities, an output of 9 to 10 tons per miner per shift could reasonably be expected.

59. By the elimination of excessive non-productive labour, and the upgrading of such labour with a view to increasing the number of men on production, we estimate that a further 1,000 tons per week would be possible.

60. By the introduction of power borers the productivity of the miner could be still further increased, and making allowance for the fact that the number of miners would also have been increased by the upgrading referred to in the previous paragraph, we estimate that the output could be increased by a further 550 tons.

61. The total increase which we believe could be effected by these means would thus be approximately 2,750 tons per week, which would bring the total output to 5,900 tons per week, the underground O.M.S. to 5.3 tons, and the overall O.M.S. to 3.3 tons. It is worth noting for comparative purposes that some mines in the West Moreton coalfields are obtaining results of this order under less favourable conditions.

62. In conclusion we should like to record our appreciation of the fact that during our investigation, we received every co-operation and assistance from the Acting Manager and his staff, and from a considerable number of the workmen themselves.

A. CROWLEY,
Engineer Member of the Coal Board.

K. D. WOOLEY,
Mining Engineer, Powell Duffryn
Technical Services Limited.

Brisbane, 13th February, 1950.

ANNEXURE No. 15.

Batch No. 49/362.

State Coal Mine,
Collinsville, 14th February, 1950.

The Supervisor,
State Coal Mines,
Mines Department,
Brisbane.

Dear. Sir,

Following your letters of 16th and 20th ultimo, relative to inspections required by you in New South Wales, of collieries using various types of mechanical equipment supplied by the following firms :—Mavor & Coulson (Noyes Bros.), Joy Sullivan (Sullivan Machinery Coy.), and Jeffrey (Gibson Battle & Coy.), I have to advise that on the 24th ultimo arrangements were made by me with representatives of the following firms, for inspections of mining equipment, as follows :-

(a) Mayor & Coulson (Noyes Bros.) ; inspection on 25th ultimo of Foxes Colliery, in the Southern District, Wollondilly, Nattai River, near Camden. The colliery is totally mechanized.

(b) Joy Sullivan (Sullivan Machinery Coy.) ; inspections on 26th and 27th ultimo of Stanford Main Colliery and Elrington Colliery, in the Cessnock area near Newcastle. These collieries are totally mechanized.

(c) Jeffrey (Gibson Battle & Coy.) ; inspection on 31st ultimo of Corrimal Colliery, in the Southern Coalfield, Illawarra District. This colliery is partially mechanized.

FOXES COLLIERY, NATTAI RIVER, NEAR CAMDEN.

(a) On the morning of the 25th ultimo, accompanied by Mr. Rocker (Noyes Bros. representative) and Mr. S. Plath (Assistant Engineer, State Coal Mine, Collinsville), I made an inspection of the system of layout and mining equipment used in the production of coal at the above colliery.

The method employed was the complete Trackless Mining system ; the plant consisting of one-30 ins. Belt Conveyor from inside of mine to screens ; one 11 B.U. Coal Loader ; one 8 B.U. Coal Loader ; four Joy Shuttle Cars model 60 D. battery driven ; two Ark Shearing Machines, crawler-mounted type.

The seam worked was from 8 to 10 ft. high, with a coal parting, the grade of same being 1 in 30 against the load. The total output was 800 tons per day of two working shifts, with a full complement at the mine a total of 60 employees.

STANFORD MAIN COLLIERY, NEAR CESSNOCK.

(b) 1. Trackless Mining Unit—

On the 26th ultimo, accompanied by Mr. White, Mr. Woodward (Sullivan Machinery Coy.), and Mr. S. Plath (Assistant Engineer, State Coal Mine, Collinsville), I made an inspection of Stamford Main Colliery. We inspected the No. 2 South-East Slant Section, opening up with a new installation of Trackless Mining

The plant consisted of One 11 B.U. Joy Loader ; One 10 R.U. Coal Cutter ; One Joy Shuttle Car, trailer No. 6 cable reel type (an additional car was on the surface ready to be taken underground).

The method employed was ; the coal was transported from the working face by means of the cable reel shuttle car, which transferred the coal direct on the branch haulage road into small mine skips of 25 cwt. capacity for transportion to the surface.

The seam worked would be from 8 to 10 ft. high, with a stone roof, the present grade being 1 in 25 against the load. The cable reel type shuttle car is designed for operation on various grades, and will operate successfully on grades of 1 in 5 against the load.

The total output from one cable reel shuttle car at present operating, and which has only been installed within the last fortnight, with operators who had had no previous experience, was 160 tons for a complement of six men employed on the mechanical unit. The coal produced was of nice large size, and the percentage of smalls was low.

Scraper Loader Unit—

An inspection of the North West Section, No. 2 Headings, of the above colliery, showed that the equipment consisted of 6 Scraper Loader Units, working on grades of 1 in 4.

The roof conditions were very bad. The coal was shot into fine dust, in order that the shovel of the scraper unit could operate. No large pieces of coal were noticed in any part of this section, when making the inspection.

The total output from the scraper loader units was approximately 160 tons for a total complement of 30 employees.

ELRINGTON COLLIERY, NEAR CESSNOCK.

(b) 2. *Trackless and Track Mining*—

On the 27th ultimo, accompanied by Mr. White (Sullivan Machinery Coy.) and Mr. S. Plath (Assistant Engineer, State Coal Mine, Collinsville), I made an inspection of the Elrington Colliery.

The equipment inspected was in two separate sections, viz., Trackless Mining and Track Mining.

The Trackless Mining equipment consisted of One 10 R.U. Coal Cutter ; One 11 B.U. Joy Loader ; Two Battery Shuttle Cars.

The roof conditions were very bad, there being about 4 ft. of mudstone being carried, which was broken away from the other coal parting. The height of the seam worked would be from 8 to 10 ft. The coal was conveyed by battery shuttle cars, and transported into mine skips of 3.2 tons capacity for transportation to the surface. The tonnage capacity, under existing bad roof conditions, is from 120 to 130 tons per shift for a complement of 18 men.

Track equipment, operating under conditions similar to the above, consisted of One 7 A.U. Track Coal Cutter ; One Track Coal Loader ; One Battery Locomotive (Atlas type.)

The coal was loaded into 3.2 ton capacity mine skips conveyed by battery locomotive for transportation to the surface. The tonnage capacity, under very bad roof conditions, was from 120 to 130 tons per shift for a complement of 20 men.

Note.—Other collieries in this district are obtaining from 300 to 350 tons per day, with the same complement of men and types of machinery.

The coal in both the above cases was nice and large, with a small percentage of smalls.

CORR1HAL COLLIERY, ILLAWARRA DISTRICT, SOUTH COAST.

(c) On the morning of the 31st ultimo, accompanied by Mr. Edwards (Gibson Battle & Coy.) and Mr. S. Plath (Assistant Engineer, State Coal Mine, Collinsville), I made an inspection of Corrimal Colliery.

We inspected what is termed the Shaft Section of the colliery. This section was opened out and operated on what is termed the Track Mining system, transferring the coal from the large transfer skips into what is termed a transfer bin, in which the small mine skips of 25 cwt. capacity are loaded by means of a belt conveyor.

The total equipment was Jeffrey equipment, of big capacity units, including Coal Cutters, large Mine Cars and Transfer System, Large Bin and Electric Locomotives. The small skips of 25 cwt. capacity were loaded from the transfer bin for transportation to the surface.

The seam worked would be from 8 to 10 ft. high, infested with stone rolls in the floor, with a stone roof, the present grade being 1 in 25 against the load. The coal loaded was nice large pieces, with a small percentage of fines. The two Loader Units complete, as installed in the colliery, give a total output of 300 tons per day for a complement of 40 men.

The Manager informed me that the company had placed another similar unit on order, as described above, so that the balance of the mine, which was working on contract, could be mechanized.

General.—

During my interview with Mr. Robertson (Sullivan Machinery Coy.) on the 24th ultimo, I had the opportunity with Mr. S. McKenzie, Superintendent of Hebburn Collieries, and Mr. J. Hindmarsh, Manager of Helensburgh Colliery, South Coast, New South Wales, of seeing the first film from America of the operation of the Continuous Worker Mechanical Unit. This machine does three operations in one, cuts the coal, breaks it down and loads it, the capacity being 400 tons per day, with a large percentage of small coal.

The film was very impressive, and I understand it is the intention of Mr. Robertson to bring the film to Queensland in the near future, when making an inspection at Mount Isa Mines relative to the latest types of rock loaders. It would be well worth your while to have Mr. Robertson show the film in Brisbane when on this inspection, and I am sure that Mr. Robertson would be only too pleased to do the same.

Taking everything into consideration, I would state that the mining equipment inspected and supplied by the various firms was of good standard for the conditions in which they were operating, with the exception of the scraper loaders which, in my opinion, for our conditions at State Coal Mine, Collinsville, are obsolete.

The equipment in my opinion, suitable for the State Coal Mine, Collinsville, is the Trackless Mining Type, large units, with cable reel type Shuttle Cars, designed for varying grades, and belt conveyors. I would refer you to my previous recommendation dated 5th August, 1947, which showed a nett profit return of 59.91 per cent., after allowing for depreciation of plant, &c., for the proposed mechanization of No. 1 Tunnel.

I would also recommend two complete units, worked on a transfer system, trackless mining type, into small skips, for No. 2 Tunnel. This would completely mechanize the State Coal Mine, Collinsville, and would place every employee on a weekly wage instead of the contract system which is at present operating.

In conclusion, I would like to state that every assistance was given by the Management of each Colliery in which we made inspections, and I would like to record my appreciation of same.

Yours faithfully,
A. WINSTANLEY,
Manager.

ANNEXURE No. 16.

Alternative Scheme

Re the Proposed Mechanization and General Surface Installation &c.,

State Coal Mine, Collinsville

Employing the use of Heavy-duty Type Trackless Mining Equipment

also

Troughed Belt Conveyors Underground

In opposition to the one submitted to the Mines Department by K. D. Woolley, Mining Engineer, Powell Duffryn Technical Services Limited, on 5th June, 1950, in which he recommends Light-duty Type Mining Equipment and Scraper Conveyors, &c., Underground, for the Mechanization of No. 2 Tunnel, State Coal Mine, Collinsville.

By

A. WI NSTANLEY,

MANAGER, STATE COAL MINE, COLLINSVILLE.

INDEX.

22nd July, 1950.

PROPOSED MECHANIZATION, STATE COAL MINE, COLLINSVILLE.

INTRODUCTION.

The proposed mechanization of the State Coal Mine, Collinsville, in the Bowen Coal Seam, was given careful consideration in the year 1942, during Mr. Justice Davidson's Board of Inquiry into the Coal Mining Industry of Queensland.

Mr. R. P. Jack, Mining Engineer of the Board at that time, submitted certain proposals relative to the mechanization, and the rehabitation of the Collinsville State Coal Mine, see extracts from the Board of Inquiry into the Mining Industry, Queensland Coal Fields Report, Nos. 1161 to 1169 inclusive.

On the 5th August, 1947, plans and estimates were submitted to the Mines Department, relative to the mechanization of the No. 1 Tunnel, State Coal Mine, Collinsville, in the Bowen Seam. This was left in abeyance due to a General Survey contemplated by the services to the Queensland Government of the Powell Duffryn Technical Services Limited, re the Coal Industry of Queensland, which was completed by them and presented to The Hon. E. M. Hanlon, Premier of Queensland, in the year 1949.

Perusal of their report, Volume II., Section G., Chapter XII., page 485, states that Model Scheme A, page 392 of Volume II., is appropriate to the conditions which are expected to be found in the Garrick Coal Seam. All workings in the present Bowen Coal Seam are to stop working operations until such times that all the workable coal seams below the Garrick Coal Seam have been worked in their descending order of sequence.

As stated on page 392 of Volume II., Powell Duffryn Technical Services Limited Report, Model Scheme A is their recommendation to the Hon. Premier for the mechanization of the present Bowen Coal Seam, if worked, being an Inclined Thick Seam varying in grade from 1 in 9 to 1 in 3 (see Vol. III., Plate 65).

On the 24th January, 1950, as directed by the Supervisor, State Coal Mines (during my annual leave in New South Wales) I made an inspection of various coal mines at which modern methods of mechanization are operating, with the object of recommending to the Mines Department the most suitable type of mining equipment for introduction at the State Coal Mine, Collinsville. My recommendation, after inspection of the various mines, was Heavy-duty type Trackless Mining equipment, with Cable Reel type Shuttle Cars designed for varying grades against the load and Belt Conveyors.

In March, 1950, a conference was held at the Mines Department, Brisbane, at which the Hon. Minister for Mines, Mr. Moore, presided. Those present being Messrs. Clark, Platt, and self, Mines Department, Messrs. Dunne, Evans, and Crowley, Queensland Coal Board, Mr. Morton, Chief Geologist, and Messrs. Hemmant and Woolley, Powell Duffryn Technical Services Limited. Discussion arose relative to the opening up of a new mine at Collinsville in the Garrick Coal Seam. This was recommended by the Powell Duffryn Technical Services Limited in their report, Chapter XII., of Volume II., page 485, *Details of Mine,* paragraphs 6 to 8 inclusive.

After lengthy discussion, it was decided that the above project be abandoned, in the meantime, and to concentrate on the mechanization of the present seam being worked, named the Bowen Coal Seam, the quality of the coal being undoubted and which was most suitable for the requirements of present consumers in North Queensland.

The proposed Mechanization Plan for No. 1 Tunnel, State Coal Mine, Collinsville, submitted to the Mines Department on the 5th August, 1947, was then tabled for discussion. Messrs. Hemmant and Woolley, Powell Duffryn Technical Services Limited representatives, objected, due to the small area of coal which is at the present time on the top side of a down throw fault. This fault gives a displacement of the coal seam approximately 100 ft. opposite No. 3 West Section, No. 1 Tunnel. The direction of the fault is in a south-easterly direction from No. 2 Tunnel, coming towards No. 1 Tunnel. Further objection was also raised by them to the effect that they had not been previously consulted in the matter and that it was their position as Consultants to the Queensland Government to prepare a Scheme with costs, &c., for the mechanization of the Bowen Coal Seam. The position defined for the proposed mechanization of No. 2 Tunnel was below the present No. 3 Pit Bottom, this being the most suitable position for the introduction of mechanized units, &c.

At al ater meeting with Mr. Hemmant, Mr. Platt and self, it was agreed that Mr. Hemmant prepare a Scheme for Mechanization Trackless Mining, with Light or Medium type of mining equipment recommended by himself, and an alternative scheme, employing Heavy-duty type Mining equipment, with Cable Reel type Shuttle Cars and Belt Conveyors. After completion of same, I was to be advised by Mr. Platt.

On the 5th June, 1950, a conference was held at the Mines Department with Mr. Woolley, Powell Duffryn Technical Services Limited, Mr. Evans and Mr. Crowley, Queensland Coal Board, and Mr. Platt and self, Mines Department.

Mr. Woolley started to explain his Scheme re Mechanization with Light Mining type of equipment with Scraper Conveyors, but had no alternative Scheme to submit relative to Heavy-duty type of Mining equipment, with Cable Reel type Shuttle Cars, which was agreed upon with Mr. Hemmant at the conference in March, 1950.

Mr. Evans of the Queensland Coal Board and Mr. Platt, Supervisor of State Coal Mines, supported my recommendations that Heavy-duty type of Mining equipment was the most suitable for the conditions at the State Coal Mine, Collinsville.

It was finally decided that I submit an alternative scheme to the one Mr. Woolley had prepared, so that both schemes could be considered by Cabinet, who would then make a decision. The Mines Department agreed to assist me with the loan of a Survey Draughtsman, in order that the necessary Plans, &c., could be prepared and submitted. Mr. Wright, Survey Draughtsman, selected by the Mines Department, arrived in Collinsville on Friday, 30th June, 1950, and as from that date, the preparation of plans for the complete Mechanization of No. 2 Tunnel of the State Coal Mine, Collinsville, with Heavy-duty type Mining equipment, was proceeded with.

SURFACE INSTALLATIONS.

The proposed Surface Installations are as follows :—Due to the dilapidated state of the present screen building, which has been in working operations at the State Coal Mine, Collinsville, servicing both No. 1 and No. 2 Tunnels coal output from the years 1922 and 1938 respectively, up to the present time, a totally new screen building be constructed of steelwork enclosed with galvanised necessary ventilators, and windows, &c., complete with all modern screening equipment, capable of handling up to 3,600 tons coal per day.

All screenings from run-of-mine coal produced are to be of various grades which coal consumers require. For further details of the proposed new screening arrangements, &c., see Sketch No. 49.

SURFACE CONVEYOR TRANSPORTATION.

The method of transporting the coal from the Mechanized Units Underground in No. 2 Tunnel is to be by Troughed Belt Conveyors, direct to the screens on the Surface. For sizes and capacities per hour of Surface Conveyor arrangement, see Drawing No. S7. A profile, starting from the intersection of the Underground Main Conveyor to Surge Bin in new screen building, showing all levels and general irregularities, are also shown on Drawing No. S8.

Provision has also been made for the handling of coal from Mechanized Sections in No. 1 Tunnel, at a later date in the above Surface arrangement.

UNDERGROUND INSTALLATIONS.

The proposed Underground installations are as follows :—Three (3) complete Mechanical Units, Heavy-duty type with Cable Reel type Shuttle Cars, to be installed in the North and South Panels, also Development Headings, the above to be incorporated by Troughed Belt Conveyors, which transport all coal won into a centralized Surge Bin 540 ft. South of the present No. 3 Pit Bottom, No. 2 Tunnel. The installation is to be in the right hand back heading.

The coal from the centralised Surge Bin automatically feeds the Main Underground Troughed Belt Conveyor, feeding the surface conveyor as mentioned previously.

For general arrangement, sizes and capacities of Troughed Belt Conveyors, see Drawings Nos. S7 and S8.

A Section level was taken of the Underground Roadway in which it is. proposed to install the centralized Surge Bin and Main Underground Troughed Belt Conveyor. All levels and irregularities of the Underground Roadway are shown on Drawing No. S9.

Underground Section arrangement of Conveyors is shown on Drawing No. S10.

ELECTRIC CABLES, SURFACE AND UNDERGROUND.

Surface.

The Electric Cables required for main line distribution are as follows :-3,000 yds. 19/•072 Bare Copper for aerial transmission line from Power House to No. 2 Tunnel. The above was ordered by State Stores, Order No. 24067, dated 29th November, 1948.

Underground.

The Electric Cables for High and Low Tension transmission Underground, to suit proposed Mechanization, are as follows :-

(a) 4,050 yds. 0.25 sq. in. Three-core High Tension Varnish Cambric Insulated Cable, lead sheathed, double wire armoured served overall and compounded with shaped conductors for operation on 5,500 volts to B.S.S. 608/1943.

(b) 1,350 yds. 0.15 sq. in. Three-core Low Tension, as above, for operation on 660 volts.

The High and Low Tension Cables, as stated, were requisitioned. on Mines Order No. 79, on the 29th October, 1948.

The present carrying load in kVA and future load with thr, introduction of Ole proposed Mechanization Scheme, are shown on Drawing No. S6.

VENTILATION.

The proposed method of ventilation of the three (3) complete Mechanized Units Sections, namely North and South Panels, also Development Headings, are shown on Drawing No. 511.

TRANSPORT OF WORKMEN AND MATERIALS.

The present Main Haulage Road at the No. 2 Tunnel is to be used in conjunction with the Surface Haulage (Remote Control) operating at the present time between No. 2 Tunnel and the present screen building at the No. 1 Tunnel.

By disconnecting No. 2 Tunnel Main Haulage and extending the present Surface Haulage Rope down No. 2 Tunnel, and the installation of two (2) deflecting wheels at the Surface of No. 2 Tunnel, the whole of the Transport System can be operated by the Remote Control Surface Haulage.

When men are being raised or lowered from No. 2 Tunnel at any time, a Certificated Winding Engine Driver will have to be in attendance at the Mine Power House, to operate this Haulage in order to comply with the Coal Mining Regulations Act.

HEAVY-DUTY TYPE MINING EQUIPMENT.

The following are the particulars of Heavy-duty type Mining Equipment recommended to be installed, and other necessary equipment, from the Underground workings at the No. 2 Tunnel to the proposed new Screen Building on the Surface.

(1

Joy Sullivan 10-R.U. Rubber Tyred Universal Coal Cutter of the Permissible Type, and approved by the U.S. Bureau of Mines suitable for 415 volt 50 cycle power supply, having a tramming speed of up to 230 f.p.m., complete with water sprays and self-spooling cable reel.

Advantages.

Faster tramming under all mine conditions due to the following reasons :-

(a) *Hydraulic Drive Motors* provide high starting torque and stepless speed control without clutches, gears, or electrical controls.

(b) *Hydraulic Steering* with finger-tip control results in easy, accurate handling of machine under all traffic conditions.

(c) *Short Wheel Base* and two-wheel steering enable the 10-R.U. to manoeuvre in less total area, and to turn corners encountered in any phase of trackless operations.

(d) *Large Pneumatic Tyres* roll easily, pack without digging, and with front-wheel drive, have plenty of traction for better tramming on soft or uneven bottom.

(e) *Four-Wheel Mounting* with the same wheel gauge as that used on Shuttle Cars simplifies roadway maintenance.

(f) *Floating Rear Axle* maintains equilibrium of the machine and ensures traction of driving wheels at all times.

(g) *Ample Power.* The 50-h.p. slow-speed heavy-duty cutting motor used exclusively for driving the cutter chain.

Only one reduction requiring only two gears, is used between motor and cutter chain drive sprocket. Overall efficiency of the drive is improved and maintenance lowered by the use of overload friction clutch and heavy rugged gears.

(h) *Low Maintenance.* Minimum repair costs are proved by results in the field under two- or three-shift operation. Unit assembly and careful design allow repair work at the face. The machine is designed with accessibility as an important consideration.

(i) *Greater Manoeuvreability.* Close coupled mounting allows operator to slew the machine over at the face, and perform many other useful manoeuvres that reduce the cutting time and speed overall operation.

(j) *Easy to Operate.* Hydraulic control of all tramming and cutting operation ensures fast, safe and easy positioning of boom and bar at all times.

The 10-R.U. has two distinctly separate and complete sets of controls, one at each side of the machine.

Controls are centralised and are labelled and grouped by function for easy training of new men and faster operation by experienced miners.

(k) *Safe.* The operator's station affords safe riding in the centre of the machine where both ends can be carefully observed, and where the man is protected against side-swiping by timber, &c.

Other Advantages.

Heavy rigid main frame maintains alignment of all working parts.

The large flat surface on the machine is a convenient place for supplies and operating equipment.

Hydraulically-driven horizontal cable reel of large capacity operates automatically as machine moves in any direction. Controls are provided to actuate the reel drive while machine is standing still.

(2)

11-B.U. Joy Loader Permissible Type, suitable for 415-volt 50-cycle power supply and complete with 300 ft. of Four-core Rubber Covered Trailing Cable.

The Joy 11-B.U. Loader is a heavy duty machine designed for production in seams averaging 60 ins. or more in thickness. This unit is most economical where high tonnages and maximum loading capacity can be utilized and embodies all the latest improvements in mechanical and electrical design.

A feature of the machine is the hydraulic system with a separate motor for driving the pump. This contributes to the low maintenance costs, found when using this machine, and makes possible the simplified, easy operating of controls.

An optional feature is a hydraulically-operated conveyor clutch throw-out. All controls are centrally located to provide easy, safe one-man operation. The rugged Joy patented gathering mechanism used on this machine assures maximum loading efficiency and minimum degradation. The Joy patented Universal Chain Conveyor included in the 11-B .U. design is extra wide for maximum tonnages and may be swung on an arc 45 deg. either side of the centre line.

The 11-B.U. Loading coal is proven for use under widely varying conditions for fast, efficient, low cost Underground production.

This heavy-duty mobile loader has a rated capacity of 5 tons per minute and a maximum capacity of 10 tons per minute.

(3)

10-S.C. Cable Reel type Shuttle Cars, with four-wheel Hydraulic Steer, four-wheel drive, Hydraulic Adjustable Elevator Discharge and Hydraulic Self-Spooling Cable Reel, suitable for 250-volt D.C. Power supply and complete with 520 ft. of Three-core Flat Type Rubber Covered Special Trailing Cable.

Advantages.

(a) Joy 10-S.C. Shuttle Cars are heavy-duty machines designed for high capacity mining. Extra rugged construction ensures the mine operator of continued service without frequent break-downs.

(b) Joy 10-S.C. Shuttle Cars are ideal units for full seam mining. These heavy-duty cars take a full load of coal or rock without difficulty.

(c) Joy 10-S.C. Shuttle Cars have hydraulic four-wheel drive and steering. Power is supplied through a cable reel.

(d) Disc-Type Brakes. The new airplane-type disc brakes, now standard on all Joy Shuttle Cars provide smooth, positive braking action without locking or grabbing. No adjustment is required for the life of the brake since the braking area is automatically compensated for wear. Disc-type brakes remain unaffected by *dirt, coal dust, oil or water.*

(e) Extra-Long Wheel Base. Joy Shuttle Cars are provided with a long wheel base to prevent pitching when the car is tramming over rolling bottom. This inherent stability permits the car to operate with less roof clearance since the ends of the car will not tend to hit the roof. Therefore, Joy Shuttle Cars have a greater capacity in pitching seams.

(f) Mercury Tube Control. Joy Shuttle Cars contain the patented Magnetax Control. Sealed mercury-type interlocks for all electrical functions of timing and accelerating are unaffected by moisture and acid condensation. The trouble-free Magnetax control inevitably requires less maintenance.

(g) Four-Wheel Steering. In many mines, roof conditions or other considerations require a working area with narrow rooms and entries. Joy Shuttle Cars with four-wheel hydraulic steering permit *right-angle turns* in *extremely narrow places.* The manoeuvreability of these cars is unexcelled.

(h) Two-Speed Conveyor. The new heavy-duty 10-S.C. Shuttle Cars are provided with a two-speed bottom conveyor. The high speed is used when unloading directly into mine cars or belt feeders. The slow speed permits unloading directly onto belt conveyors without overloading the belt.

(i) No-Slip Differential. One of the latest transmission developments, the No-Slip Differential has been designed into the Joy 10-S.C. Shuttle Car. Like conventional differentials, this unit permits the outer wheels to rotate faster than the inner wheels when turning a corner. However, the wheels are positively prevented from spinning. If one wheel runs into a mud-hole, and starts to spin, the no-slip differential automatically transmits full driving power to the opposed wheel. Thus Joy 10-S.C. Shuttle Cars cannot bog down in bad bottom, unless all four wheels stick simultaneously.

(j) Capacity. The capacity of 10-S.C. Shuttle Cars, in cubic feet depending upon side boards, is 190 to 350.

(4)

C.D.-26 Two-Boom Hydraulically articulated Rubber Tyred, Self-Propelled Coal Drill, suitable for 250-volt D.C. power supply, and with all Permissible Equipment, complete with Three-Core Flat Type Special Rubber Covered Trailing Cable.

The Joy C.D.-26 was designed to speed up the drilling operation in trackless mines. The double-boom arrangement is especially useful where wide rooms are being driven, since the wide drilling range of machine minimises the amount of manoeuvreing necessary to drill the complete round. Each boom can be operated independently or both drills can be run simultaneously. Only one man is required for each drill. Controls are mounted on the boom so that the operator can obtain maximum visibility when drilling. An exclusive feature of Joy Drills is the Pre-Selector Feed and Speed Control. This ingenious device permits the operator to select in advance the best rotation and feed for the particular job the drill will be called upon to perform. This feature provides mine management with a method of standardisation for efficiency which will get the best possible drilling performance, even with new operators. These drills will bore to a maximum diameter of 4i-ins. hole and depth of 9 ft.

(5) Portable Mining Mobile Timbering Machine.

The portable mobile timbering machine is to be electrically operated, complete with circular saw, hydraulic jack, and timber carrier.

Circular Saw is for the cutting of timber for the erection of Crowns, Bars, or supports, to required lengths.

Hydraulic Jack to be provided with extra extension capable of extending to a maximum height of 12 ft. when required.

Advantages.

Quick movement from working-place to working-place. Erection of Crowns or Bars simplified as with present methods employed.

Correct lengths of timber cut thereby reducing excessive waste of timber lids or wedges.

Greater number of working places timbered with less complement of men.

The timber carrier is capable of holding and carrying approximately 20 props, which is a decided advantage in working operations.

(6) Portable Mining Type Sub-Station.

The unit is to be constructed to incorporate control switchgear and cable box on both in-coming and out-going circuits.

The unit size is to be 150-kVA output at 415 volts on the lower voltage side, and 1,050 volts on the high tension side.

The unit is to conform to the Mining Regulations, the switchgear being of the drawn-out flame-proof pattern with Buxton Certificate.

The tank is to be constructed of mild steel with welded seams, Mechanical strength is to be provided by ample thickness of plating and external reinforcements where necessary. It is to be built on a strong foundation structure to which flanged rollers, designed for 2-ft. rail gauge, are required for flitting.

Cooling tubes are to be arranged on the two long sides.

The switch gear is to comprise metal clad flame-proof mining type drawn-out pattern circuit breakers, with over current releases on three phases, oil dash pots time lags, isolating plugs and flame-proof oil tank with oil.

Leakage protection is to be provided on the lower voltage side. This is to consist of core balance relay operating leakage protection.

The cable boxes are to be of the detachable or flit type, for both the higher or lower voltage in-coming and out-going cables.

(7)

Steel Surge Bin, to be constructed of mild steel plating with channel, angle iron and supports ; the size is to be 17 ft. x 17 ft. at the top, 6 ft. 6 ins. x 6 ft. at the bottom and 11 ft. deep.

The outlet end to be arranged with the tyler feeding arrangement, discharging the coal from the surge bin on to the Main Haulage 36-ins. Troughed Belt Conveyor system operating to the Surface conveyors.

(8)

Panel Conveyors are of the 30-ins. Troughed Belt type 480 ft., complete with Vulcan-Sinclair fluid coupling drive arranged for sequence control ; Belt Speed 400 ft. p.m., Capacity 352 tons per hour, the belting being 30 ins. wide x 8 ply x 32 oz. duck, with Fin. top and bottom rubber covers.

(9)

Main Development Heading Conveyor to be of the 30-ins. Troughed Belt type, 940 ft. long with extensions of additional 720 ft. each, complete with Vulcan-Sinclair fluid coupling drive arranged for sequence control, Belt Speed 400 ft. p.m. Capacity 352 tons per hour, the belting being 30 ins. wide x S ply x 36 oz. duck, with k-in. top and A-in. bottom rubber covers.

(10)

Underground Conveyor from Surge Bin to Surface Conveyor, to be of the 36-ins. Troughed Belt type 3,588 ft. to be arranged in tandem complete with Vulcan-Sinclair fluid coupling drives and sequence control. Belt Speed 400 ft. p.m., Capacity 508 tons per hour, the belting being 36 ins. wide x 8 ply x 36 oz. duck, with Fin. top and A-in. bottom rubber covers.

(11)

Surface Conveyor, to be of the 36-ins. Troughed Belt type 2,813 ft., to be arranged in tandem complete with Vulcan-Sinclair fluid coupling drives and sequence control. Belt Speed 400 ft. p.m., Capacity 508 tons per hour, the belting being 36 ins. wide x 8 ply x 36 oz. duck, with k-in. top and is-in. bottom rubber covers.

(12)

Surface Conveyor, to be of the 42-ins. Troughed Belt type 566 ft., to be arranged with Vulcan-Sinclair fluid coupling drive and sequence control. Belt Speed 400 ft. p.m., Capacity 756 tons per hour, the belting being 42 ins. wide x 8 ply x 36 oz. duck, with s-in. top and A-in. bottom rubber covers.

(13)

New Screen Building, to be constructed of steel-work enclosed with galvanised iron, necessary ventilators and windows, &c., complete with all modern screening equipment capable of handling up to 3,600 tons of run-of-mine coal per day.

ESSENTIAL FACTORS IN APPLICATION OF SHUTTLE CAR SYSTEMS.

The following are the essential factors in the application of Shuttle Cars, and the advantages derived by the introduction of Mobile Coal Loading Machine with Shuttle Cars of the Battery, Electric, Cable Reel, or Double Trolley Wire types. A description of the Shuttle Car, its working capacity per working shift, and its performance on heavy local grades Underground :-

In determining whether rubber-tyred haulage can be used effectively and in selecting the type and size of equipment that is best suited to do the job, certain physical factors must be considered, as they determine and limit the use of the equipment, which should be designed to fit the prevailing operating conditions.

The physical factors that must be considered include :-

1. The hardness and abrasiveness of the material and the size to which it will be broken.

2. The amount and quality of water as it affects the floor conditions, and the stickiness of the material to be handled.

3. The dimensions of drifts, entries, rooms, and haulage ways and the plan of mine lay-out, as they may affect clearances and manoeuvreing of equipment.

In designing or selecting equipment, consideration must also be given to the following :—

4. Capacity and overall dimensions of the Shuttle Car,

(a) In relation to the rate of loading and unloading ;

(b) In relation to the length of haul ;

(c) In relation to the horizontal and vertical clearances.

(d) In relation to haulage grades, and

(e) In relation to motive power.

5. Type and capacity of power units. At the present time, four types of cars are in service, namely, storage battery, cable and reel, double trolley, and diesel. Under certain conditions, each type has some advantages.

6. The ease with which the car may be steered and manoeuvred, particularly at the loading and unloading points.

7. Mechanical features, such as tyres, wheels, and brakes.

S. Safety features to protect the shuttle car operator during loading, while driving forward and backwards, and while turning.

In making a decision as to the ecomonic desirability of shuttle cars, the following additional points must be reviewed.

9. The net load of material that can be hauled at the lowest cost.

10. The maximum, and the most effective, length of haul and the number of shuttle cars required to give the best overall cost.

11. The practicability of using the equipment to handle waste supplies, tools, &c.

ADVANTAGES OF MOBILE LOADERS WITH SHUTTLE CARS.

Mobile Loaders with shuttle car haulage, offer the following advantages :-

1. Maximum flexibility of operation. Loader and cars can be moved between working-places or sections of the mine more readily than scrapers or scooter box set-ups.

2. Working place track-work and haulage eliminated.

3. Loader operational time losses held to a minimum since the shuttle car operator can " spot " his loading hopper directly under the loader discharge boom.

4. Maintenance costs are not excessive, varying from 0.25d. to 0.5d. per ton. Various operational characteristics of the mobile loaders and shuttle cars may be summarized as follows :-

(a) The large size units have been operated in 10-ins. depth of water, and the smaller units in 6-ins. depth of water, without difficulty ;

(5) Shuttle Cars will haul loads up a 5 per cent. grade with storage batteries, and more than 15 per cent. grades with cable reel power ;

(c) Loaders and cars will operate over comparatively rough bottom, providing the surface is hard enough to prevent bogging down ;

(d) Mobile equipment may be used in workings, at first glance considered too narrow for clearance by developing proposed haulage ways, using four-wheeled steering shuttle cars and installing special timber wherever required.

Depreciation.

Depreciation of the above Mobile Loaders, with Shuttle Cars, are usually handled on a standardised percentage basis by the cost and accounting departments of the operating company, and might be either a per ton or time period charge. In estimating possible savings with a mechanized mining installation, allowing five years for writing off the initial cost, should result in a conservative figure for net savings per ton, when all the costs are balanced.

Shuttle Cars.

The so-called " Shuttle Car " is a four-wheeled unit self-propelled, and equipped with a bottom conveyor so that the rear of the car can always be " spotted " or kept under the boom of the loading machine. As the rear of the car is loaded, the bottom conveyor is operated to carry the load forward in the shuttle car, and thus permit the complete loading of the shuttle car without taking the car from underneath the boom of the loading machine. When the loaded shuttle car is trammed to the entry, it is unloaded by running the conveyor in the bottom of the shuttle car and the material is discharged onto a haulage belt conveyor. The rubber-tyred cars now being installed in various mines, are operated by storage batteries, electric cable and reel or double trolley wire.

The distance the shuttle car travels to the transfer point is generally limited to 800 ft. with the round trip 1,600 ft.

The recent use of shuttle cars discharging directly onto belts, have aroused a great deal of interest. Troughed belts in various lengths of up to 2,000 ft., driven by electric motors at speeds of 400 to 510 ft. per minute. There is very little spillage at the loading point, even though the shuttle cars of 8 to 10 tons capacity unload in 67 to 90 seconds.

Heavy Local Grades.

At a mine near Harrisburgh, Ill., America, 6-ton shuttle cars are being operated in old haulage ways where local dips make it impracticable to operate with track transportation. Where the grade is over 12 to 15 per cent., there is a small hoist at the top of the grade, and with a 1-in. cable, the shuttle car is pulled as much as 300 ft. By the addition of the one man on the hoist, they have been able to maintain an average of 525 tons per shift with a 13-man crew.

At another coal mine in the Rocky Mountains region, America, 4-wheeled shuttle cars of 6 tons capacity are being operated on heavy grades without any assistance from auxiliary hoist as noted above. Room and pillar mining is used with the panel entries driven directly up the pitch with the maximum grade of 16 per cent. in favour of the loaded cars. The cars are powered with storage batteries, and there is no difficulty in handling the empty cars up the grades. Four-wheel brakes are giving satisfactory service under these difficult conditions.

The following are the particulars and advantages of Conveyor Drives employing the use of Vulcan-Sinclair Fluid Coupling.

CONVEYOR DRIVE.

Conveyor break-downs can be traced to incorrect design of the conveyor drive. Damaged gearing, bent bracket arms, broken conveyor links and trouble with electrical equipment, are almost always due to the violent effect of the inertia of the motor drive upon the conveyor mechanism wherever a jam occurs. Much the greatest inertia is stored in the rotor of the motor because it may be running at ten to twenty times the speed of the driving sprocket and as inertia varies as the square of the speed, the effect of inertia in the rotor is one hundred to four hundred times that of the inertia of the sprocket. Furthermore, when a direct-coupled A.C. Motor is stalled under load, the current rises to perhaps five or six times that of normal, and the heat generation in the motor to perhaps thirty times normal, while at the same time, the rate of cooling is reduced to one-quarter when the motor is stalled.

This results in a very rapid rise in the motor temperature, until the cut-out goes into action and shuts the conveyor plant completely down.

A conveyor drive, to be truly satisfactory, in all respects, therefore must be so designed that stalling of the motor is prevented by a means which limits to a safe amount, the transmission of power from the drive to the conveyor mechanism whenever a jam occurs in the latter. But a device of this kind must also be capable of automatically re-establishing the driving effect when the cause of the jam or the momentary overload is removed. Nor should the device selected operate on the weakest link principle, which demands replacement of the broken link before the drive can resume normal operation.

On the other hand, the device to be employed must be simple and reliable. Vulcan-Sinclair fluid couplings have in many cases been used to drive belt conveyors with large capacity of tonnage per hour. The conveyors are driven by totally enclosed squirrel cage motors, equipped with starting gear to suit local requirements. The type of Fluidrive principally used for this purpose is the traction coupling which consists of an impeller driven by the motor shaft. The impeller acts as a pump whch transmits the power to a runner through the medium of the kinetic energy of a vortex ring of oil circulating in the working circuit. The action of the runner is that of an oil turbine driving the output shaft on which it is mounted. A casing is bolted to the impeller and encloses the runner, the casing being filled with thin oil to the level of the filling plug provided. A gland of the steel diaphragm type is provided at a point where the shaft passes through the casing.

1. As the motor starts against no load, it rapidly accelerates to full speed, while the torque transmitted by the coupling quickly increases and sets the load smoothly in motion. The use of Fluidrive thus permits the employment of standard squirrel cage motors with direct-on starting.

2. The incorporation of Fluidrive enables a standard squirrel cage motor to run up to 80-90 per cent. of its full speed before taking up maximum load.

3. In the case of conveyors not incorporating Fluidrive, the motor is usually rated on the starting conditions rather than on the running conditions, the former being 1.25 to F75 full load torque, according to prevailing conditions. The employment of Fluidrive, however, allows the motor to be rated on the running conditions, giving an improved power factor and operating efficiency of the motor.

4. Depending on any particular case, the starter, cables, &c., can be rated according to the motor. The use of a smaller motor therefore, because of the application of Fluidrive, often permits of a reduction in cable cross section, size of starting gear, &c.

5. The elasticity of Fluidrive effects a much *sweeter drive,* with consequent reduction in wear of the mechanical parts.

6. The torque transmitted, can definitely be limited to, say, 1.6 times full load torque, or such figure as is desired for any particular duty. This can be adjusted by the amount of oil in the coupling.

7. In the event of a conveyor stalling due to an obstruction, the inertia of the motor rotor is entirely isolated by the coupling. As soon as the stalling or overload condition of the conveyor is cleared, however, the runner of the fluid coupling speeds up automatically. It is quite unnecessary to unload a conveyor by shovel, as is sometimes done, in order to assist the motor to restart. Should the stalled condition of the conveyor be unduly protracted, a delayed action trip switches off the power supply to the motor. It may be added, that the relationship between the load and speed of a drive subject to stalling is 1.6 times the full load torque.

8. Fluidrive, to all intent and purposes, eliminates the need for slip-ring motors with their more elaborate and costly starting gear. This is particularly important when remote control is required, necessitating additional contactor gear in the case of the slip-ring equipment. For direct-on starting of the squirrel cage motor, a simple push button control in the remote position is all that is required.

The conveyor drive may be placed in a position difficult of access. The fact that Fluidrive requires practically no attendance is of definite advantage, therefore. Another advantage is the fact that it is hermetically sealed.

For this reason, it is suitable for operation in a dust-laden atmosphere. Also there being no mechanical connection between the driving and driven members, it precludes any necessity for making frequent adjustments, such as may be called for by unavoidable wear occurring with mechanical torque transmission members. For the same reason, no failure occurs because of fatigue of mechanical parts, subject to impact stresses.

GULLICK COAL BUSTER.

The following are the particulars, advantages, and use of the Gullick Coal Buster, used for the breaking down of Machine Cut Coal, and alternative method of breaking same by Cardox Shooting.

The Buster consists of a stainless-steel tube fitted with a number of radial plungers which are forced outwards by a hand pump exerting a hydraulic pressure of up to six tons per sq. in.

Briefly, the action of the Buster is as follows :-

The coal is cut by Coal Cutting Machine. Holes are drilled as for shots and are reamed to a larger diameter. The Coal Buster is inserted and pressure applied, which gradually forces the small double plungers outwards. In an average of two minutes, they reach the end of their travel, and bring down the coal.

The following are the advantages obtained by the use of the above :-

1. It cannot ignite gas.
2. It is silent in operation.
3. It does not shake the roof or disturb the roof supports.
4. Its use often leads to marked improvement in roof conditions.
5. The absence of concussion reduces the amount of dust raised.
6. By exerting a slow thrust, the Buster breaks the coal into large strong lumps. As the lumps have not been shattered, they do not disintegrate further and lose value every time they are handled.
7. Dirt bands in the seam are broken into large pieces which can easily be picked out.
8. Workmen can work in safety in nearby working place while the coal Buster is in use.
9. No fumes are made.
10. Used extensively in Lancashire District, England.

CARDOX SHOOTING.

Carbon Dioxide in steel tubes also has widened its field of use in late years. While the cost per ton is more, the higher coarse-coal yield and better loadability of the falls have more than offset this extra cost at many operations. Carbon Dioxide also has been found very efficient in pulling deep cuts in thin coal, where it is difficult to get other breaking mediums that could be used without breaking down and out the kerf, leaving the front of the cut intact. The above is used extensively in American Coal Mines.

Disadvantages.

Carbon Dioxide cylinders require charging, which necessitates the installation at the surface of a suitable plant to do this and the employment of additional workmen.

PROPOSED INSTALLATIONS OF HEAVY-DUTY TYPE MECHANICAL UNITS, &c., No. 2 TUNNEL.

General.

The locality or position defined for the installation of Heavy- duty type Mechanical Units, &c., would be at a point 540 ft. south of the present No. 3 Pit Bottom.

Three (3) Development Headings would be driven in a westerly direction, at a grade of approximately 1 in 80 in favour of the load. These Headings are to be driven from the present Main No. 2 Tunnel Headings.

At a distance of approximately 605 ft. west, the formation of the South Panel Section would then commence. The North Panel Section would commence after developing an additional 88 ft. west of the commencement of the South Panel Section.

The total distance to be developed in the South and North Panels, before working places are to be extended in an easterly direction, as shown on Drawing No. S12, would be 372 ft.

After completion of the above distances, the full installation of three (3) Mechanical Units, which would be the maximum number of units that can be installed in this Mechanized District, would take effect.

Mode of Operation.

All coal from the South and North Panels, also Development Headings, are cut by a 10-R.U. Heavy-duty type Universal Coal Cutter. Shotholes are bored by a C.D.-26 Mobile Drilling Machine. The coal is then busted by the application of a Gullick Hydraulic Coal Buster ; Cardox-Shooting, or ordinary explosives may be used as a substitute.

The coal is then filled away by means of a 11-B.U. Heavy-duty type Coal Loader, which deposits the coal at the rate of 5 to 10 tons per minute, into a 10-S.C. Cable Reel type Shuttle Car of approximately 10 tons capacity. The Shuttle Car, after being filled with coal, transports the load at the rate of 3.9 miles per hour, or 343 ft. per minute, to a 30-in. Troughed Belt Conveyor, which is running at a Belt speed of 400 ft. per minute, with a capacity of 352 tons per hour. In the meantime, the duplicate empty 10-S.C. Cable Reel Shuttle Car is being loaded under the boom of the 11-B.U. Heavy-duty type Coal Loader.

The coal being unloaded onto the 30-in. Troughed Belt Conveyor by the 10-S.C. Cable Reel Shuttle Car will take from 60 to 90 seconds, which would be slightly over the capacity per minute of the Belt Conveyor. Therefore, the operator would reduce his speed of unloading to just over the 90-second period.

After unloading, the empty 10-S.C. Shuttle Car then proceeds back on its way to be loaded again. At a point determined by both drivers, the full 10-S.C. Shuttle Car will pass the empty 10-S.C. Shuttle Car when on its way to the unloading station.

The coal from the South and North Panel Belts feed the Main Development Heading Conveyor, also running at the same speed and tonnage capacity as the Panel Belts. This Main Development Heading Conveyor discharges its coal into what is termed a Centralised Surge Bin, for distribution by automatic feed onto the Main 36-in. Troughed Belt Conveyor, with a speed of 400 ft. per minute, and a capacity of 508 tons per hour, feeding the Surface Belt Conveyors.

After the completion of loading in a working bord, and its cut-through, the 11-B.U. Coal Loader, accompanied by the two (2) 10-S.C. Cable Reel Shuttle Cars, transfer to the working bord and cut-through above.

The timbering of the working bord and cut-through just vacated by the above equipment is then carried out by the Mobile Timbering Machine crew, who do all the necessary timbering required before the 10.R.U. Coal Cutting Machine again operates in the bord or cut-through.

This complete cycle of operations is carried out in both South and North Panels, also Revelment Headings every working day.

It is only necessary in the scheme outlined in Drawing No. S.12 and Drawing No. S.13, to transfer the Panel Belt Conveyors for installation to the next panel workings a little time before the completion of the existing panels described above.

The estimated life of each Panel Section, including Development and Pillar Extraction, with an average daily output of 300 to 350 tons of coal minimum per working shift, and averaging 230 working days per annum, would be approximately 12 months, assuming the average thickness of the coal seam remains at 18 ft.

The working height in the Development workings to be 12 ft. approximately, giving a tonnage of coal in each place cut by Coal Cutting Machine and busted, &c., for loading, of approximately 70 tons. The size of Pillar centres in Development operations being 88 ft. by 88 ft. ; bord and cut-throughs driven 18 ft. wide, leaving a solid square block pillar of coal 70 ft. by 70 ft.

Condensed, the percentage extracted in Development workings being 27 per cent., the balance of 73 per cent. being in Pillar Extraction.

PERSONNEL REQUIRED TO OPERATE MECHANIZATION SCHEME.

The total personnel required to operate the three (3) productive units for a minimum daily output of 900 to 1,050 tons per day, including Surface arrangements, would be as follows :—

Underground.

1.	Coal Cutting	6 men
2.	Drilling Coal Face and Busting Coal for Loader	9 men
3.	Loading Coal	6 men
4.	Shuttle Car Drivers	6 men
5.	Timbering Crews working places	9 men
6.	Attending to Conveyors and Centralized Surge Bin	3 men
7.	Electrical and Mechanical Attendants	3 men
8.	Attending to Main Track Conveyor, Surface Conveyor and transporting all material Underground	2 men
9.	General Repair Shiftmen	2 men
10.	Deputies	3 men
11.	Underground Manager	1 man
	Total	50 men

Surface.

12. Screen Building and Loading Trucks, &c.	8 men
13. Engine Driver, Power House ..	1 man
14. Arranging Material and Stores, &c.	2 men
Total ..	.. 11 men

Summary.

Underground	.. 50 men
Surface	.. 11 men
Grand Total	.. 61 men

SUMMARY OF MAIN DETAILS.

SOUTH AND NORTH PANEL SECTIONS, ALSO DEVELOPMENT HEADINGS.

Method of Access	Tunnels.
Method of Transport	Troughed Belt Conveyors Underground and Surface. Endless Rope Haulage in Main Tunnel and Surface for the transport of men and materials.
Method of Working	Modified Bord and Pillar Panel System. Length of Panels 528 ft. by 264 ft.
Size of Pillars, &c.	88 ft. by 88 ft. centres. Bords and cut-throughs 18 ft. wide, leaving a square Pillar for extraction 70 ft. by 70 ft.
Type of Machines	Coal Cutting 10-R.U. Rubber Tyred Universal Machine.
Loading ..	Joy 11-B.U. High Capacity Coal Loader.
Transport..	10-S.C. Cable Reel type Shuttle Cars feeding Troughed Belt Conveyors, complete with Vulcan-Sinclair fluid coupling and sequence control.
Output ..	From panel, development and pillar extraction, minimum 900 to 1,050 tons per working day.
Annual Output ..	207,000 tons to 241,500 tons.
Man Power	Underground . .. 50 men Surface .. .. 11 men Total .. 61 men
O.M.S. Underground ..	900 tons .. = 18 1,050 tons .. = 21
Surface	900 tons .. = 82 1,050 tons .. = 96
O.M.S. Total ..	900 tons .. =14.42 1,050 tons .. =17.2

PROPOSED MECHANIZATION OF STATE COAL MINE, COLLINSVILLE.

The following is an estimate of the Plant required :—

Surface.

(1) One new Screen Building, complete with necessary screening equipment, capable of handling 3,600 tons per working day ..	34,050
(2) 566 ft. of 42-in. Troughed Belt Conveyor complete with Vulcan-Sinclair Fluid Coupling drive and sequence control, belt speed 400 ft. per minute, 756 tons capacity per hour ..	9,056
(3) 2,813 ft. of 36-in. Troughed Belt Conveyors, arranged in tandem, complete as above, belt speed 400 ft. per minute, capacity 508 tons per hour ..	36,991
(4) Stone Drift or Tunnel from Surface to Right Back Heading, No. 2 Tunnel, 177 ft. long, at a grade of 1 in 3.5 ..	1,770
Total Surface Estimate	£81,867

Underground.

(1) 3,588 ft. of 36-in. Troughed Belt Conveyors, arranged in tandem, complete as above, from Surge Bin to Surface Conveyors. Belt speed 400 ft. per minute, capacity 508 tons per hour	47,182
(2) Coal Surge Bin with reciprocating feeder, &c. ..	1,000
(3) Main Development Heading Conveyor, 940 ft. long, with extension for an additional 720 ft. of 30-in. Troughed Belt Conveyor as above. Belt speed 400 ft. per minute, capacity 352 tons per hour	17,430
(4) North Panel Conveyor, 480 ft. of 30-in. Troughed Belt Conveyor, as above. Belt speed 400 ft. per minute, capacity 352 tons per hour ..	4,320
(5) South Panel Conveyor, 480 ft. of 30-in. Troughed Belt Conveyor, as above. Belt speed 400 ft. per minute, capacity 352 tons per hour ..	4,320
(6) Heavy-duty type Equipment—	
Three 10-R.U. Coal Cutters ..	48,000
Three 11-B.U. Coal Loaders	37,500
Six 10-S.C. Cable Reel type Shuttle Cars	65,394
Three C.D.-26 Mobile Boring Machines	23,763
Three Timbering Mobile Units	6,000
High and Low Tension Electric Cable ..	20,000
Three 150 kVA Portable Mining Type Transformers	3,000
Eight Gate-End Switches with double outlets ..	2,000
Twenty-two Control Boxes Single Outlet to suit 10-S.C. Cable Reel type Shuttle Cars	1,000
Total Cost Heavy-duty type Equipment	280,909
(7) Cleaning and Retimbering Conveyor Roadway from Surge Bin to Surface	6,000
Total Underground	£286,909

Summary.

Surface ..	.. 81,867
Underground	.. 286,909
	368,776
Incidentals	.. 31,224
Grand Total	.. £400,000

Estimates of working costs, &c., taken out by the Accounts Department, State Coal Mine, Collinsville, are attached herewith. These costs are for a daily production of 200, 300, 400, and 500 tons from each of the three (3) mechanical units, based upon an average number of working days per annum, and taking into consideration the continuance of mining in No. 1 Tunnel under present manual methods.

Provision has been made for the following :-

1. Capital Expenditure of £400,000 to be covered by depreciation at the rate of 20 per cent.; thus paying off the total amount in a period of five (5) years.

2. Interest, at the rate of 4 per cent., is allowed on the £400,000, which will require to be made available by the Government Treasury, on loan to the Mines Department.

3. The percentage return on Capital invested of £400,000, after allowing for all expenditure, including depreciation and interest.

A graph is also attached, showing the percentages gained on £400,000 invested for various tonnages, and allowing the above Capital to be paid off in full in a *five-year period.*

In conclusion, I would strongly recommend that careful consideration be given by Cabinet for the above expenditure, so that the total mechanization of No. 2 Tunnel, including a New Screen Building, &c., can be installed at the State Coal Mine, Collinsville as soon as practicable.

18th July, 1950.

STATE COAL MINE, COLLINSVILLE.

PRODUCTION COST-THREE MACHINE UNITS-EACH PRODUCING 200 TONS PER SHIFT : 230 DAYS PER YEAR.

Production-600 x 230 = 138,000 tons.

	£ s. d.	£ s. d.
Wages-		
-Direct Wages, 61 employees	28,887 0 0	0 4 2.24
Indirect Wages-		
Surface ..	25,300 0 0	0 3 8.00
Salaries and Clerical	3,800 0 0	0 0 6.61
Total Wages and Salaries Cost	. £57,987 0 0	0 8 4.85
Stores, &c.-	£ s. d.	£ s. d.
Oils and Greases	1,150 0 0	0 0 2.00
Explosives	2,300 0 0	0 0 4.00
Brattice	2,300 0 0	0 0 4.00
Timber	6,900 0 0	0 1 0.00
Stores ..	6,900 0 0	0 1 0.00
Coal to Boilers	6,330 0 0	0 0 11.01
Water	1,270 0 0	0 0 2.21
Total Stores and Other Costs	. £27,150 0 0	0 3 11.22
Total Wages, Stores and Other Costs	. £85,137 0 0	0 12 4.07
Oncost-	s. d.	£ s. d.
Statutory Holidays ..	2,280 0 0	0 0 3.96
Payroll Tax ..	1,490 0 0	0 0 2.59
Holiday Allowance ..	3,420 0 0	0 0 5.95
Sick Allowance ..	2,540 0 0	0 0 4.42
Workers' Compensation	3,300 0 0	0 0 5.74
Fire Insurance	80 0 0	0 0 0.14
General Expenses	1,900 0 0	0 0 3.30
Fares, Travelling Expenses	100 0 0	0 0 0.17
Royalty	3,450 0 0	0 0 6.00
Depreciation	105,700 0 0	0 15 3-83
Interest	24,750 0 0	0 3 7-04
Pensions Levy..	5,450 0 0	0 0 9.48
Total Oncost	£154,460 0 0	1 2 4.63
Total Costs	£239,597 0 0	1 14 8.69
Present Selling Price	. £242,079 12 0	1 15 1.00
Profit per Annum	£2,482 12 0	0 0 4.31

Return of £2,482 12s. on Capital Invested of £500,000 = .5 per cent.

18th July, 1950.

STATE COAL MINE, COLLINSVILLE.

PRODUCTION COST-THREE MACHINE UNITS-EACH PRODUCING 300 TONS PER SHIFT : 230 DAYS PER YEAR.

Production-900 x 230 = 207,000 tons.

	£ s. d.	£ s. d.
Wages-		
Direct Wages, 61 employees	28,887 0 0	0 2 9.49
Indirect Wages-		
Surface ..	28,800 0 0	0 2 9.39
Salaries and Clerical	5,760 0 0	0 0 6.68
Total Wages and Salaries Cost	£63,447 0 0	0 6 1.56

Stores, &c.-	£	*s.*	*d.*	£	*s.*	*d.*
Oils and Greases	1,725	0	0	0	0	2.00
Explosives ..	3,450	0	0	0	0	4.00
Brattice	3,450	0	0	0	0	4.00
Timber	10,350	0	0	0	1	0.00
Stores	10,350	0	0	0	1	0.00
Coal to Boilers	7,220	0	0	0	0	8.37
Water ..	1,450	0	0	0	0	1.68
Total Stores and Other Costs	£37,995	0	0	0	3	8.05
Total Wages, Stores and Other Costs ..	£101,442	0	0	0	9	9.61

Oncost —	£	*s.*	*d.*	£	*s.*	*d.*
Statutory Holidays	2,600	0	0	0	0	3.02
Payroll Tax ..	1,590	0	0	0	0	1.84
Holiday Allowance	3,900	0	0	0	0	4.52
Sick Allowance ..	2,890	0	0	0	0	3.35
Workers Compensation	3,600	0	0	0	0	4.17
Fire Insurance	90	0	0	0	0	0.10
General Expenses ..	2,200	0	0	0	0	2.55
Fares, Travelling Expenses	110	0	0	0	0	0.13
Royalty ..	5,175	0	0	0	0	6.00
Depreciation ..	106,500	0	0	0	10	3.48
Interest ..	25,400	0	0	0	2	5.45
Pensions Levy	6,200	0	0	0	0	7.19
Total Oncost ..	£160,255	0	0	0	15	5.80
Total Costs ..	£261,697	0	0	1	5	3.41
Present Selling Price	£363,119	8	0	1	15	1.00
Profit Per Annum . ..	£101,422	8	0	0	9	9.59

Return of £101,422 8s. on Capital Invested of £500,000 = 20.28 per cent.

18th July, 1950.

STATE COAL MINE, COLLINSVILLE.

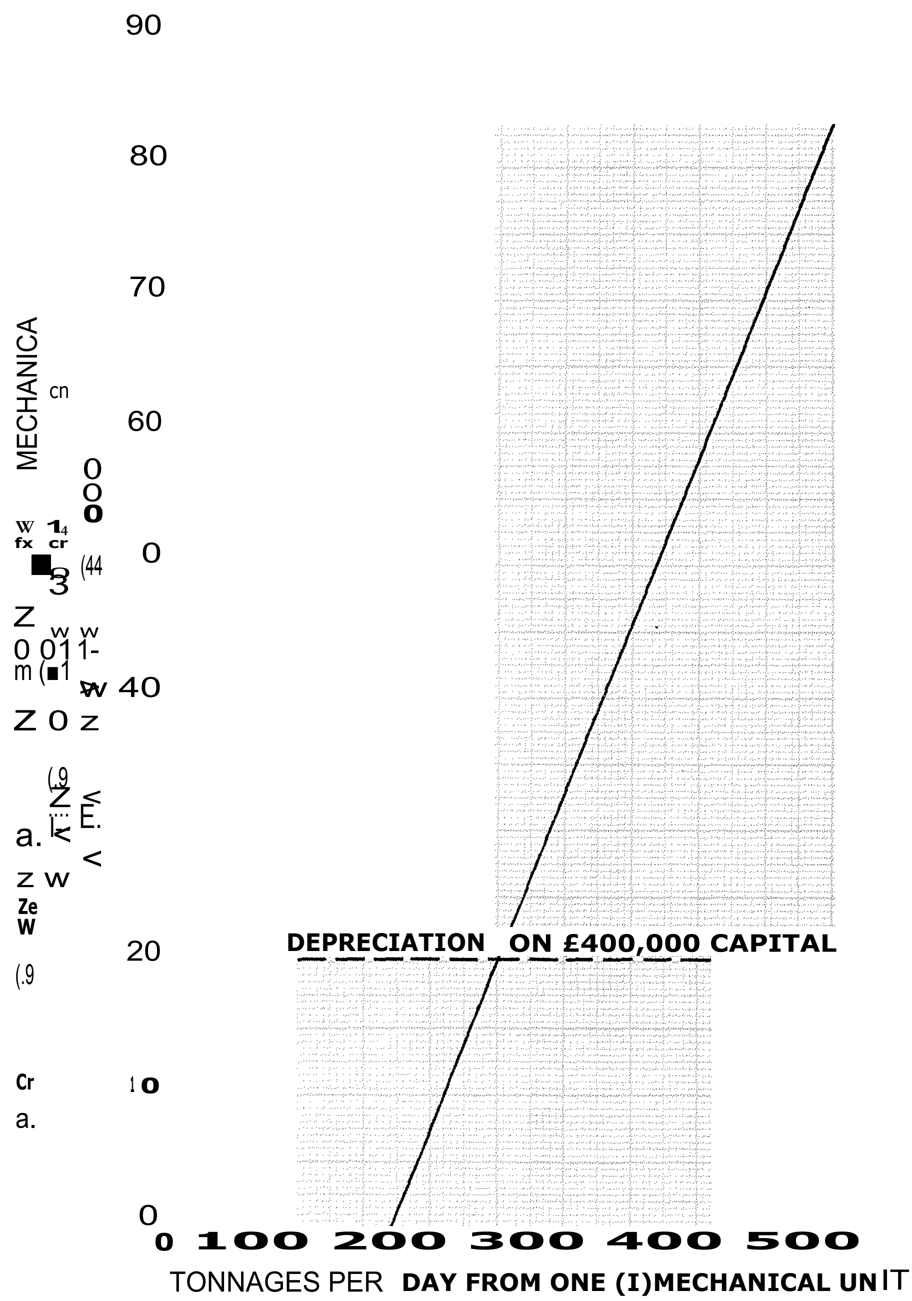
PRODUCTION COST-THREE MACHINE UNITS-EACH PRODUCING 400 TONS PER SHIFT : 230 DAYS PER YEAR.

Production - 1,200 x 230 = 276,000 tons.

Wages-	£	s.	*d.*	£	8.	*d.*
Direct Wages, 61 employees	28,887	0	0	0	2	1.12
Indirect Wages-						
Surface ..	31,000	0	0	0	2	2.96
Salaries and Clerical	6,200	0	0	0	0	5.39
Total Wages and Salaries Cost	£66,087	0	0	0	4	9.47

Stores, &c. —		*s.*	*d.*	£	8.	*d.*
Oils and Greases ..	2,300	0	0	0	0	2.00
Explosives	4,600	0	0	0	0	4.00
Brattice	4,600	0	0	0	0	4.00
Timber	13,800	0	0	0	1	0.00
Stores ..	13,800	0	0	0	1	0.00
Coal to Boilers	7,760	0	0	0	0	6.75
Water ..	1,560	0	0	0	0	1.35
Total Stores and Other Costs ..	£48,420	0	0	0	3	6.10
Total Wages, Stores and Other Costs .	£114,507	0	0	0	8	3.57

GRAPH SHOWING
PERCENTAGES GAINED ON 4400,000
CAPITAL INVESTED
FOR VARIOUS TONNAGES OF COAL AND ALLOWING CAPITAL
TO BE PAID OFF IN FULL AFTER FIVE YEAR PERIOD
(THREE (3) MECHANICAL UNITS OPERATING)



	£	s.	d.	£	s.	d.
Oncost-						
Statutory Holidays	2,800	0	0	0	0	2.43
Payroll Tax ..	1,660	0	0	0	0	1.44
Holiday Allowance	4,190	0	0	0	0	3.64
Sick Allowance	3,100	0	0	0	0	2.70
Workers Compensation	3,680	0	0	0	0	3.20
Fire Insurance	100	0	0	0	0	0.09
General Expenses ..	2,330	0	0	0	0	2.03
Fares, Travelling Expenses	120	0	0	0	0	0.10
Royalty ..	6,900	0	0	0	0	6.00
Depreciation ..	106,980	0	0	0	7	9.02
Interest	25,820	0	0	0	1	10.45
Pensions Levy	6,680	0	0	0	0	5.81
Total Oncost	£164,360	0	0	0	11	10.92
Total Costs	£278,867	0	0	1	0	2.49
Present Selling Price ..	£484,159	2	0	1	15	1.00
Profit Per Annum ..	£205,292	2	0	0	14	10.51

Return of £205,292 2s. on Capital Invested of £500,000 = 41.05 per cent.

18th July, 1950.

STATE COAL MINE, COLLINSVILLE.

PRODUCTION COST-THREE MACHINE UNITS-EACH PRODUCING 500 TONS PER SHIFT : 230 DAYS PER YEAR.

Production-1,500 x 230 = 345,000 tons.

	£	s.	d.	£	s.	d.
Wages-						
Direct Wages, 61 employees	28,887	0	0	0	1	8.10
Indirect Wages-						
Surface ..	32,480	0	0	0	1	10.59
Salaries and Clerical	6,500	0	0	0	0	4.52
Total Wages and Salaries Cost	£67,867	0	0	0	3	11.21

	£	s.	d.	£	s.	d.
Stores, &c.-						
Oils and Greases	2,875	0	0	0	0	2.00
Explosives ..	5,750	0	0	0	0	4.00
Brattice ..	5,750	0	0	0	0	4.00
Timber	17,250	0	0	0	1	0.00
Stores ..	17,250	0	0	0	1	0.00
Coal to Boilers	8,120	0	0	0	0	5.65
Water	1,630	0	0	0	0	1.13
Total Stores and Other Costs .. .	£58,625	0	0	0	3	4.78
Total Wages, Stores and Other Costs ..	£126,492	0	0	0	7	3.99

	£	s.	d.	£	S.	d.
Oncost-						
Statutory Holidays	2,930	0	0	0	0	2-04
Payroll Tax ..	1,700	0	0	0	0	1.18
Holiday Allowance	4,390	0	0	0	0	3.05
Sick Allowance	3,250	0	0	0	0	2.26
Workers Compensation	3,780	0	0	0	0	2.63
Fire Insurance	105	0	0	0	0	0.07
General Expenses ..	2,440	0	0	0	0	1.70
Fares, Travelling Expenses	125	0	0	0	0	0.09
Royalty ..	8,625	0	0	0	0	6.00
Depreciation ..	107,310	0	0	0	6	2.65
Interest	26,090	0	0	0	1	615
Pensions Levy	6,990	0	0	0	0	4.86
Total Oncost	£167,735	0	0	0	9	8.68
Total Costs .. .	£294,227	0	0	0	17	0.68
Present Selling Price	£605,199	0	0	1	15	1.00
Profit Per Annum .	£310,972	0	0	0	18	0.32

Return of £310,972 on Capital Invested of £500,000 = 62.19 per cent.

ANNEXURE NO. 17.

To:

The Honourable W. POWER,
SECRETARY FOR MINES, IMMIGRATION, AND ELECTRICITY.

Proposed Scheme for the Partial Mechanization

OF

The State Coal Mine, Collinsville.

By: A. CROWLEY, ENGINEER MEMBER, QUEENSLAND COAL BOARD,

and

POWELL DUFFRYN TECHNICAL SERVICES LIMITED.

BRISBANE,
August, 1950.

SUMMARY.

This is a scheme for the mechanization of the cutting, loading, and transport of coal at the No. 2 Tunnel of the State Coal Mine, Collinsville. It provides for the extraction of no more than 35 per cent. of the worked section in order that the minimum damage may be done to overlying seams, and is intended as an interim scheme pending the further proving of those seams. This has imposed a certain unorthodoxy upon the layout, but as far as possible equipment has been selected which can be expected to be suitable in other seams.

The scheme provides for an average output of 820 tons per day, or 196,800 tons per 240-day year.

The cost of the equipment required is £178,500, as shown in Schedule I.

The labour force required underground is 64, giving an underground output per man-shift of 12.8 tons. The approximate proportion of the surface employees is 34, making the total employees 98, and the overall output per man-shift 8-4 tons. Details of these manpower requirements are given in Schedule II.

The estimated operating cost is 13s. 6d. per ton, as shown in Schedule IV.

We have not attempted to estimate the capital cost per ton of output but in Schedule **IV.,** we have classified the capital expenditure according to the number of years, which, in our opinion, should be taken as the effective life of the equipment for the purpose of writing off the capital expenditure involved.

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PROPOSED SCHEME FOR THE PARTIAL MECHANIZATION

OF

THE STATE COAL MINE, COLLINSITILLE.

INTRODUCTION.

1. This mine is situated some 53 miles south-south-west from the port of Bowen and at the northern end of the Bowen Syncline. In 1949 it produced 139,664 tons, which was 70 per cent. of the total output in Northern Queensland. During the last twelve months there has been a considerable migration of labour away from the mine, and the output is now only of the order of 600 tons per day. It is not the only mine on the coalfield, there being in addition the privately owned Bowen Consolidated Mine at Scottville about II miles to the west, where the daily output is approximately 400 tons.

2. The combined output of these two mines is not sufficient to meet the present local demand, and it is estimated by the Queensland Coal Board that in the near future a further 500 tons per day will be required. The problem of increasing the output from this coalfield is therefore of some urgency, and accordingly various conferences have been convened by the Honourable the Minister for Mines with a view to drawing up a scheme for increasing the output of the State Mine by the mechanization of part or all of the underground workings.

3. The seam at present worked is the Bowen Seam, which has an average thickness in the area of some 15 ft. and produces coking coal of good quality which also makes a good steam-raising fuel. It is not, however, the uppermost seam in the series, for there are known to be four seams of workable thickness above it, though insufficient evidence is at present available as to the exact qualities of these seams or the mining conditions likely to be encountered.

4. Coal is at present worked by the bord and pillar method, the haulage roadways and bords being driven, for the most part, 6 yds. wide, though sometimes only 4 yds., and at 30-yd. centres. In the older workings these distances were very far from being strictly adhered to, and the shape of the workings is extremely irregular. In more recent times, particularly in the workings of the No. 2 Tunnel, the pillars are, in general, rectangular and of the above dimensions. The coal is hand-worked with the aid of hand drilling and explosives and is transported to the surface by horse haulage in the first instance, and then by electrically operated mechanical haulage. Approximately 8 to 10 ft. of coal are worked in the first workings, and second workings have been, for the most part, restricted to the recovery of top coal and the splitting of pillars, but the latter has not met with any great degree of success.

5. It is generally agreed that the most desirable course would be to carry out the further prospecting campaign recommended in the Powell Duffryn Report, and, depending on the results of that prospecting, to select the most suitable area and seam for the opening of a new mine. Since, however, it is considered that the urgency of the problem will not allow this to be done, it has been decided that a scheme should be drawn up for the mechanization of some, at least, of the existing workings in such a way that the method of working shall not have a deleterious effect on the superincumbent strata, and that as far as possible new machinery should be selected which would be adaptable for working in another seam if subsequent prospecting should make such a course desirable. It will be found that these considerations have imposed a certain unorthodoxy upon the scheme which we are proposing.

BASIC PRINCIPLES OF PROPOSED SCHEME.

6. At a conference held with the Supervisor of State Coal Mines and the Manager of the State Coal Mine, Collinsville, a number of basic principles were discussed and a considerable measure of agreement on them was reached ; these principles are set out below.

Area to be Mechanized-

7. It was generally agreed that the new mechanization scheme should be kept quite separate from the existing contract mining, and that therefore the mechanization should be undertaken at one of the two existing tunnels with the contract miners concentrated in the other. It was further agreed that the most suitable area is that accessible to No. 4 pit bottom in No. 2 Tunnel. Owing to the fact that an up-to-date mine plan was not at that time available, the exact location could not be decided, but at a subsequent conference it was agreed that a panel immediately below No. 3 West level should be the first area to be mechanized.

Percentage of Extraction-

8. The Bowen Seam in this area is likely to be overlain by workable areas of at least some of the upper seams, and therefore the percentage of extraction to be aimed at should not be more than 30 per cent.-35 per cent.

Number of Shifts to be Worked.

9. It was agreed that, for the time being, one shift only should be worked on production, but from a technical point of view there would be little difficulty in doubling the personnel and working two shifts—thus getting twice as much coa,1 for the same capital expenditure.

Transport to the Screening Plant.

10. The distance from No. 4 pit bottom to the surface is some 1,500 yds., and from the mouth of the Tunnel to the existing screening plant is a further 1,050 yds. If the coal were to be taken from the workings to the screening plant by belt conveyor, three conveyors would be required in the Tunnel and one on the surface, and the total cost would be of the order of £55,000. If subsequent prospecting should result in the opening of a new mine near the outcrop of any seam, this conveyor equipment, or at any rate a considerable portion of it, would become redundant for a considerable period, and this would not only represent idle capital but would in addition be likely to deteriorate, especially as so much of it will consist of rubber belting. Furthermore the existing coal handling equipment at the surface would constitute a bottle neck which would probably restrict the output to that which can be transported by the existing endless-haulage system.

11. This endless-haulage system consists at present of two endless haulages—one, a 250-h.p. haulage, which pulls the coal up the Tunnel, and the other, a 40-h.p. haulage, which takes the coal from the mouth of No. 2 Tunnel to the screening plant near the mouth of No. 1 Tunnel. At present a 11-in. diameter rope is used on the tunnel haulage and a 1-in. diameter rope on the surface haulage, and the full and empty skips have to be transferred from the one rope to the other at the mouth of No. 2 Tunnel.

12. The capacity of the 250-h.p. haulage at present is stated by the Management to be 114 tons per hour. If continuity of operation can be assured we think that a higher figure should be attainable, but it would probably not be wise to assume a capacity of more than 800 tons per shift, and this must set the scale for the mechanization of the workings. One factor which has limited the capacity of the haulage system in the past has been the necessity for stripping the rope of all skips at the end of the shift in order to provide a man-riding rake to take the men out of the mine. The installation of a special man-riding haulage in the companion intake dip has been under consideration for some time, and we recommend that a haulage should be installed for man-riding and supplies purposes so that the main haulage system can operate continuously on coal throughout the shift.

13. The Manager agrees with this figure for the capacity of the system, and thinks that it can be obtained without any modification. We have observed during our visits, however, that numerous stoppages occur, and it is obviously desirable that these should be eliminated or at any rate reduced to a minimum. We recommend that detailed time-studies should be made of. the operation of this haulage system so that causes of delay may be pin-pointed, and steps taken to remedy them. The fact that, in the proposed layout, all the coal will be fed onto the system at one point will obviously effect some improvement, and in our opinion improvement in track, and renewal of many of the clips, or replacement by another type, will have a further beneficial effect. The need for some modification in the system may also come to light as a result of such time-studies, but we feel that any recommendation for such modification would be premature until the matter has been further investigated.

Intermediate Transport.

14. Broadly speaking the following three types of intermediate transport could be applied :-

(i.) Rope haulage ;

(ii.) Locomotive haulage

(iii.) Conveyor.

15. It is considered desirable that whatever layout is adopted the main haulage level of every panel should be straight, and if conveyors are to be used in the development work it is absolutely essential that this should be so. In previous workings in this tunnel variations in gradient have been encountered and it is reasonable to assume that they will be encountered in the future, and this means that any straight road driven approximately along the line of strike will be undulating.

16. A rope haulage over this type of roadway would have to be either main and tail or endless. It would be possible to install either of these systems, and, if precautions were taken, such as the provision of plenty of spare skips at all loading points, to even out the fluctuating rate at which the coal will come from the working faces, the capacity of such a system could be made adequate for the requirements.

17. The capacity of a locomotive haulage system is severly limited by undulating gradients and we therefore do not favour it in this instance.

18. A conveyor will work over reasonable undulations and can be made to deal with considerable peak loads, any necessary evening out of load fluctuations being provided by a surge bunker at a permanent loading point which will serve the whole life of the panel. Such a conveyor installation with this method of evening out load fluctuations will be more economical in manpower than a rope haulage, and we therefore recommend a conveyor installation for the intermediate transport system.

19. The high capacity (700 to 800 tons per shift) required of this conveyor dictates the use of a belt conveyor for this purpose. The optimum width depends on various factors such as peak rate of output, largest size of lump likely to be handled, and maximum belt speed considered desirable. High belt speeds allow belts to be of narrower width, but on the other hand they increase the degradation of the coal, and if any portion of the belting becomes caught in an obstruction, the belt travels through a greater distance before any remedial action can be taken, and therefore

greater damage is likely to result. It should obviously be possible to install belt conveyors in such a way that this type of occurrence can be avoided, but since the Management and workmen at the State Mine have little, if any, experience of belt conveying, it is not considered desirable to have a belt speed higher than 250 ft. per minute. In order to deal with a peak rate of output of some 200-250 tons per hour, for which we may cater in our mechanization at the face, and yet be within the limits imposed by the main haulage system, and since large lumps are frequently produced by the present method of mining, we consider that the belt should be 36 ins. wide.

20. The coal should be transferred from the belt to the skip on the endless-haulage system via a bunker, which will act as a surge bin to even out the fluctuations in the rate at which the coal is brought to the face, and also provide a certain amount of storage in the event of any stoppages due to breakdown on the outbye haulage system, screening plant, or shortage of wagons. The Supervisior of State Coal Mines has expressed the wish that this bunker should have a capacity of 100 tons, and this would certainly be a wise precaution to ensure continuity of operations at the working face. Diagrammatic sketches of the loading arrangements are shown in Plate 6 from which it will be seen that the main belt will deliver onto a travelling shuttle-belt so designed that it can discharge at any point between the two ends of the bunker.

21. Coal will be discharged from the bunker via a number of chutes, each fitted with a door which can be operated so as to adjust the rate of flow through the chute on to a scraper feeder conveyor running parallel with the side of the bunker. The chutes will deliver sideways on to the scraper feeder so that their widths will not be limited by the width of the scraper feeder. The latter will deliver into the skips at the loading point. The empty skips, after being taken off the endless-haulage rope by a clipper, will gravitate round a turn into the level and will then run under gravity against a spring buffer and back over a spring-operated pointer on to the loading road. They will then be mechanically controlled by the man in charge of the loading point, and after being filled will be clipped on to the full rope by another clipper.

22. The use of a substantial surge bunker will obviate the necessity for having a number of spare skips at the loading point. The smaller the number of skips at this point the easier will be their control and the smaller the number of men required to handle them. Since the capacity of the haulage is approximately 2 tons per minute, and the rate at which coal will come from the face may be as much as 4 tons per minute for a period of perhaps 20 minutes, this bunker will require a capacity of 40 tons merely for the purpose of evening out these load fluctuations. The remaining 60-ton capacity of a 100-ton bunker would be available to ensure continuity of operations in the coal face in the event of a stoppage of the haulage system.

General Principles of Layout.

23. In the interests both of maintaining the stability of the strata and of safe pillar extraction at a subsequent date, it is considered desirable that the working section should be restricted to the bottom 8 or 10 ft. of the seam. This practice is carried out in this part of the workings already, the roof usually being one of two partings 8 ft. and 10 ft. from the floor respectively. These partings are not absolutely consistent throughout the workings and it may sometimes be necessary to change from one to the other and on other occasions it may be necessary to make an artificial roof.

24. The percentage of extraction decided upon suggests the Use of some form of room and pillar method of mining and this, also, is no innovation to the coalfield. Since the seam is liable to spontaneous combustion it will be necessary to divide the workings into panels and make provision for easy sealing off of panels in the event of a heating being detected, though the low percentage of extraction should ensure that no such heating occurs during the development period. It is recommended that a continuous barrier pillar, 20 to 30 yds. wide, should be left between panels.

25. It is proposed that sets of development level roadways will be driven approximately along the line of strike from a suitable point below No. 3 pit bottom, and from these development levels rooms will be driven to a distance depending on the type of face transport selected. The width of each pillar between the rooms will be approximately three times the width of each room so that when the time comes for the extraction of the pillars a new room can be driven up in the middle of each pillar and each room—both new and old—will be able to retreat, bringing back with it the top coal and pillar coal. The exact method by which this pillar extraction will achieved, details of roof support, line of break, &c., are not matters which need be discussed now, because experience in the use of the machinery in the intervening period must have considerable influence upon them, but it would obviously be prudent to make provision for subsequent pillar extraction by laying out the workings so that the pillars shall have suitable dimensions for this purpose as well as for supporting the roof. Plates 1 and 2 show the general features of the layout, further details of which will be discussed in paragraphs 37 to 112.

Face *Transport.*

26. In a layout of this kind, the coal can be brought from the working faces either by mobile vehicles such as shuttle cars or mine cars or by conveyors or by the use of duckbill loaders. The latter are a special application of conveyors in which the conveyor itself, which is of the shaker type, has a specially constructed head which enables it to dig into the pile of prepared coal. Considerable success has been achieved with duckbill loaders in various coalfields throughout the world, particularly in the United States of America. In general, they are seen to their best advantage where wide rooms provide the maximum quantity of coal for each extension of the conveyor, where good roof permits the erection of the minimum number of props, and where there is insufficient height for other types of loading machines. Furthermore, they are only suitable where the floor

is hard and where the gradients are level or in favour of the load, and they involve more man-handling of equipment than is the case with mobile loaders. In the case which we are considering the need for maintaining stability of the strata limits both the width and height of the rooms, there is insufficient knowledge of roof and floor conditions in the other seams which may have to be worked, and owing to insufficiency of information about gradients it is not certain that the development levels could be driven with them. We do not consider, therefore, that duckbill loaders would be the most suitable under the circumstances.

27. Shuttle cars possess certain obvious advantages in that they are extremely flexible in regard to both the number of working places which they can serve and the amount which they can transport from them, and their use makes possible the installation of very high-capacity loading equipment. They are, however, limited by gradient.

28. The use of large mine cars also enables high-capacity loading equipment to be used but they are less flexible and, when used in conjunction with locomotives, even more limited by gradient. The use of rope haulage overcomes this difficulty but still further reduces their flexibility.

29. The exact gradient of the area for which this mechanization scheme is proposed is not known, but the average gradient immediately below No. 3 pit bottom is 1 in 8, with local gradients up to 1 in 5.6, and similar steep gradients are anticipated in the working area. Although shuttle cars are now being made with more powerful motors and better brakes than hitherto, we do not recommend their use in this scheme for the following reasons :-

(1) The gradient in future workings in this or other seams may be even steeper than in the present area. This is particularly likely to be the case if the prospecting referred to in paragraph 5 should result in the opening of a new mine nearer the outcrop.

(2) There is already a certain amount of water in some parts of the workings, and more will be used for dust suppression, so that the limiting factor as far as gradient is concerned will not be the efficiency of the brakes so much as the grip between the tyres and the floor.

(3) Although the roof in the present workings is reasonably good and may well improve when mechanized mining is introduced, there are places where dislodgement of props by a skidding shuttle car would have very serious consequences.

(4) The use of diamond-shaped pillars to ease the problem of cornering and also to enable the shuttle cars to avoid working on the full dip would reduce the stability of the strata which the layout is designed to provide.

(5) For reasons which will be further discussed in paragraph 40, the minimum number of production units will be two, consequently the minimum number of shuttle cars which would have to be bought would be five, four of which would be in service and one kept as a spare. This would involve a cost of some £50,000—a very large sum to be invested in equipment of which the success is questionable.

30. We are left, therefore, with a system of conveyors as the most suitable means for transporting the coal from the working faces to the main belt conveyor in the level, and we recommend for this purpose the use of scraper chain conveyors, which are easily extensible, robust in construction, will work either with or against the gradient (provided unfavourable gradients are not too steep) and are generally considered suitable for use with mobile loading equipment.

31. The Manager of the State Coal Mine, Collinsville, is very strongly in favour of the use of shuttle cars, and it was agreed that an alternative scheme involving their use should be drawn up. At a later meeting it was agreed that such an alternative scheme should be prepared by the Management of the State Mine.

Method of Loading.

32. Apart from duckbill loaders referred to above, the choice here is between hand-loading on to conveyors, scraper loaders, and mobile loading machines. Since the conditions are suitable for the use of some form of loading machines we are not in favour of hand-loading. Although there are several successful installations of scraper loaders both in New South Wales and Queensland, and this type of loading has the advantage that smaller teams are employed, the total number of men required is greater, and there can be no doubt that the best results that can be obtained by their use is not as good as the best which can be obtained by the use of mobile loaders. Furthermore, the type of coal-cutting equipment most suitable for use with scraper loaders is the short-wall machine cutting at floor level, and we are in agreement with both the Supervisor of State Coal Mines, and the Manager of the State Coal Mine, Collinsville, that in the Bowen Seam cutting at a horizon above floor level is desirable. For these reasons we recommend that mobile loading equipment should be used.

Method of Preparing Coal for Loading.

33. The logical accompaniment to a mobile loading machine is a mobile cutting machine, and we recommend that universal type machines, capable of putting in shear cuts and thus reducing the amount of shot-firing, should be purchased. Although it is possible with this type of machine to put in so many cuts that shot-firing is altogether eliminated, we think that the best arrangement at Collinsville will be to have one horizontal cut and one or two shear cuts with a limited amount of shot-firing. The shot holes should be drilled by electrically operated hand-held boring machines operated by the same crew as operate the coal-cutting machines.

Type of Power.

34. We recommend that three-phase A.C. electric power, which is already available in the mine, should be used, the power being transmitted underground at a high voltage and transformed in the working district to 415V. This transformation should be by means of mobile transwitch units which can be advanced along the supply level as the face advances, and thus kept close up to the various machines in which the power will be used. The present main feeder cable in No. 2 Tunnel is carrying current at 1,050 volts, at which pressure the current required for a mechanization scheme of any size would be far beyond its carrying capacity. Furthermore its condition renders it completely unsuitable for use as part of a higher voltage transmission system and a new cable will be necessary.

35. In deciding the most suitable voltage at which the power should be transmitted it will be necessary to take into consideration the generating voltage of whatever new generators are to be installed within the next few years. At present the transference to Collinsville of one of the generators from either Maryborough, Townsville, or Rockhampton Power Stations is under consideration and the final decision will no doubt depend largely on which is likely to be available first. In making our estimates of cable requirements we have assumed that the main transmission will be at 3,300 volts.

Ancillary Services.

36. At the Conference referred to in paragraph 6, the question of ventilation, roof support, dust suppression, lighting and man-riding facilities were also referred to, and the general principles decided upon have been embodied in the layout described below.

DETAILS OF LAYOUT.

Sizes of Rooms and Pillars.

37. The necessity to provide for the recovery of pillars at some future time, and the percentage of extraction agreed on, lead us to recommend the layout shown in Plates 1, 2 and 3, in which two sets of level development roads—three in each set—will be driven at 331-yd. centres and interconnected by cross-cuts at 271-yd. centres. The set on the Dip side will serve as intakes and that on the rise side as returns. A barrier 27i yds. wide will be left between the two sets which will be pierced at intervals of 821 yds., this being designed to reduce the number of cross-cuts between intakes and returns to the minimum consistent with the necessary interconnection of workings for the ventilation of the faces and the concentration of output on to one conveyor in the lowest development level. With the dimensions given above, the lowest or main conveying level will be started at a distance of 210 yds. below No. 3 pit bottom.

38. The main levels and the rooms will be driven 6 yds. wide, thus leaving pillars 211 yds. wide by 271- yds. long for extraction at a later date. With these dimensions the distance to be driven in each room before it holes through to the next level will be equal to the distance which each level must be driven before a new room can be formed. The cross-cuts between the two sets of roadways referred to in paragraph 37 will be driven 3 yds. wide instead of 6, to facilitate the work of stopping them off in order to prevent leakage as soon as they are no longer required either for ventilation or conveying purposes.

Output per Cut.

39. With the universal type of mobile coal cutter, a jib 7 ft. 6 ins. long will be required to cut a room 18 ft. wide. The depth of cut which will be obtained from a jib of this length will vary by 1 or 2 ins. from day to day, and will tend to be greater in level roadways than in those advancing to the rise. It will also depend, to some extent, on the efficiency with which the coal cut during the last cycle was prepared for loading. Assuming, however, that an advance of 7 ft. 6 ins. will be obtained for every cut put in, that the average section worked will be 9 ft. thick, and on the basis of 27 cu. ft. to the ton, the output per cut will be 45 tons.

Number of Production Units Required.

40. An output of 720 tons would thus require the preparation and loading of 16 cuts which, allowing for some 61-hours' working time during the shift, means that one cut of 45 tons must be loaded every 241 minutes. After making allowance for the time necessary for flitting the loading machine from one working place to another, and also for contingencies, we are of opinion that one loading machine, however great its capacity, will not be able to maintain this rate of loading and flitting, and we therefore recommend that there should be two production units, each giving an output of 360 tons or 8 cuts per shift. This will allow some 49 minutes per cut.

41. It will obviously be advisable to have a spare loader and a spare cutter so as to enable machines to be overhauled regularly on the surface, and also to reduce to the minimum the delays caused by any mechanical breakdowns which do occur ; normally only two machines of each kind will be in use, but the spare machine may be used with advantage when transferring from one panel to another.

INTERMEDIATE TRANSPORT BETWEEN THE FACE TRANSPORT AND OUTBYE TRANSPORT SYSTEMS.

42. This has already been discussed in general terms in paragraphs 14 to 22 where it was recommended that a 36-in. belt conveyor and surge bin should be installed to bring the coal from the face transport system to the main endless-haulage system. It is of paramount importance

that this conveyor should run continuously throughout the working shift and require the minimum of attention to enable it to do so. We therefore recommend that it should be of the fully troughed covered bottom belt type, receiving coal at one point only and fitted with a loop take-up, so that the receiving end—which should be of very robust construction and provide for correct centring of the coal on to the belt—shall not have to be moved for the purpose of tensioning the belt, but will stay in the same position until the advance of the workings necessitates the extension of the belt. In order to ensure that the belt is loaded centrally, we recommend the use of a scraper chain feeder conveyor which will collect the coal from the face conveyor of the main level and from the trunk conveyor bringing coal down from the upper levels and deliver it on to the receiving end of the main belt conveyor. This feeder conveyor can be driven from the return drum of the main belt conveyor, but in view of the amount of coal which the feeder will have to handle at peak periods, we recommend that it should be provided with a separate electric drive.

43. The face conveyors in all the levels, except the lowest or main level, will deliver on to the trunk conveyor as shown in Plate 3. In order to keep the maximum length of these face conveyors as short as possible, which is desirable both for economy in material and efficiency of operation of the conveyors themselves, the trunk conveyor will have to be advanced from one position to its next position (a distance of three pillar widths or 824 yds.) as soon as the next cross-cut between intake and return, together with the rooms in the same straight line as that cross-cut, have been completed. Similarly, in order to keep the length of scraper chain conveyor in the main level to the minimum—and this is desirable in the interests of reducing the number of conveyors over which the coal has to pass on its way to the main loading point—the belt conveyor should be extended at the earliest possible moment after the advancing of the trunk conveyor from one position to another. The desirability of spreading the work of shifting conveyors as evenly as possible over the complete cycle of operations will make it preferable not to attempt this work of extending the belt conveyor at the same time as that of advancing the trunk conveyor, but it should be done as soon after as possible, and preferably on the succeeding day.

Face Transport System.

44. As mentioned in paragraph 30, and for the reasons discussed in paragraphs 26 to 29, we recommend the use of scraper chain conveyors for transporting the coal from the working faces to the main belt conveyor, and the distance of 824 yds. between successive positions of the trunk conveyor has been chosen so as to enable the various rooms and cross-cuts to be completed before the face conveyors in the levels become so long that they cannot work efficiently as one unit and must be replaced by two units in tandem.

45. The trunk conveyor will have a total length of approximately 172 yds., and this will have to be split into two units, of which the lower will have to be of the same capacity as the scraper feeder and the main belt conveyor itself, with this reservation, viz., that whereas spillage from the belt conveyor would be scattered over the whole length of the level where it is less likely to receive attention and may interfere with the further efficient operation of the conveyor, spillage from this lower half of the trunk conveyor or from the feeder conveyor will be concentrated over a short length ; furthermore the construction of scraper conveyors is such that spillage does not interfere with the efficiency of their operation. In spite of this reservation, however, it is clear that the capacity of these two scraper conveyors should be of the order of 200-250 tons per hour. Several conveyors of this capacity are available, and we recommend the use of two such in this particular situation.

46. In order to facilitate the work of advancing the trunk conveyor from one position to another, we recommend that sufficient spare conveyor structure should be purchased to enable the major portion of this conveyor to be laid in the new position while coal is still being conveyed by the conveyor in the old position. The purchase of spare driving heads and tail ends and some spare intermediate structure is desirable in any event, and use can be made of them for this purpose.

47. At the same time as this trunk conveyor is advanced, it will, of course, also be necessary to shorten the level conveyors which deliver their coal on to it, and this will involve the transfer of all the driving heads from the old positions to the new. In order to spread out this work rather more evenly, the spare lower half of the trunk conveyor should be completed and the driving heads which deliver on to it advanced on the day before the top half of the trunk conveyor—together with the corresponding level conveyor driving heads—are moved. This will involve keeping the lower levels some 12 ft. ahead of the upper levels, and the maximum lengths of the conveyors in these levels will thus be 4 yds. longer than the maximum length of those in the upper levels, but we are satisfied that as long as the direction of the contour lines remains as it is at present, these conveyors will be able to carry their load satisfactorily. Should the contour lines swing round so that the levels start clipping, it would then be necessary to reduce the distance between cross-cuts from three pillar-widths to two.

48. The conveyors in the rooms will have a maximum length of approximately 28 yds., and will therefore present a straightforward problem. In view of the desirability of keeping the conveyors in the levels as short as possible, the rooms, and the cross-cut where applicable, will have to hole through as near as possible at the same time, and therefore they will all reach their maximum length together ; consequently it will not be possible to effect economies by transferring structure from one room to another, and the amount of structure required for these conveyors will be the number of conveyors multiplied by the maximum length of each.

49. Particulars of the conveyor requirements are set out in Schedule I. from which it will be seen that the total requirements for the main production panel, including the necessary spares, will be :—

21 Driving heads,

21 Tail ends,

1,300 yds. of chain and trOughing,

Up to 800 yds. of belt conveyor,

which will cost approximately £A60,000.

50. This comparatively large number of conveyors, of which sixteen will normally be working in any one day, is dictated by the policy of partial extraction. Apart from the higher capital cost involved it brings with it the need for ensuring that the highest standard of maintenance should be achieved particularly because the breakdown of one conveyor may entail the interruption of very much more than one-sixteenth of the output. It also involves the need for an interlocked sequence control system which will ensure that when any conveyor stops for any reason all those feeding on to it are also stopped.

Type of Loading Machine.

51. As stated in paragraph 32, we consider that mobile-loading machines would be the most suitable for this scheme, and we recommend the use of one of the medium-sized loaders, with a peak capacity of 4 tons per minute of lump coal. Such machines are easily manoeuvrable and comparatively simple to maintain. They are mounted on caterpillar tractors, the width of which should not be less than 10 ins.

Type of Coal-Cutting Machine.

52. Several types of mobile coal-cutting machines capable of cutting in both horizontal cuts at a horizon which is infinitely variable between upper and lower limits, and also capable of putting in shear cuts, vertical or inclined, are on the market. They are mounted on caterpillar tractors or pneumatic tyres. In view of the fact that machines of British manufacture are normally mounted on caterpillars, we recommend that caterpillar-mounted equipment should be employed. We also recommend the fitting of a cable reel to facilitate the handling of the cable when flitting.

Crossing of Conveyors by Mobile Equipment.

53. It is common practice to take caterpillar-mounted mobile mining equipment over scraper-chain conveyors without protecting the latter, the only preparation required being the removal or permanent bending down of some of the spill plates, according to whether the type of conveyor used has detachable spill plates or not. Specially strengthened crossing sections are also available from some manufacturers, and we recommend their use. Such crossing cannot be accomplished close to the driving head unless the conveyor is of the captive chain type, as with other types the need to lead the chain gradually from near floor level up to the delivery height of the driving head results in an inclined portion of the conveyor some 6 or 8 yds. long, which would be too high to be crossed by the mobile equipment without the construction of special ramps. Scraper conveyors with captive chains are for the most part only suitable for short lengths or alternatively for light loads, and would therefore not be suitable for standardization throughout the proposed scheme. They would, however, be admirably suited for the rooms and the cross-cut, and we consider that the advantage of being able to cross this type of conveyor near the driving head justifies the selection of this type of conveyor for this special purpose.

Sequence of Operations.

54. It is proposed that there should be four main phases in the cycle of operations as follows :-

(i.) Cutting and drilling ;

(ii.) Shot-firing ;

(iii.) Loading ;

(iv.) Timbering and extending conveyors.

55. Since the largest proportion of the capital expenditure will be invested in the coal-loading and conveying equipment, it is desirable that this should be used to the maximum possible extent, and therefore the aim of the system should be to ensure that properly prepared coal shall be available for the loader throughout the shift, that the transport system, particularly that portion of it closest to the face, shall be continuously available for taking away the coal from the loader, and that the time spent by the loader in flitting from one working place to another shall be the minimum possible.

56. To satisfy the first two of these requirements, it is necessary that sufficient time shall be available for the preparation of the coal for loading and for the extension of the transport system, ventilation system, erection of roof supports, &c. For this purpose it is necessary that for each machine there shall be at least four working places, in each of which one of the abovementioned phases of the cycle of operations can be taking place. The normal routine of a crew of cutters and drillers, shotsmen, timbermen, conveyor extenders, and loader operators, will be to travel from one place to another in rotation and thus ensure that the loading machine is kept in continuous employment, and Plate 3 shows the relative disposition of the various machines at a typical stage.

57. It will be seen that there are five available working places in which the four phases can be carried out and therefore it might be thought that one of these phases, e.g., shot-firing, could be divided into two, thus providing more time for its completion, or alternatively a that fifth reserve phase should be recognised during which any arrears of the four main phases could be made up. To a certain extent advantage may have to be taken of this latter alternative, but it should not be established as a regular practice because there will be certain occasions, as for instance when a room or cross-cut is only in a short distance from the level off which it has been turned, when shot-firing cannot be carried out in the level without interfering with the work of loading in the room. Although the adoption of simultaneous firing, as recommended in paragraph 63, would reduce to a minimum the delays caused by having to withdraw the loader crew during shot-firing, such delays should be avoided as far as possible.

58. Plate 4 shows the order in which the various cuts will be put in and it will be seen that, on the assumption that eight cuts are cleared per day by each team (one in the upper three levels and one in the lower three levels), a new set of rooms will have to be started every seven working days and a new cross-cut between the two sets of levels every 21 days. It will also be seen that the sequence of cuts is such that the work of extending the conveyor in one place will never interfere with the loading of coal in the next place.

Cutting.

59. Two men will be allocated to this work in each team and in the period allotted (averaging 49 minutes) they will be expected to put in one arc at a pre-determined level, say, 3 ft. 6 ins. above floor level, and one or more shear cuts, drill the necessary shot-holes, and flit the machine to the next working place. The number of shear cuts to be put in in each working place will have to be decided as a result of experiment, and in reaching such a decision the time available, the relative times occupied by putting in extra shear cuts, and by drilling the extra shot-holes which will be otherwise necessary, and the time required for the extra shot-firing, will all have to be taken into consideration.

Drilling.

60. As stated in the preceding paragraph the drilling will be undertaken by the two coal-cutter operators, each team having one drilling machine with them and a second machine available as a spare. In order to save having two cables to handle during flitting, a small transformer should be attached to the coal-cutting machine and the drill supplied from this via a short length—say 10 yds.—of drill cable. In addition a further spare drill and 125-yd. length of cable should be available for emergency drilling in places where the coal cutter is not likely to be operating.

61. In the normal course of operations the holes will be drilled to the same depth as the cut, i.e., 7 ft. 6 ins. The holes in the bottom coal will be drilled before the cut is put in and if it is found that a considerable amount of top coal falls when the cut is put in, thus making it difficult to charge the holes, this difficulty may be overcome by drilling the first foot of each hole to a larger diameter and inserting therein lengths of suitable sized pipe through which the charging of the holes can be carried out without first having to clear the fallen top coal. When the top coal is being drilled the cut should be blocked with wedges as a safety precaution. A further point to which attention must be drawn is that the depth to which holes are bored in the bottom coal for clearing the last cut in any bord—that is the cut which will break through to the level above—must be tested by putting a bore-hole which penetrates the thickness of coal left at that stage, and allows the depth of the shot-holes to be fixed at a limit which ensures safe firing of shots. The carrying out of what may be termed an exploratory bore at this stage will also prove to the cutting team whether or not their full depth of jib will, in cutting, penetrate the remaining block of coal.

62. Since there is no previous experience of machine cutting in the Bowen Seam it is impossible to forecast what will be the optimum drilling pattern and some experimental work will have to be carried out before this can be determined It is important that the quantity of drilling should be sufficient to ensure that the coal is properly prepared for loading, in particular that the bottom coal shall be effectively dislodged from its original position, and that both top and bottom coal are broken into lumps which can be easily handled by the loading machine, the conveyor system, the loading point, and the coal-handling plant at the surface.

Shot-Firing.

63. This phase of the work, like the others, must be completed within the allotted time of 49 minutes per cut and this may well present greater difficulties than any of the other phases. Since only four working places are normally available for each unit, it will not be possible to speed this work up appreciably by having two sets of shot-firers for each unit, and in order that one set of two men may carry out this work for each production unit, it will therefore be necessary to see that this phase is thoroughly well organised, and that so much as possible of the work should be carried out away from the face, for instance, by the preparation on the surface, and packing for transport underground, of stemming cartridges made of fire-proofed paper filled with sand. The quantity of explosives required by one shotsman per shift may well be in excess of what he and his assistant can carry into the mine themselves, and a specially constructed explosives car should therefore be used for bringing explosives into the workings via the man-riding and supplies haulage. The shot-firing can also be speeded up appreciably by some degree of simultaneous firing which has advantages with respect to safety as well as speed. All the holes in the bottom coal should be fired together before firing those in the top coal so that the results of the former can be inspected before being concealed from view by the top coal falling on it.

64. In view of the fact that a considerable amount of shot-firing will be going on throughout the shift and that other men in the team will also be moving from place to place, special attention will have to be paid to ensuring that these other men receive adequate warning when shots are about to be fired. Unless this is done there is a risk of workmen being injured when flitting a machine along one of the levels across the bottom of a room in which shot-firing is taking place or when men are working in a level at the same time as shots are being fired in a room or cross-cut that is about to connect through to it. If both the shotsman and his assistant station themselves at strategic points when shots are being fired this risk should be avoided.

65. The use of a single shot-firing cable of the twin-core type, which can be carried in one length from place to place, will enable the shotsman to select the most suitable site from which to fire the shots, and for this and other reasons we recommend the use of this type of cable, rather than of separate single-core cables, which are sometimes favoured for multi-shot firing.

Loading.

66. This, in many ways, is the simplest of the four phases provided that the other three phases have been properly carried out. If the place has been properly safened and timbered, the coal properly prepared, the conveyor extended and the whole transport system maintained in working order, even a loader with a capacity of 2 tons per minute should have no difficulty in clearing the 45 tons per cut in some 35 or 40 minutes, leaving 20 minutes or more for flitting to the next working place. These comparatively small machines have, however, the disadvantage that being lighter in weight they are slightly less stable on a sloping floor, particularly when working along the strike ; trouble on this account should not be experienced if the coal is properly prepared, but to ensure maximum stability we recommend the use of a slightly larger loader with a capacity of 4 tons per minute. In any case it would be as well when loading on the levels to start off with the coal on the upper side so that the remainder of the coal will help to keep the machine in position. It will probably be found that a small quantity of coal, particularly round the tail end of the scraper conveyor, is in such a position that it cannot easily be loaded by the machine, and this will have to be hand shovelled by the loader operator's assistant either direct on to the conveyor or out into the middle of the room where the machine can get at it. The operator's assistant can be doing this work during part of the time when the loader is loading the main body of the coal.

Timbering.

67. After a cut has been loaded it will be necessary for timber to be set under the newly exposed roof so that the place is once more safe for men to work close to the face. The loader operators will normally be several yards back from the face and will therefore not be exposed to any risk of the timbering system has been advanced close to the previous position of the face, but as a precaution one or two screw jack props should be provided in every working place so that the loader operators can set them quickly in the event of a bad piece of roof being encountered. In 9 ft., or possibly more, of height it will usually be an advantage to have the screw at the lower end rather than at the upper end, and in order to facilitate operation wooden blocks should be set underneath them as well as on top, the top block being normally fastened to the prop but easily replaceable.

68. The timbermen will therefore be required in each working place as soon as possible after the loader has completed filling the coal and in order to facilitate the quick supply and erection of timber a mobile timbering machine with a built-in power operated saw should be used. Such a machine is capable of sawing timber to length and lifting a crown up to the roof by hydraulic means before swinging it into position at right angles to the line of the roadway, and holding it in that position while a prop is set under each end. With such a machine two men will be able to bring in the necessary timber from the nearest supply dump and complete the timbering of a working place in the required time.

69. It is very important that the timber should be correctly set, not only from the point of view of giving the maximum support to the roof, but also so that the working place can be driven in a straight line,, and for this purpose a mark, previously made at the surface of the mine a fixed distance from the end of the crown, should be set immediately under the sight line on the roof. In dry workings this mark can be made with whitewash but where the workings are damp paint must be used, or alternatively, a small metal strip can be nailed on, such as a single prong of a certain type of belt fastener. All crowns should be sent down the mine in a standard length and they will normally be erected at that length. If, for any reason, it is necessary to shorten them it will, of course, be necessary to ensure that a portion is cut off from the correct end, i.e., not the end from which the mark has been measured.

70. The most satisfactory timbering system will have to be decided by the Management in the light of experience, but from what is known of the roof conditions with the present method of mining, one crown, supported by two props at intervals of 3 ft. 9 ins. (i.e. half the depth of cut), should be satisfactory.

71. When starting off a new cross-cut or room a certain number of end props will have to be replaced by a crown running in the same direction as the level. Normally four such props will need to be replaced, though sometimes it may be necessary to replace five. If the roof is bad it may be necessary to use a steel girder instead of a wooden crown. The same process will have to be adopted when a cross-cut is about to connect through to a level. As this work will be additional to the normal work of timbering working places, and will also involve the removal of roof supports, it will be advisable to employ a pair of timbermen for it on a non-productive shift. The number of such replacements of props by crowns will be approximately eight for every set of rooms turned, i.e., an

average of just over one per day. On some days two such replacements will be required and this will be well within the capacity of one set of timbermen. When there is no such replacement work to be done the timbermen can be employed on replacing broken timber throughout the rest of the workings or on any other type of repair work, including the setting of extra timber at the ends of the rooms and cross-cuts after they are no longer required for flitting or conveying purposes.

Conveyor Extension.

72. This work will have to be done as soon as the timbering has been completed sufficiently to support the roof immediately over where the men responsible for it will be working. These men will have to make all preparations while the timbering is going on and should be able to load the necessary extension structure (troughing and chain) on to the timbering machine when it enters the working place for easy transport to the face. They can then proceed with the necessary cleaning up, breaking of the chain, &c., to enable the extension to be completed as quickly as possible as soon as the place has been made safe. The conveyor should be extended so that its tail end is approximately 6 ft. from the face before the cut is put in. This will bring it within reach of all the coal of the following cut, and at the same time leave room for manoeuvring the loader between the tail end and the corner of the new face on the same side of the working place as the conveyor. The men responsible for extending the conveyor should also extend the air duct and the water pipes, and this work also can be undertaken while waiting for the timbermen to get out of the way.

Flitting.

73. Quite obviously the minimum time possible should be spent on this work so that the maximum time is spent on productive work. For this purpose the operators of the various machines should know, and follow, regular flitting routes and obey certain rules of the road. For instance, an incoming machine should get out of the way for an out-going machine, either by getting into the side of the roadway, or in any case where there is not quite room for two machines to pass, by waiting at a branch road until the outgoing machine has passed. By this means the loading machine should never be held up in a working place because the phase immediately before loading is shot-firing, and therefore even when there are two working places in one level, there is no outgoing machine for it to give way to. In the event of the loading machine meeting one of the other machines on the level or elsewhere, it should take precedence over it. For the same reason where any of the machines have to cross the main trunk conveyor, which may be necessary to assist in turning when the trunk conveyor road is also used for flitting, a ramp should be constructed so that machines can cross the trunk conveyor with the minimum of interference with the conveying of coal. Also, all cables should be freed and any obstacles in the neighbourhood removed so that the operation of crossing can be carried out in the shortest possible time.

74. During flitting it will be the duty of one of the operators to see that the trailing cable is not dragged round corners, and where possible it should be coiled on top of the machine (in the case of those machines not provided with a cable reel) when travelling outbye and paid out behind when going inbye.

75. Owing to the fact that the majority of conveyor driving heads will be in use in or near the trunk conveyor road, the main transwitch units and switch hear for the conveyors will be kept in the supply level just outbye of the trunk conveyor. If the switch gear for the mobile equipment were also to be placed at this point the cables feeding this mobile equipment would have to have a maximum length of 220 yds. in the case of the top levels, and 190 yds. in the case of the bottom levels, and although the outbye portion of these lengths would remain in one place during the 21-day cycle, the moving on of these cables when the switch gear was advanced would still further complicate the work which would have to be carried out at that time. It would, therefore, be preferable to keep the switch gear for the mobile equipment in the centre of each set of levels just outbye of the flitting rooms and supply power to each group of this switch gear by means of one pliable armoured cable which will be extended by 40-yd. lengths until the main switch gear is advanced. The cost of this arrangement, including the cost of spare cables to lay in the new trunk conveyor road, will be less than the cost of the extra length of trailing cables.

76. It will be noted that in the case of the upper three levels this switch gear for the mobile equipment will be near the return end of the workings. We have given this matter full consideration and are of the opinion that in view of the large quantity of air which it is proposed to circulate through the Workings there is no objection to the proposal.

77. The crossing of conveyors by mobile machines has been discussed in paragraph 53. We would add here that when a machine has to go round a corner as well as across a conveyor, it should complete one part of the operation before starting the other. By this means crossing will be accomplished on a straight line at right angles to the conveyor, which willthus suffer the minimum of damage.

Conveyor Shifting.

78. In this type of layout, in which, as we have pointed out in paragraph 50, the need for a low percentage of extraction involves the use of a considerable number of conveyors for the output obtained, the work of shifting these conveyors is appreciable, and therefore it is necessary that this work, which will have to be carried out on a non-productive shift, should be organised as efficiently as possible and all reasonable labour-saving devices should be adopted. This need is further emphasised by the fact that there is no regular routine job to be carried out every day, and Schedule III., which shows the distribution of the various conveyor shifting operations throughout the complete cycle of 21 working days, shows that in spite of the partial staggering of the work

made possible by having the lower set of levels 12 ft. in advance of the upper set, on some occasions two conveyors must be shifted whereas on a number of other days no such work is required. If the necessary spare equipment, including cables, is obtained, so that these apparently idle shifts can be occupied in making the necessary preparations for the busier shifts, two men with a flitting truck should be able to complete the shifting of the room conveyors and trunk conveyors and the shortening of the level conveyors. The electrician and mechanic will be responsible for advancing the switch gear and cables, and for the latter assistance will have to be obtained from two labourers who have been allocated to the non-productive shift. For the purpose of extending the main belt the further assistance of the two timbermen can also be obtained as this operation will only occur once every 21 days.

79. The extension of the main belt conveyor can be facilitated by having the necessary extension structure brought in at the rate of 12 ft. per day and placed in readiness on the upper side of the main level (the scraper conveyor will be on the lower side). If the scraper feeder and the receiving end of the belt are built on skids they can be pulled on to their new position by a small winch, after which the extension structure and belting can be inserted in the usual way. This work will require the assistance of the timbermen and labourers, as stated in paragraph 78.

80. To ensure that the extension is carried out in the same straight line as that in which the remainder of the belt is running, the new position of the receiving end, and of the extension structure, will be determined by plumbing from a sight line on the roof. The sight line will be kept up-to-date daily in the face of the level, checked at frequent intervals (not less than once per week) by the surveying staff at the mine, and replaced whenever it becomes obliterated. The sight line will be at the centre of the roadway so that there is adequate room on both sides for cleaning and inspection, for the replacement of broken timber, and for extending the conveyor without dismantling the whole of the scraper conveyor on the bottom level. The latter will be on the lower side of the road so that a transverse chute will be required for delivering the coal onto the scraper feeder. Cleaning and inspection of the belt conveyor will also be facilitated if the receiving end and the extension structure are elevated 9 ins. above floor level.

81. With a belt conveyor several hundred yards long there is a tendency when the belt is broken for the two halves to fly apart even though the tension has been released, and in order to ease the problem of joining the two halves up again after the extension has been made, both top and bottom strands of belt should he held in position by a clamp just outbye of the joint where the belt is to be broken, until the new piece of belting has been inserted. The additional pieces of belting will be in standard lengths equal to slightly less than twice the amount of travel on the loop take-up. For ease of handling, 100-ft. lengths of belting with a 20-yds. travel on the loop take-up are recommended. We recommend the use of plate hinges for connecting lengths of belting together.

82. A roll of this length of 7-ply belting will have a diameter of the order of 4 ft. 6 ins. to 5 ft. 0 ins., and this will require, in any event, a special trolley for its conveyance. We recommend therefore that a special trolley should be constructed having a hand-operated winch with a small diameter drum on which the belting can be rolled.

83. As mentioned in paragraph 78, the shifting of the switch gear and cables to supply power to the various conveyor motors will be the responsibility of the electrician and mechanic on the non-productive shift. In order to keep the length of cable between switch gear and motors as short as possible the switch gear will be kept close up to the trunk conveyor. The cables will consist of 0.06 sq. ins. pliable armoured cable made up into standard lengths of 40 yds. with coupling plugs at each end. Such lengths will be light enough to be handled by four men, of whom one will have to see that the trailing plug is not allowed to drag on the ground. As stated in paragraph 78 the provision of a number of spare lengths of cable for installation in the new trunk conveyor road before they are actually required for use will reduce the amount of work involved at the time of the change-over itself.

84. In order that the work of advancing the transwitch units and main banks of switch gear for the conveyors and fans may be facilitated these should be mounted on trolleys and the supply track should be kept laid right up to a point immediately outbye of the rooms which are being used for flitting the mobile machines. A double track should be laid at this point to facilitate the bringing in of supplies past this switch gear. One pair of rails will have to be omitted where the supply track crosses the trunk conveyor and this will have to be placed in position immediately before the switch gear is advanced.

85. The switch gear will consist of two 200-k.V.A. transwitch units each connected to seven 80-amp. gate-end boxes. Normally one transwitch and one bank of four gate-end boxes will supply the power requirements in the top three levels and one in the bottom three levels. At the time when the bottom set of switch gear is advanced to supply the conveyors in the bottom levels in their new position power will still be required at the bottom of the old trunk conveyor road to drive the bottom half of the old trunk conveyor, the scraper feeder, and the outbye scraper conveyor on the main level, The first of these three motors will, for the following 24 hours, be supplied from the top set of switch gear while the other two will be supplied from its own switch gear via the cable length laid in the bottom level, which has previously been carrying power from the old trunk road to the room turned off the bottom level. When the top set of switch gear is advanced 24 hours later the bottom half of the truck conveyor will no longer be required, but the other two conveyor motors in this neighbourhood will continue to be supplied in this position from the inbye trunk road until the main belt conveyor is extended.

86. When the transwitch,unit is advanced from one position to the next it will, of course, require an additional 821- yds. of high-tension cable on its outbye side. For this purpose three 30-yds. lengths of high-tension cable, complete with couplers, will have been laid in position and coupled together in advance and will only have to be inserted between the old length and the transwitch in order to make power available to the latter. When the total number of these short lengths of high-tension cable immediately outbye of the transwitch unit reaches nine they should be replaced by a 250-yds. length which will be brought in on a cable drum on the supply road. The short lengths will then be taken out of use, uncoupled, tied into the side of the roadway in such a way that they cannot get damaged by passing traffic, and carried on one at a time as required.

87. In addition to the distinguishing marks required by the Coal Mining Acts, all trailing cables should also have their lengths and sizes marked on them to facilitate the use of the correct cable for any particular purpose. The most satisfactory way of marking cables is by stamping the couplers at the ends.

88. The various cable sizes are specified in Plate 5 and also in Schedule I., which shows the quantity required for the first bulk instalment. After this first instalment only high-tension extension cable for panels further to the Dip will be required.

Ventilation.

89. The ventilating system is shown on Plate 2. The current will enter the mine through two main intake airways, one of which will be the coal-haulage roadway and the other the new man-riding roadway. A portion of it will then enter the main working panel via the uppermost of the three lower levels, after which this portion will split into three approximately equal parts one in each of the three lower levels. (The lowest, or main level, though connected to the main haulage road will not be used as a main intake over the extreme outbye length owing to the desirability of reducing the wind velocity in the neighbourhood of the loading point and surge bin.)

90. At the face the current will be directed into the last set of completed rooms in the lower half of the workings, and then via the last completed cross-cut to the last set of completed rooms in the upper levels. For this purpose it will be necessary to erect temporary doors on the supply level and also on the lowest of the three return levels and sheets on the trunk conveyor road as shown in Plate 2. It will also be necessary to seal off all cross-cuts once they are no longer required for coursing the air through the workings or conveying coal or supplies. For this reason these cross-cuts will be driven only 9 ft. wide so as to facilitate the erection of good stoppings.

91. The faces of the levels themselves and of the rooms and cross-cuts being turned off them will have to be ventilated by the use of either brattice partitions or ventilating tubing. From the point of view of diluting inflammable gas it would be quite sufficient to course the wind through all the working places, but in order to give each working place a supply of fresh air as free as possible from the contamination of the fumes of shot-firing and dust from other working places, it will be preferable to bleed off a certain quantity of air to each room from the main current. To achieve this object and ensure a sufficient velocity in each working place to maintain satisfactory comfort conditions, we recommend that independent ventilation should be provided for each room by means of auxiliary fans and canvas air tubing. All these fans should be situated in the main air current so as to ensure that as far as possible they are blowing fresh air into the workings. The tubing should be suspended near the roof on the side furthest from that on which the room conveyor is situated so as to reduce the amount of dust raised by the tipping of coal on to a conveyor.

92. The other portion of the main air current which comes down the two intake tunnels will be used for ventilating the development work further to the Dip. In order to keep this current completely separate from the main ventilating split it will be necessary to construct two air crossings through which the return air from the development area can be conveyed to the return airway on the far side of the main haulage tunnel. The amount of wind required to ventilate this development area will be very much less than that required in the main working panel, and in order to keep the full benefit of the two return airways running parallel with the two main intakes it will be necessary to construct two further air crossings just above the main production panel so that the load on the two return airways can be equalised. Thus it will be necessary to construct four air crossings initially, though subsequently for panels further to the Dip only two crossings will be required for each pair of panels.

93. The relative resistances of the two circuits will vary according to the distances which the main production panel has travelled from the main haulage, but the resistance in the development area is likely to be always considerably less than that in the main production panel, and for this reason regulators will be required in the return from the development area. These regulators should be situated as near as possible to the junction with the return from the production panel.

94. The concentration of the workings which is involved in this proposal will result in a smaller quantity of air being required for ventilation purposes and it is provisionally estimated that some 60,000 cu. ft. of air per minute will be required in the main production panel, and 20,000 cu. ft. per minute in the development area. Allowing a further 20,000 cu. ft. per minute for leakage this will give total requirements of 100,000 cu. ft. per minute compared with the 140,000 cu. ft. per minute which the fan is passing at present. The paralleling of the two return airways as recommended in paragraph 92, and the paralleling of the intakes and returns in the main production panel, should ensure that the resistance of the mine is no greater than at present in spite of this concentration of workings, and therefore it is probable that the fan can be slowed down and an appreciable saving in power obtained.

Dust Suppression.

95. There is already in existence a water reticulation system consisting of 11-in. diameter pipes laid into each road, and a similar system must be maintained in all the working places and advanced regularly so that the length of hose required to connect from the last pipe to the face is not more than 60 ft. Water should be applied for dust suppression purposes in the following ways :—

(i.) When Coal Cutting.

The most effective method of dust suppression during cutting at a horizon above floor level is to take the water in through the jib to a point at the back of the cut from which it will be brought out by the outgoing chain cuttings, and in the process will become intimately mixed with the cuttings themselves. The application of water to the ingoing chain in the case of a horizon above floor level is much less efficient, and a large proportion of the water so used is not, in fact, effective in suppressing dust. Although with a simple arc-walling machine it is possible to supply the water to the jib via a system of pipes forming part of the machine through the driving shaft of the cutter chain sprocket, and thence via a water swivel to the interior of the jib, this will not prove so easy in a universal type machine and it will probably be necessary to connect the hose direct to a pipe leading into the jib.

(ii.) *Immediately Prior to Firing.*

The face and gummings should be sprayed so as to lay any dust that would otherwise be projected into the air current by shot-firing.

(iii.) *When Firing.*

During firing operations the water hose should be connected to a pipe on which about 10 sprays are mounted so as to project a curtain of mist some 6 yds. back from the face which will catch a considerable proportion of the dust raised during the process of shot-firing. Such a spray should be attached by a suitable clip to one of the sets of timber in such a way that the curtain is projected across the roadway.

(iv.) *During Loading.*

Most loading machines are provided with water sprays at strategic points, and although they cannot hope to lay all the dust, and a good deal of the water is inevitably used in wetting large lumps of coal, for the best results two should be mounted on to the loading head in such a way that they can wet the pile of coal that is being loaded, and two on the underside of the delivery jib, so as to wet the dust as it leaves the jib and falls on to the conveyor. These sprays will contribute, to some extent, to the satisfactory solution of the dust problem.

96. If adequate dust suppression measures are applied during the above three operations it should not be necessary to install further sprays at transfer points or at the main loading point, in spite of the large tonnage to be handled at the latter. Properly constructed transfer chutes should, however, be fitted to all driving heads to reduce dust production and degradation as much as possible. If experience indicates the need for sprays also at these points, this will of course present no difficulty.

97. The efficiency of the dust suppression system will obviously depend very largely on the proper maintenance of the various appliances provided, and for this reason it is most important that the various jets and sprays should not be allowed to be blocked up by particles of coal or any other matter, and that when they do become blocked up the blockages should be promptly cleared. Filters should be installed on the supply side of every jet, or, in the case of a loader which may be fitted with several jets, then on the supply side of the machine. At least one type of filter suitable for this work is available ; the chief requirements of such filters are that they should be efficient in operation without involving excessive back pressure (a pressure of 25 lbs. per sq. in. is desirable at the coal cutter jib), and so constructed ghat they will not pass water when the filter is removed.

98. We have considered the question of introducing a wetting agent into the water supply pipe line so as to limit the amount of water which must be used for dust suppression purposes. Since, however, the major proportion of the small coal will be used for steam raising, for which purpose this type of coal requires a considerabi amount of conditioning with water, and since the requirements of the coke works can be met from, he hand-filled coal from No. 1 Tunnel, we do not consider that the use of a wetting agent will be i., ecessary at the present stage.

Lighting.

99. Most mobile loading machines are provided with self-contained headlamps, and if these can be maintained in proper order without undue expense they should be so maintained. They are not, however, placed in such a position that they can give really satisfactory illumination at the coal face, and frequently considerable portions of the face are shaded by large lumps on the gathering head. If they are supplemented by well-maintained cap lamps carried by the machine operators, adequate illumination at the coal face should result. A mains lighting supply from a lighting transformer should be provided along the main and supply levels and at the intersections of the levels with the trunk conveyor road.

Man-Riding Facilities.

100. In paragraph 12 we recommended that a man-riding haulage should be installed to enable the main haulage system to operate continuously on coal throughout the shift, It will also have the advantage of conserving the m en's energies for productive effort and lengthening the portion of the shift during which they are available for work. This man-riding haulage engine should be continuously manned, both during the productive shift and back shift. The driver on the productive shift should be responsible for the maintenance of the rollers on the endless haulage turn at the top of the tunnel, and the driver on the afternoon shift will also be available for other duties, such as acting as telephone attendant, emergency storekeeper, &c.

101. It is possible that the extension towards the surface of the parallel intake dip in which we have proposed that the man-riding haulage should be installed will involve driving through bad ground. For this reason it is desirable that work on this extension should be started immediately, as although it would be quite simple for the men to walk down a short inclined adit to reach the outbye end of this haulage road; this man-riding haulage should also be used for the transport of supplies and the handling of material will be very much simplified if the roadway is continued to the surface.

Maintenance.

102. It is of the utmost importance that all the machinery involved in this mechanization scheme should be regularly and thoroughly maintained and overhauled. As far as routine maintenance is concerned the electrician and mechanic on the back shift will be responsible for the lubrication of all the machinery under their charge, and a report confirming that this work has been completed should be made out by one of them at the end of every shift. They should also replace any worn or missing picks in the coal-cutting machine, and check up on the tensioning of the cutter chains and the conveyor chains of the loader. They should not be required to carry out major repairs on any of the machines as these must obviously prejudice the routine maintenance work. Such emergency repairs must be dealt with either by bringing down fitters from the surface, or, if the trouble is serious, by taking the machine out of production and subjecting it to a thorough overhaul.

103. Each machine should have its own identification number and at the end of every shift the operator of that machine should report in a book provided for the purpose the number of tons cut or loaded as the case may be. This will facilitate a decision as to when a particular machine is due for overhaul and the mechanical engineer at the mine will be responsible, under the Manager, for seeing that machines are, in fact, given their overhaul at the due date, or earlier if other circumstances, such as its observed condition or the need to transfer it to development work in the near future, demand it.

104. All conveyor drive heads must also be overhauled at regular intervals, and although there will be a few occasions when all drive heads except one will be in service, the periods during which this will not be the case will be long enough to ensure that such regular overhauls can be carried out. For this purpose a rota system should be drawn up providing, for instance, that every high capacity drive head on coming from the surface after being overhauled should be installed on the outbye conveyor of the trunk conveyor road (in which position it will have the greatest load placed upon it), after which it would be transferred to one of the main level conveyors or to the upper half of the trunk conveyor according to which had been longest in service. *A* similar rota should be arranged for the smaller conveyors used for driving the rooms and crass-cut.

105. Provision for the necessary spare drive heads and other conveyor structure has been made in Schedule I., as has also a spare driving head, receiving end, and ioop take-up for the main belt conveyor. The latter will be available for stand-by purposes and also for the transitional period when changing over from one panel to another.

106. Trailing cables also should be marked with their identification numbers so that they, too, may be sent out regularly for testing and repair. This is already required by the Coal Mines Acts.

107. To assist in the efficient carrying out of •.,:ny minor underground repairs, a small prefabricated fitting shop containing a bench with vice r,nd the necessary hand tools, such as breast drill, punches, spanners, &c., should be erected at a suitable point, say in the mouth of a room near the inbye end of the supply road, and advanced from time to time.

Supplies.

108. All routine supplies, such as timber, r Es, conveyor extension material, oil, stone dust, and stemming, will be sent down on a daily sum- y rake on the man-riding haulage system towards the end of the productive shift and taken on ; the district supply haulage at the beggінning of the following shift. Since some difficulty may oe experienced in taking 14-ft. crowns round right-angle bends without unloading them, particularly when turning from the supply level into the narrow cross-cut, four men have been allocated for the work of handling these supplies on a non-productive shift. These men will be responsible for taking the supplies on beyond the end of the supply track with the help of the timbering machines and/or the supply truck to suitably placed supply dumps, such as timber dumps at the points of intersection of rooms and levels, from which the timbermen can collect props and crowns as required.

109. In view of the fact that most of the material which will have to be sent down the mine via the supply haulage system will consist of timber varying from 8 to 14 ft. in length, the provision of special trolleys is desirable. Special man-riding trolleys should also be constructed for the

conveyance of men over this haulage system. As explained in paragraph 63 it may also be necessary to provide a special explosives car but this will have to be sent in earlier in the productive shift so that it can be unloaded and its contents used before the end of the shift. It is therefore open for consideration whether the gauge of this system should be retained at the standard 2-ft. gauge in use throughout the rest of the mine or increased to 3 ft. which is more in conformity with modern practice and can be expected to provide safer and more reliable transport. If it can be established that this haulage system will not be required for the transport of coal or stone, we recommend that the gauge should be so increased. It will be seen, however, in paragraph 116 that the possibility of having to draw some coal from the development area over this haulage system must also be considered and if this should be the case then clearly it would be necessary to adhere to the standard gauge of 2 ft.

First-Aid Facilities.

110. A site for a suitably equipped ambulance station should be decided upon by the Manager and' kept advanced close to the face.

Fire-Fighting Facilities.

111. The introduction of a large number of electrically-operated machines, together with the necessary cables and switch gear, must obviously increase the risk of underground fires. This risk can be reduced by proper selection and maintenance of electrical equipment but it would obviously be wise to take the further precaution of establishing fire-fighting facilities by the provision of hoses and suitable connections to the dust suppression water supply system.

112. We recommend therefore that tee-pieces with suitable stop-cocks and fittings should be included in the pipe-lines at specified intervals, say every 82i yds.

Dip Development.

113. The exact life of a panel, as described in the preceding paragraphs, will depend on any arrangements that may be made between the State Mine and the Bowen Consolidated Mine, for further readjustments of boundaries, and also on the presence or absence of any faulting which may be encountered. On the assumption, however, that each panel can advance a distance of some 1,000 yds. from the main haulage road, the life of a panel will be approximately one year, and therefore every two years it will be necessary to advance the main dip by a sufficient distance to enable a new panel to be formed on either side, i.e., by some 200 yds. This is not, by any means, a rapid rate of advance and should be achieved without any difficulty.

114. During the life of the first panel, however, no dip development work will be required as it has already been done and the only development work for the second panel will be the formation of the necessary levels and rooms and the drivage of the necessary levels to a distance at which they are long enough to install the various conveyors. On the assumption that the next panel to be worked after panel " A " will be panel " B," the amount of drivage required for this work will be approximately 1,330 yds.

115. In order to allow plenty of time for the construction of air crossings, initial installation of conveyors, &c., this amount of drivage should be completed in nine months, say, 180 working days, which means that the average rate of advance must be 71- yds. per day. This rate of progress in roadways 6 yds. wide will yield 135 tons per day, which added to the 720 tons which it is proposed to obtain from the main production panel, gives a total output of 855 tons to be hauled to the surface. This, it will be seen, is in excess of the figure of 800 tons which has been assumed as the maximum daily capacity in paragraph 12. As we stated in paragraph 13 we consider that further investigation of the operation of this haulage system is required, and it may be that it will be found possible to increase its capacity so that 850 tons per day can be satisfactorily hauled to the surface over it. If this is not so, however, it will be necessary to arrange that this development coal should either be stocked in skips underground during the day shift and brought to the surface and tipped during the non-productive shift, or be brought to the surface during the day shift via the man-riding and supplies haulage, and then taken across to the screening plant by the surface haulage system as is already done with coal coming up the main tunnel.

116. The capacity of the surface haulage can be increased, and if the development coal is fed on to this haulage in a systematic manner—for instance, if one skip of development coal is fed on to this haulage after every third pair of skips from the main tunnel—the balance of the system will be maintained.

117. The first alternative, namely of handling the development coal on a second shift, will require the provision of more skips than the second alternative, and if the demands of. No. 1 Tunnel will result in these extra skips not being available then the second alternative will be preferable. If, for any reason, the first alternative is chosen the hours of work of the haulage men involved in the development area and at the loading point of the main production panel should be so staggered that loading can continue throughout the full shift. By this means as much as possible of the total output can be handled on the day shift, and the surplus, which will have to be handled on the second shift, will be reduced to a minimum.

118. It would be wise to postpone a decision on which of these alternatives is preferable until after the further investigation into the operation of the main haulage system, which we have recommended in paragraph 13, has been completed. However, in making our estimate of the number of men required, as set out in Schedule II., we have assumed the second alternative, namely, that coal from the development area will have to be brought to the surface via the man-riding haulage system.

119. A daily output of 135 tons will not justify the purchase of a mobile loader as the output can be loaded satisfactorily by two scraper loaders at approximately half the capital cost. If short-wall coal cutters were used to prepare coal for these loaders they would cost rather more than one mobile cutter of the type which it is proposed shall be used in the main production panel, and therefore we recommend the use of a mobile coal cutter in this development work. In order to keep the scraper loader as close up to the working face as possible we recommend that it should be followed up by a scraper conveyor which will bring the coal back to a loading point where it will be delivered into skips. Two conveyors with a total maximum length of 160 yds. will enable all the coal to be loaded on the main supply level of this development panel. From this level the skips can either be pulled up the man-riding haulage road or fed on to the main endless haulage system.

120. The scraper loaders and conveyors can also be used in the necessary stone work for making air crossings, loading points, &c. The new equipment required for this development work is listed in Schedule I., and in addition to this, use could be made of one of the existing 50-h.p. subsidiary haulages. The manpower requirements for this development work are shown in Schedule II., from which it will be seen that the total number is 14.

121. As stated in paragraph 92, the ventilation of this development work will be by a separate split from the main production panel.

Power Requirements.

122. The total horsepower of the various items of underground machinery contained in our proposal is approximately 900, and a further 150 h.p. will be required for the man-riding and supplies haulage which will be situated on the surface. Although the load factor of the system will probably be low—not more than 55 per cent.—there may well be occasions when all the mobile machines and approximately half the conveyors are working at or near full load, and therefore the maximum extra demand on the powerhouse as a result of this mechanization scheme may be of the order of 600 kilowatts. This extra load cannot be carried by the existing generating plant even after the installation of the Chillagoe boilers, which we understand is being put in hand.

123. We have already recommended in a memorandum dated 20th February, 1950, that either the best Maryborough unit or the best Townsville unit should be transferred to Collinsville as soon as it becomes redundant, and that the Townsville unit would be preferable owing to the fact that it is approximately twice as large as the Maryborough unit and is, moreover, a more efficient unit. At present it appears as if the Maryborough unit could be installed by June, 1951, and the Townsville unit by January, 1952, at the earliest. The preparation of the first mechanized panel, the ordering and installation of the equipment, and the training of the staff concerned in its operation and maintenance, is likely to be complete before June, 1951, but it could be before January, 1952, and for this reason, unless the programme of the State Electricity Commission is altered, we recommend that the Maryborough unit should be installed.

124. Whichever unit is, in fact, installed, there will be insufficient stand-by capacity to allow normal production to continue if the unit is taken out of service, and although satisfactory overhauls could be undertaken during the Christmas holiday period, any breakdown would involve the need for spreading the load by transferring some part of the production to the afternoon shift in order to avoid loss of output.

Manpower.

125. The numbers of men required for the various processes described above are summarised in Schedule II., from which it will be seen that 48 will be required underground on the day shift and 16 on the back shift, a total of 64 altogether. The total output to be obtained should average 820 tons, giving an output per manshift underground of 12.8 tons. It will, of course, be necessary to make allowance for a certain amount of unavoidable absenteeism and extra men will have to be allocated to the mine for this purpose.

126. We estimate that the total number of men on the surface that will be required to handle the coal (assuming that it is all tipped during the day shift), and to maintain the equipment in good order will be 34, making a total of 98 men allocated to this Tunnel. This will give an average O.M.S. overall of 8.4 tons.

Operating Costs.

127. Estimated operating costs are shown in Schedule IV. To obtain the labour cost we have assumed that the average cost of employing a man is £3 3s. Od. per day, inclusive of wages, pay-roll tax, holidays, sick pay, workers' compensation insurance, and pensions, but not long-service leave, for which we have made a separate allocation, and divided this figure by 8.4, the estimated average O.M.S.

Capital Cost.

128. The total capital expenditure required, excluding that involved in increasing the capacity of the power station, is approximately £178,500. We have not attempted to estimate the capital cost per ton, but in Schedule IV. we have classified the various items of capital equipment according to the number of years' life which can safely be assumed for the purpose of writing off the expenditure incurred.

129. In making these calculations we have given careful consideration to all the relevant factors and we are of the opinion that with proper organisation these results should be attainable. Some of the most important aspects of organisation are discussed in the following paragraphs.

Training.

130. An essential part of this organisation referred to above, without which full co-operation cannot be expected, is the adequate training of all personnel in their respective duties. The premature installation of machinery without such training will lead to unnecessary hold-ups in the early stages of production and consequent low standards in subsequent operations.

131. We recommend therefore that all workmen who will be concerned in this scheme should receive not only written instructions, supplemented by oral explanations, as to their various duties, but also practical training on the surface in the operation, handling, and maintenance of the various machines. For this purpose the first machine or piece of apparatus of each type should be left on the surface of the mine for a definite period, say one month, in order that the operators may become thoroughly accustomed to handling them under daylight conditions before attempting to do so underground. These daylight conditions should simulate underground conditions as closely as possible as far as manoeuvring space is concerned, by the erection of posts according to the timbering rules, and the formation, with these posts, of roadways of the dimensions proposed in this scheme.

Supervision.

132. No scheme of this kind can be successful without proper supervision, for the purpose of ensuring safety, continuity of operations by following the correct routine, the most appropriate modification of the latter should unforseen circumstances arise, and discipline, upon which both safety and efficiency depend. It is obvious that those who are to supervise must recieve an even more thorough training than the workmen under them in the use of the proposed macchinery, so that they can ensure that correct practice is followed after the machinery has been installed.

133. The proposed scheme involves the use in fairly large quantities of a number of items of consumable stores, such as shot-firing cable, water hose, sprays, hinges for brattice doors, and drilling bits, which will have either a utility or souvenir value outside the mine, especially during the early stages. It will be an obvious duty of the supervisory staff to keep the consumption of such items to the minimum necessary for efficient coal production.

Routine.

134. In addition to the proper maintenance and lubrication of machinery mentioned in paragraph 103, there are other operations, which, though not spectacular, have an important contribution to make to the success of the whole scheme. These include the driving of roadways correctly to point or sight line, the maintenance of the correct sequence of cutting, firing, loading, and timbering, the regular recording on large-scale plans of the daily advance, the making of adequate reports on the shift's work, in particular drawing attention to any weaknesses in the organisation which have shown themselves during the past 24 hours, and the carrying out of systematic time study work to help in finding out these weaknesses. The latter subject deserves some extra comment.

135. Accurate time studies of various operations enable the Management to have a record of the proportion of any shift during which a particular machine is doing its work, the extent of any delays, and the reasons for them. In the initial stages such time studies are liable to be resented by the men operating the machines, but if it is explained to them that the object is not so much to check on whether they are doing their work (a check which will be provided in an efficient system by the amount of coal produced) as to check on the efficiency of the organisation, for which the Management is primarily responsible and if, furthermore, they are allowed to have access to the information obtained, they will quickly learn to appreciate its value.

136. In order to establish a satisfactory routine it is obviously necessary that every workman should have a clear knowledge of his duties, and that the Overman and Deputies should also have a clear knowledge of the duties of the workmen under them and are in a position to give any necessary instruction which may be required beyond what has already been given during the training period mentioned in paragraph 131.

137. We should perhaps add that we consider that the allocation of men to the various jobs involved should rest with the Management in regard to both the filling of regular positions and the replacement of absentees by " floaters " or other temporary labour.

Method of Payment.

138. Although initially all the men engaged in this mechanized portion of the mine will have to be paid on a day-wage basis, we recommend that as soon as possible some system of incentive payment should be instituted. If it is not, then when the coalfield becomes entirely mechanized, which will probably be at a not much later date, it will be too easy for the pace to drop to that of the slowest worker. Initially there will probably be some competition for employment in this mechanized section and that will be the time to establish a proper system of incentive payments.

CONCLUSIONS.

139. The target which we have set requires high standards for its attainment, but no higher than are justified by the exceptionally good natural conditions at Collinsville and the high capital expenditure which we are recommending. Success can only be achieved by a combination of proper organization and full co-operation. The workmen have an obligation to provide the latter, and to refrain from restrictive practices, which should be fought in a determined manner if ever any attempt is made to establish, them. In return they are entitled to the former, and to some grounds

for confidence that the work has been thoroughly planned, and that any difficulties which may be met will be energetically tackled. It is suggested that as a step towards creating such confidence, copies of this document, or the greater part of it, should, at the appropriate time, be made available to them.

140. In a mechanized scheme on such a scale, the necessity for such full co-operation is far greater than with hand mining, and the effect on output of the defection of a small number of men is out of all proportion to the number of men involved. It is therefore necessary to ensure that the workmen concerned are not allowed to labour under a sense of grievance, and such grievances should be removed if they are genuine or discredited if they are not. Furthermore the rapid turn-over of labour which already causes the Management some concern even with the present comparatively simple methods of mining will present a really serious problem when men have to be thoroughly trained to operate and maintain expensive machinery. Every effort should therefore be made to ensure that good quality labour is attracted to the coalfield and encouraged to remain there.

141. It is generally accepted that there is room for considerable improvement in the provision of amenities at Collinsville, and although it is impossible to remedy immediately all the defects, the psychological effect of making an early start on certain projects designed to improve the conditions of living would be considerable, and we therefore recommend that a definite programme and time-table for this work should be drawn up. Its contents should be made known to the employees, and as a token of further improvements this programme should be put in hand during the stage of preparing the underground workings for the mechanization which we have proposed.

142. We are certain that unless the workmen can see by such action that the same attention is being paid to their living conditions as to their working conditions, the chances of success of this or any other mechanization proposal are remote.

SCHEDULE I.

EQUIPMENT TO BE PURCHASED FOR PROPOSED MECHANIZATION SCHEME, INCLUDING SPARE UNITS.

A. MAIN PRODUCTION. PANEL.

Number and Description of Equipment.	Approximate Price. £	£	
Machinery.			
3 Mobile loading machines	15,000		
3 Mobile coal-cutting machines	15,000		
3 Mobile timber-setting machines	17,000		
5 Drilling machines	400		
1 Flitting Truck	2,000		
1 36-in. Belt conveyor, 800 yds. long	20,000		
1 Spare drive head, with motor, receiving end, and loop take-up, for above	2,300		
1 36-in. Shuttle conveyor, 20 yds. long	1,500		
12 High-capacity drive heads and motors for scraper chain conveyors	12,000		
12 Tail ends for above	1,200		
1,100 yds. Intermediate chain and troughing for above	16,500		
7 Low-capacity drive heads and motors for scraper chain conveyor	4,000		
7 Tail ends for above	500		
200 yds. Intermediate chain and troughing for above	4,000		
12 5-h.p. Fans	1,800		
700 yds. Canvas ventilating tubing	1,000		
1 150-h.p. haulage	7,500		
Total Machinery		121,700	
Transformers, Switch Gear, &c.			
2 High tension isolating switches	400		
4 200 k.V.A. Transwitch units	5,600		
26 80-amp. gate-end switches	2,600		
15 15-amp. switches	110		
3 Lighting transformers	300		
120 Lighting fittings	800		
4 Drill control panels	300		
Total Transformers, Switch Gear, &c.	10,110		
Cables.			
3,300 yds. 0.1 sq. in. D.W.A.P.I.L.C. 3-core 3.3 kV.	5,400		
40 yds. 0.4 sq. in. D.W.A.P.I.L.C. 3-core 660 v.	100		
320 yds. 0.15 sq. in. Pl.A.T.R.S. 4-core 660 v.	650		
270 yds. 0.06 sq. in. D.W.A.P.I.L.C. 3-core 660 v.	350		
150 yds. 0.01 sq. in. D.W.A.P.I.L.C. 3-core 660 v.	120		
1,640 yds. 0.06 sq. in. P1.A.T.R.S. 4-core 660 v.	2,000		
1,400 yds. 0.0145 sq. in. Pl.A.T.R.S. 3-core 660 v.	1,000		
4,000 yds. 7/0.036 S.W.A.P.I.L.C. 2-core 250 v.	1,400		
450 yds. 0.06 sq. in. Trailing 5-core 660 v.	800		
450 yds. 0.0225 sq. in. Trailing 5-core 660 v.	400		
800 yds. 0.007 sq. in. Trailing 5-core 660 v.	600		
200 yds. 0.01 sq. in. Trailing 5-core 250 v.	100		
Cable boxes, T-boxes, couplers, &c.	1,000		
Total Cables		13,920	
Total for Production Panel			145,730

B. DEVELOPMENT AREA.

Number and Description of Equipment.	Approximate Price. £	£	£
Machinery.			
2 Scraper loaders ..	2,500		
1 Mobile coal-cutter ..	5,000		
2 Drilling machines	160		
2 Low-capacity drive heads and motors for scraper conveyors ..	1,200		
2 Tail ends for above	150		
160 yds. Intermediate chain and troughing for above	2,400		
2 Fans	300		
100 yds. Canvas ventilating tubing	150		
Total Machinery ..		11,860	
Transformers and Switch Gear.			
1 High tension isolating switch ..	200		
1 200 k.V.A. Transwitch unit	1,400		
7 80-amp. gate-end switches	700		
3 15-amp. switches	25		
2 Drill control panels	150		
Total Transformers and Switch Gear		2,475	
Cables.			
300 yds. 0.1 sq. in. D.W.A.P.I.L.C. 3-core 3.3 kV.	500		
160 yds. 0.06 sq. in. P1.A.T.R.S. 4-core 660 v. ..	200		
240 yds. 0.0145 sq. in. P1.A.T.R.S. 3-core 660 v.	170		
300 yds. 0.06 sq. in. Trailing 5-core 660 v. ..	530		
300 yds. 0.0225 sq. in. Trailing 5-core 660 v. ..	270		
150 yds. 0.01 sq. in. Trailing 5-core 250 v.	75		
Cable boxes, couplers, &c. ..	100		
Total Cables ..		1,845	
Total for Development Area ..			16,180
Initial spares, approximately 5 per cent.			8,090
			170,000
Contingencies 5 per cent.			8,500
			£178,500

(*Note.—Cable* prices are subject to fluctuation, depending upon the current prices of copper and lead. In the above schedule generous allowances have been made to cover maximum prices.)

SCHEDULE II.

MANPOWER REQUIREMENTS.

Day Shift—	Per Unit.	Total for Panel.	
A. Main Production:Panel-			
Cutters and Drillers ..	2		
Shotsman and Assistant	2		
Loader Operators	2		
Conveyor men ..	2		
Timber men ..	2		
Deputy ..	1		
	11		
Two (2) units		22	
Loading point, clippers, and traffic chargemen		5	
Overman		1	
Mechanic and Electrician		2	
Surveyor's Assistant ..		1	
Process Study ..		1	
Stoppings, doors, &c.		2	
			34
B. Development Area—			
Cutters and Drillers .		2	
Deputy-shotsman and Assistant		2	
Loader Operators		2	
Timbermen		2	
Loading point ..		1	
Rope Attendants		5	
			14
Afternoon Shift—			
Track layers		2	
Supplies		4	
Timbermen		2	
Deputy ..		1	
Engine Driver ..		1	
Conveyor shifters ..		2	
Mechanic and Electrician		2	
Labourers ..		2	
		—	16
Total Underground ..	..		64
Average Output	.. 820 tons.		
Average Underground O.M.S.	.. 12.8 tons.		

Surface-	Per Unit.	Total for Panel.
Haulage and Coal Handling (including weighing) ..	13	
Tradesmen ..	14	
Labourers	4	
Stores and Clerical	3	
Total Surface		34
Total Labour. .		98

Average Output .. 820 tons.
Average O.M.S. overall .. 8.4 tons.

SCHEDULE III.

SEQUENCE OF OPERATIONS IN SHIFTING CONVEYORS, CABLES, AND SWITCH GEAR, AND SPECIAL TIMBERING WORK ASSOCIATED THEREWITH.

(The letters and numbers of the conveyors are those marked on Plate 3).

SHIFTING WORK REQUIRED.

Number of Day in Complete Cycle.	Conveyors.	Switchgear and Cables.	Special Timbering Required.
1	Advance conveyor drive heads R.1 and R.2, leaving tail ends available nearby	Insert extra 40-yd. lengths of 0.06 sq. in. Pliable Armoured cable on First and Second levels	Timber R.4 and R.5
2	Advance conveyor drive heads R.4 and R.5, leaving tail ends available nearby	Insert extra 40-yd. lengths of 0.06 sq. in. Pliable Armoured cable on Fourth and Fifth levels	
3	Stack L.6 structure and clean up ..	General Maintenance	
4	Change drive head on R.1, 2, 3, 4, or 5	General Maintenance	
5	Available for work in development area	General Maintenance	
6		General Maintenance	Timber for R.3
7	Install R.3	General Maintenance	Timber for R.I and R.2
8	Advance R.1 and R.2 drive heads and tail ends	Insert extra 40-yard lengths of 0.06 sq. in. Pliable Armoured cable on First and Second levels	Timber for R.4 and R.S.
9	Advance R.4 and R.5 drive heads and tail ends.	Insert extra 40-yd. lengths of 0.06 sq. in. Pliable Armoured cable on Fourth and Fifth levels	
10	Install L.7. Bring on Spare T conveyor structure.	General Maintenance	
11		General Maintenance	
12	Lay spare T conveyor structure	Lay extra 30-yd. lengths of H.T. cable in supply level	
13		Lay spare cables in new trunk road	
14	Advance R.2 drive head, leaving tail end available nearby	Insert extra 40-yd. lengths of 0.06 sq. in. Pliable Armoured cable on Second level	Timber for R.2 and R.1.
15	Advance R.1 and tail end ; advance R.5 leaving tail end available nearby	Insert extra 40-yd. lengths of 0.06 sq. in. Pliable Armoured cable on First and Fifth levels. Lay extra cable in Fourth level	Timber for R.5 and R.4.
16	Advance R.4 and tail end ; connect up to T.3 and shorten L.2 and L.3	Advance lower transwitch and gate-end switches. Couple spare cables in lower half of new trunk. Couple up spare cable in Fourth level	
17	Connect up T.4, shorten L.4, L.5, L.6	Advance upper transwitch and gate-end switches. Couple spare cables in upper half of new trunk	
18	Extend belt conveyor ..	Shorten conveyor cable in First level	
19	Substitute T.1 for T.4, L.1, L.2, L.3, L.4, L.5, or L.6 and send latter out	General Maintenance	
20	Jack up belt extension and clean up ..	General Maintenance	
21	Jack up belt extension and clean up ..	General Maintenance	Timber R.1 and R.2.

SCHEDULE IV.

OPERATING COST PER TON OF OUTPUT.

	s.	d.
Labour	7	6
Timber	0	8
Other Stores ..	2	6
Power	0	10
Royalties ..	0	6
Long service leave	0	6
Overheads ..	1	0
Total Operating Cost	13	6

CAPITAL EXPENDITURE CLASSIFIED ACCORDING TO EFFECTIVE LIFE OF EQUIPMENT.

Life of Equipment.	Capital Expenditure.
	£
1 year	2,080
2 years	620
3 years	43,160
5 years	95,400
7 years	6,710
10 years	6,140
15 years	24,390
Total	.. £178,500

CAPITAL EXPENDITURE PER TON OF ANNUAL OUTPUT = 18s. 2d.

ANNEXURE NO. 18.

COPY.

DEPARTMENT OF MINES.

STATE COAL MINE, COLLINSVILLE—MECHANIZATION.

(Copy hereof is 233A on file 51/113B, on which is also the previous record.)

1. Start new file—State Coal Mine, Collinsville, Mechanization.

2. Prepare Executive Council Minute for expenditure of £7,770 in preparation of the west back heading for the mechanization of the mine.

3. Refer to State Stores for the calling of separate tenders for those items mentioned in paragraphs *(a), (b)* and (c) of para. 17 *(b)* (ii.). Say that in the case of *(b)* and (c) further necessary information for supply to prospective tenderers is being prepared and numbers of copies will be furnished to the Board as soon as available.

4. *Mr. Platt.—For* preparation of such information add.

(Init) C.
14th March, 1951.

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1. Two separate schemes have been prepared for mechanization of the above mine ; one by the Mine Management in conjunction with the Supervisor, and the second by the Powell Duffryn Technical Services Limited in conjunction with Mr. Crowley of the Coal Board.

There have also been several discussions between representatives of Powell Duffryn, the Coal Board, and the Supervisor and Mine Manager.

The technical officers who took part in these discussions were :-

Powell Duffryn Technical Services Limited.—Messrs. D. G. Hemmant and K. D. Woolley.

Coal Board.—Messrs. I. Evans and A. Crowley.

Department of Mines.—Messrs. T. Platt and A. Winstanley.

2. Factors of the mechanization proposals, which can be regarded as common to both schemes, comprise :—

(1) Available proved coal reserves.

(2) Necessity for new screening facilities.

(3) Surface transport of coal by belt from No. 2 Tunnel Mine to screens.

The Honourable the Minister

Cabinet approved this recommendation for mechanization of Collinsville State Mine.

(Init.) W. P.
12th March, 1951.

(4) Delivery by belt in the west back heading of all coal production from No. 2 Tunnel Mine.

(5) Reconditioning of west back heading.

(6) Gathering belt for coal to the main belt.

(7) Surge bin at gathering belt heading.

(8) Transference of coal to the gathering belt.

(9) Coal cutters.

(10) Loaders.

(11) Depth of cut.

(12) Height of face.

(13) Drilling of coal.

(14) Timbering.

(15) Ventilation of face.

(16) Stock-piling at surface, in case of interruption of railway transport.

(17) Man-riding and supply haulage in tunnel and to districts.

(18) Provision of servicing diesel truck on back heading.

(19) Cables for electricity.

(20) Development.

3. Factors on which agreement was reached are Nos. (1), (5), (6), (7), (14), (16), (17), (19), and (20).

4. Other factors upon which there has been qualified agreement are as follows :-

(2) Necessity for new screening facilities.

It is agreed that the existing screening plant is obsolete and wasteful with regard to manpower, but Powell Duffryn contended that such new installation should be treated as a secondary stage in the mechanization of Collinsville.

No estimated cost for screening plant is therefore included in P.D.T.S. estimated total.

(3) and (4) *Surface transport of coal by belt from No. 2 Tunnel Mine to screens,* and *Delivery by belt in the west back heading of all coal production from No. 2 Tunnel Mine.*

Powell Duffryn again suggest this might be treated as a secondary stage in mechanization and is not absolutely necessary in the present scheme for the partial mechanization at No. 2 Tunnel.

No estimated costs for such belts are therefore included in P.D.T.S. estimated total.

(9) Coal cutters.

It was generally agreed that a Universal type coal-cutting machine should, be employed but there is disagreement in that Powell Duffryn recommend the use of Caterpillar-mounted machines as against pneumatic-tyred units as favoured by the Coal Board and the Department of Mines.

(10) Loaders.

It is agreed that the Joy type loading machine should be used, but there is disagreement in regard to the capacity and type of mountings. Powell Duffryn are in favour of the British 4-ton per minute machine, caterpillar mounted, as against the American equipment of 8 to 10-ton per minute machine, pneumatic tyred, favoured by the Coal Board and the Department of Mines.

(11) and (12) *Depth of cut,* and *Height of face.*

There is not entire agreement as to depth of cut and height at the working face. Powell Duffryn suggest 7 ft. 6 ins. for the cut and 9 to 10 ft. working height, since they state that full mechanization of the mine should be applied initially utilizing the same working height that has applied for many years at Collinsville and which, from experience, has proved satisfactory.

The Management's scheme has scheduled a depth of cut at 9 ft. to 9 ft. 6 ins. with a working height of 10 to 12 ft.

It is agreed that in all probability any of these figures may have to be revised in the light of actual working with mechanized units.

(13) *Drilling of Coal.*

It is agreed that drilling equipment is required, but there are two points of view. Powell Duffryn are in favour of utilizing the normal type of power borers with a suitable control box mounted as an integral part of the machine, the drilling itself being done by the cutting crew.

It should be noted that the drilling machines at present on order for Collinsville could be utilized in this work.

Mr. Crowley of the Coal Board agrees with that point of view. On the other hand, Mr. Evans of the Coal Board and the Mine Management prefer rubber-tyred Universal mobile boring machines for more expeditious operation and the minimizing of the time taken by a cutter crew to cut a place and flit their machine to a second bord.

5. The remaining matters on which there has been no agreement whatsoever are :-

(8) *Transference of coal to the gathering belt.*

Powell Duffryn favour the utilizing of scraper chain conveyors for bringing the coal from the working face down to the main gathering conveyor.

On the other hand, the Coal Board and the Mine Management favour pneumatic tyred cable reel type of shuttle car.

(15) *Ventilation of face.*

Powell Duffryn are of the opinion that it will be necessary to apply auxiliary ventilation by the use of a number of small forcing fans and ventilation tubing.

The Coal Board and the Mine Management's point of view is that each machine section shall be ventilated by a separate split of fresh air from the existing ventilation circuit and carried to the working face by means of brattice cloth.

Mr. Crowley of the Coal Board, whilst agreeing with the second view expressed, believes that experience may prove it necessary for the subsequent installation of auxiliary fans with tubing.

(18) *Provision of servicing diesel truck on back heading.*

Powell Duffryn do not agree with the necessity for providing a servicing truck.

The Coal Board and the Mine Management regard this as an essential part of the mechanization to facilitate the servicing of the equipment, the transport of managerial staff for inspections and the transport of injured persons in the mine, obviating the use of the main transport system.

6. Both schemes are attached. In submitting its scheme, P.D.T.S. Ltd. point out that it is for the mechanization of the cutting, loading, and transport of coal to the existing haulage at No. 2 Tunnel, and provides for the extraction of not more than 35 per cent. of the section to be worked in order that the minimum damage may be done to overlying seams, and is intended as an interim scheme pending the further proving of such overlying seams. This has imposed a certain unorthodoxy upon the layout, but as far as possible, equipment has been selected which can be expected to be suitable in other seams. The scheme provides for an average output of 820 tons per day or 196,800 tons per 240-day year. The cost of equipment required is detailed with a total of £178,500. The labour force required underground is given as 64, with about 34 more on the surface, with an estimated cost of production at 13s. 6d. per ton. No attempt has been made to estimate the capital cost per ton of output.

P.D.T.S. Ltd. also consider it is generally agreed that the most desirable course would be to carry out the further prospecting campaign recommended in the Powell Duffryn Report and, depending upon the results of that prospecting, to select the most suitable area and seam for the opening of a new mine. However, the Company considered that the urgency of the problem will not allow this to be done and it has been decided that their scheme should be for the mechanization of some, at least, of the existing workings in such a way that the method of working shall not have a deleterious effect on the superincumbent strata, and that as far as possible, new machinery should be selected which would be adaptable for working in another seam if subsequent prospecting should make such a course desirable.

7. The views of the Coal Board and the Department of Mines are made in the light of extensive experience of the peculiar local and industrial conditions obtaining at Collinsville and in this country generally.

8. The scheme favoured by the Coal Board and the Department of Mines comprises heavy pneumatic-tyred cutters, loaders and shuttle cars for operation at and in the vicinity of the coal face for a minimum production at the rate of 900 tons per day or 4,500 tons per week and a maximum of 1,200 tons per day or 6,000 tons per week.

At the same time workers not required on the mechanized work at No. 2 Tunnel Mine will be employed at contract mining of coal by hand methods in No. 1 Tunnel, under the present prevailing conditions, and such production would be of the order of 350 tons per day or 1,750 tons per week.

9. The cost estimated in the P.D.T.S. Ltd. scheme is £178,500, but no provision is made in that total for the following items, which are necessary to both schemes if the output is not to be limited to 820 tons per day from No. 2 Tunnel :—

			E
(i.)	Preparation west back heading (essential in any circumstances)		7,700
(ii.)	Surface conveyors ..	Adequate for 2,000 tons per shift	46,047
(iii.)	Main Conveyor below ground		47,182
(iv.)	Screening plant .. .		34,050
(v.)	Three (3) mobile boring machines ..		23,763
			£158,742

This would make the cost of the Powell Duffryn scheme £337,242.

Taking the output figure of 820 tons per day, capital expenditure of £337,242 would be £411.25 per ton of coal per day or £1.78 per ton of coal produced annually on 230 working days.

10. The scheme prepared by the Department of Mines and favoured by the Coal Board is also attached. The estimated cost is £400,000 representing £333.3 per ton of coal per day based on a maximum of 1,200 tons per day or £1.45 per ton of coal produced annually on 230 working days.

11. In actual practice it is likely to be found that only three-fourths of the outputs given in 9 and 10 would be attained, so capital cost per ton of coal per annum should be estimated at £2.37 and £1.93 respectively, the higher figure being that for the Powell Duffryn scheme.

12. Output per manshift employed would apparently be more than twice as much in favour of the scheme drawn up by the Department of Mines. Such figure is given by the Mine Manager as 14.42 tons based on 900 tons per day. At present the output per manshift is just over 2 tons.

13. Powell Duffryn doubt the ability of shuttle cars, recommended by the Coal Board and the Department of Mines, to negotiate the grades existent in the area at Collinsville, viz. one in nine, but such cars are operating on undulating grades with a maximum of one in eight at Newstan Colliery, New South Wales, and one in six on the Collie Coalfield, Western Australia, and such grades in the U.S.A. A rate of 580 tons per shift is occasionally obtained at Newstan Colliery by one such complete unit comprising a coal cutter, loader and two shuttle cars, as described in the Department of Mines report, although a conservative rate of 300 tons per shift is estimated for Collinsville.

14. The equipment recommended by Powell Duffryn for use at and in the vicinity of the coal face has been tried, with unsatisfactory results, and has been superseded by the types favoured by the Coal Board and the Department of Mines at the following New South Wales mines :—Hebburn No. 2, Wollondilly, Wallarah, and Cessnock No. 1, and probably others.

15. It is expected by the Department of Mines that the existing powerhouse at the Mine, with alterations and additions as already approved and under construction, will furnish the necessary electricity for that scheme, whereas Powell Duffryn in their proposals state additional plant above that provided and proposed would be required.

16. The broad details of the scheme favoured by the Mine Management and the Coal Board are estimated to cost as follows :—

Underground-

(i.)	Development ..		7,770
(ii.)	Heavy-duty type equipment comprising—		
	(a) Four coal cutters ..		
	(b) Four coal loaders ..		
	(c) Eight cable reel type shuttle cars		
	(d) Three mobile boring machines ..		256,657
	(e) Three timbering mobile units and		
	(f) Necessary cables, transformers, switches and control boxes for all the above ..		
(iii.)	Conveyor Belts—		
	South Panel	4,320	
	North Panel	4,320	
	Main Development Heading ..	17,430	
	Spare Panel ..	4,320	
	Spare Main ..	17,430	
			47820
(iv.)	Coal Surge Bin and feeder, &e.		1,000
(v.)	Conveyor from Surge Bin to Surface Conveyor		47,182
			360,429

Surface—

(vi.)	Conveyors to screens	46,047
(vii.)	Screening Plant	34,050
		80,097
(ix.)	Incidentals ..	31,224

(*Note :—Subparagraphs* (ii.) and (iii.) above include an additional complete mechanized unit (1 cutter, 1 loader, 2 shuttle cars) with spare belt conveyors to allow continued development with some increase of production, as well as spares to be used as replacements to ensure constant output. The total cost of these spares is £71,750, and this additional expenditure will result in the costs shown in paragraphs 10 and 11 being lowered.)

Summary.

	£
Underground	360,429
Surface ..	80,097
Incidentals	31,224
Grand Total	£471,750

17. RECOMMENDED—

(a) Approve of implementation of the scheme of mechanization set out in paragraph 16 hereof, at an estimated cost of £471,750, which figure under present day conditions of increasing prices and costs is likely to attain £500,000 ;

(b) Authorize—

Executive approval.

(i.) Immediate commencement of the underground development estimated to cost £7,770 ;

(ii.) Calling of separate tenders through State Stores for—

Mr. Platt.—As there is a possibility of a new General Manager it is desirable to widen the paragraph (a) of (ii.) by inserting the word " trackless " in asking State Stores to obtain quotations. Also possibility of rubber shortages. (Init.) C. 14-3-51.

(a) Supply and installation of heavy-duty (trackless 14-3-51) type machines and ancillary equipment as listed in (ii.) of paragraph 16 ;

(State Stores could be informed that there are only two firms making equipment, the Brisbane Agents being Beiers & Ridgway (Joy Sullivan) and Underhill & Day (Jeffrey).) — Omit to State Stores.

(b) Supply and installation of conveyor belts as listed in paragraph 16 (iii.) (v.) and (vi.), and coal surge bin and feeder, &c., as listed in (iv.) of paragraph 16 ;

(c) Construction of surface screening plant capable of handling 3,000 tons of coal per day, to be constructed of steel in conformity with the general outline of the plan to be submitted.

SUBMITTED.

For the Queensland Coal Board-

(Sgd.) E. F. DUNNE, Chairman.
(Sgd.) IDRIS E VANS, Member.
(Sgd.) A. CROWLEY, Member.

For the Department of Mines

(Sgd.) G. F. CLARK, Under Secretary.

(Sgd.) THOS. PLATT, Supervisor, State Coal Mines.

18th September, 1950.

ANNEXURE NO. 19.

COPY.

Hon. W. Power, M.L.A.,
Minister for Mines.

19th July, 1951.

PRESS STATEMENT.

GENERAL MANAGER—STATE COAL MINES.

The Minister for Mines (Hon. W. Power, M.L.A.) announced today that the Governor in Council had approved the appointment of Mr. Athol Lightfoot as General Manager of State Coal Mines and ancillary Coke Works at an annual salary of £2,500, for a period of five years.

The Minister said Mr. Lightfoot is at present Superintendent for the Lithgow Valley Colliery Co. at Lithgow, New South Wales, and, although in early middle age, has had extensive managerial experience of large mines, especially in the mechanical winning of coal, on which aspect he is particularly well qualified as a few years ago he studied mechanized mining in the United States and, since his return to Australia, he has been in control of fully mechanized coal mines giving good results.

" My Government," said Mr. Power, " is anxious to proceed with the approved proposal to mechanize the State Coal Mine at Collinsville in order to ensure that sufficient coal is produced to meet the increasing demands of North Queensland and to enable that part of the State to further develop its natural resources. In view of the isolation of the coal mine and resulting labour shortages, it is clear that adequate coal can be obtained only by mechanization, which will also improve working conditions for employees by eliminating practically all arduous labour."

" In Mr. Lightfoot," continued the Minister, " we believe we have obtained a person thoroughly competent not only to advise as to mechanical methods to be installed, but to ensure the proper use of the equipment installed with consequent benefit to both employer and employee. In a project to cost up to half a million it is essential that the control and management be vested in a well qualified and experienced person. Mr. Lightfoot will take up duty immediately he can be released by his present employers, and will concentrate on plans to mechanize Collinsville."

ANNEXURE NO. 20.

THE LITHGOW VALLEY COLLIERY COMPANY PTY. LIMITED.

Lithgow Valley and Hermitage Collieries,
Lithgow, 10th August, 1951.

Mr. G. Clark,
Under Secretary for Mines,
Department of Mines,
Brisbane, B.7.

Dear Mr. Clark,

Following upon a study of the data you have forwarded, there are several points which I would suggest you may consider with a view to having current estimates available for possible equipment, and so avoid a delay at a later date.

The equipment I would specify would be as follows :—

Item 1. Three high-capacity loaders for use under trackless conditions—Seam height 7 ft. plus, and full dip of seam of 1 in 6. Floor conditions ? The machines to operate on 415 volt, 50 cycle, 3-phase A.C.

Item 2. Three high-capacity universal coal-cutting machines to operate on above grades—caterpillar tracks being essential in my opinion, for several reasons.

These machines to have the longest cutter bar available and to operate on 415 volt, 50 cycle, 3-phase A.C.

Item 3. Three 32-volt hand-held boring machines.

Item 4. Three 415 32-volt Protektrol type transformer units for mounting on coal cutter to power the boring machines.

Item 5. Five shuttle cars of highest possible capacity to operate on above grades, separate quotations to be obtained for cable reel alternating current, cable reel direct current, and diesel-powered cars.

For preference diesel-powered 8-10 ton capacity cars are desirable, and their use underground would be governed by the attitude of the Chief Inspector of Coal Mines.

Item 6. Suitable belt conveyors for surface and underground. In this respect a profile of the grades should be submitted to the various firms, and tenders requested for equipment to handle the required tonnage per hour.

In respect to conveyors I would specify that for the surface and main tunnel conveyors each flight should be of the greatest possible length. Subsidiary conveyors should be suitable for extension or retraction in 150-yd. lengths and should have the same capacity as main tunnel conveyor.

Item 7. Suitable belt and chain face conveyors with a capacity of 200 tons per hour, to permit of simple extension of 8 ft.-9 ft. to a total length of 180 yds. Such belt conveyors to have a loop take up of 75 ft. centres. Such conveyors are to be weighed up against shuttle cars in final analysis.

Item 8. Four 150 kVA portable substations with transformation down from your primary underground voltage to 415 volt, 50 cycle 3-phase A.C.

Item 9. Three Portable Mercury arc rectifiers. Input 415 volt 3-phase 50 cycle A.C. Output 250 volt—two wire D.C. 200 amps.

These would be necessary with D.C. powered shuttle ears.

Item 10. Ten Double sided 100-amp. gate-end boxes for cutters and loaders.
Eight single unit gate-end, D.C. boxes for use with shuttle cars.

Item 11. Sufficient supplies of cables for all purposes for initial commencement of two units plus two years extensions.

Item 12. Sufficient supplies of water pipes and hoses for face reticulation of water—similar to cables.

You may have already covered the foregoing but if not I would suggest the following Agents : —

For Loaders, Cutters and Shuttle Cars :—

Joy Sullivan Manufacturing Co.
Jeffrey Manufacturing Co.
Goodman Manufacturing Co.
Mayor & Coulson Ltd. (No shuttle cars)
Anderson Boyes Ltd. (No shuttle cars)

For Conveyors, Belt and Chain :-

Joy Sullivan Manufacturing Co.
Jeffrey Manufacturing Co.
Goodman Manufacturing Co.
Mayor & Coulson Ltd. Huwood & Co., Ltd.
British Jeffrey Diamond Manufacturing Co.
The Mining Engineering Co. Ltd., M.E.C.O.
Richard Sutcliffe Limited.
Goodyear Tyre & Rubber Company.
Dunlop Perdriau Ltd.

For Gate-End Boxes :-

Security Electric Company.
Electric Control & Engineering Ltd.
Several British Firms.

For Boring Machines :-

Noyes Bros. Ltd.
Electric Control & Engineering.
H. 0. McCormacks.
Siemens Scuckert Ltd.
Consolidated Pneumatic Tool Company.

For Cables :-

W. T. Henleys Telegraph Works Co. Ltd.
Johnson & Phillips Ltd.
Olympic Cables Ltd.
Noyes Bros. (Sydney) Ltd.

Transformers and Switchgear :-

Australian General Electric.
British General Electric.
Coates & Co.

For Rectifiers :-

Coates & Co. Pty. Ltd.
Hackbridge & Hewittic Electric Co. Ltd.
Australian General Electric.

If this should be of assistance and any further detail is required, I shall be only too pleased to oblige.

In all cases of Loaders, Cutters, Shuttle cars, and Conveyors, information should be requested as to delivery dates and stocks of spare parts available at nearest point, service provided particularly with primary installations.

Yours faithfully,

(Sgd.) A. LIGHTFOOT.

ANNEXURE NO. 21.

Department of Mines,
Brisbane, B.7.

21st August, 1951.

MEMORANDUM.

The Under Secretary for Mines, Brisbane.

PROPOSALS PERTAINING TO CUTTING, DRILLING, LOADING AND CONVEYING COAL—STATE COAL MINE, COLLINSVILLE.

I would offer the following comment on Mr. Lightfoot's suggestions : —

Item 1. Original proposals were for four such loaders for three fully operating units and one for development, based on a return per shift of 300 tons each from the three fully operating units. It was recognized that such a tonnage was no more than 60 per cent. of that obtained from similar units in New South Wales.

Floor conditions could be stated as coal or sandy shale and the item regarded as suitably described.

Item 2. Again, four such coal cutting machines were originally stated as necessary for the reasons given and Mr. Winstanley was particularly keen on pneumatic tyres. As stated by Mr. Lightfoot there are several reasons which would cause preference for caterpillar traction. The item could be regarded as suitably described, with an addition given pertaining to items 3 and 4.

Items 3 and 4. Huwood hand-held electric drills, with transformers to operate at a pressure of 125 volts, have already been supplied to the mine. Apparently Mr. Lightfoot prefers to fit the transformer to the coal cutter and the use of a lower pressure of 32 volts. Mr. Robertson, Manager, Sullivan Machinery Company informed me that some Universal coal cutters supplied by his Company were fitted with equipment to permit of drilling. Originally it was considered preferable not to hold a coal cutter at the face for the purpose of drilling and a "Jumbo" for drilling was preferred to facilitate the movements of the cutter and avoid using hand-held drills owing to the height of the seam. However, in consideration of the short time required by modern machines for cutting a place, a further 10 or 15 minutes for the coal cutter crew to drill a place might be preferable to bringing in a second crew with a " Jumbo."

I would suggest adding to item 2 ; Machines to be fitted with a transformer for drilling or, alternatively, to permit of the fitting of such transformers.

Item 5. Seven such shuttle cars were originally stated as necessary. I am not aware of any such cable reel shuttle cars operating on alternating current or powered by diesel engines, although enquiries have been made. As Chief Inspector of Coal Mines, with the knowledge I have at present, diesel engines would not be permitted to operate in deadends, i.e. beyond a point where a circuit of air was naturally complete.

The item could be used in the form given by Mr. Lightfoot.

Item 6. My recollection is that a maximum of 3,000 tons of coal on the one shift was stipulated for the main trunk conveyors in the original report. However, this might be regarded as too ambitious and I would be inclined to state a maximum of 2,000 tons for the one shift. Further, in consideration of the high price of belt conveyor, it might be advisable to have the belt conveyor system capable of 2,000 tons per shift, with the exception that a smaller belt of 1,000 tons per shift capacity could be used for a period. I would not specify that " each flight should be of the greatest possible length " because excessive wear and strain could be a bad feature of such an arrangement. I take it that Mr. Lightfoot means that the collective capacity of subsidiary conveyors should have the same capacity as the main tunnel conveyor and not each separate subsidiary conveyor. The item is not well described.

Item 7. Originally such belt and chain face conveyor were taken into consideration and rejected. No harm would be associated by the calling of tenders in the manner described.

Item 8. Originally one substation to which high voltage current would be supplied was stipulated. I do not see the necessity for portable substations at the present juncture.

Item 9. Such Portable Mercury Arc Rectifiers as described were in the original recommendation.

Item 10. This appears in keeping with the original report.

Item 11. There are many types of electric cables and some units such as cable reel shuttle cars require a special shape. This item is one which will require very careful consideration before quotations are called ; further, there is serious delay in supply of cables at the present time.

Mr. Lightfoot does not give the Agents, but, generally, manufacturers. Agents for the firms given would be—

Joy Sullivan Manufacturing Co.—Beiers & Ridgway Pty., 318 Adelaide street, Brisbane.
Jeffrey Manufacturing Co.—Underhill Day & Co. Pty. Ltd., 135 Queen street, Brisbane.
Goodman Manufacturing Co.—John Carruthers, Sydney.
Mayor & Coulson Ltd.—Noyes Bros. (Sydney) Ltd., Elizabeth street, Brisbane.
Anderson Boyes Ltd.—Queensland Machinery Co. Ltd., Albert street, Brisbane.
Security Electric Co.—Noyes Bros. (Sydney) Ltd., Elizabeth street, Brisbane.
The Mining Engineering Co. Ltd.—Queensland Machinery Co. Ltd., Albert street, Brisbane
Electric Control & Engineering Ltd.—C. F. Willers, Eagle street, Brisbane.
H. 0. McCormacks—Noyes Bros. (Sydney) Ltd., Elizabeth street, Brisbane.
Siemens Scuckert Ltd.—Gollin & Co. Pty. Ltd., Eagle street, Brisbane.
Consolidated Pneumatic Tool Company—Noyes Bros. (Sydney) Ltd., Elizabeth street, Brisbane.
Dunlop, Goodyear, Olympic, A.G.E. and B.G.E. have branch offices in Brisbane.

To me, it appears advisable for Mr. Lightfoot to become acquainted with the whole position in regard to the State Coal Mine, Collinsville, before he makes any decisions, even the calling of tenders for equipment. Such matters should preferably be discussed with the Manager, State Coal Mine, Collinsville, on the mine premises.

(Sgd.) THOS. PLATT,
Supervisor, State Coal Mines.

ANNEXURE NO. 22.

Department of Mines,
Brisbane,
22nd August, 1951.

Dear Mr. Lightfoot,

With further reference to your letter of the 10th instant regarding the equipment you would specify for mechanization at Collinsville, I desire to advise that upon Mr. Platt's return from Bowen, he gave me his views on the various items specified by you, and a copy of his memorandum of 21st instant is enclosed for your information.

Dealing with these item by item, it would appear that the position in each case is as follows :—

Items 1, 2, 5, 6, 7, 9 and 10.—All in order for submission to State Stores to obtain quotation.

Items 3-4. I possibly should have informed you of the electric drills and transformers already held at Collinsville—to operate at 125 volts but these are not yet in operation—awaiting cable. The information may or may not alter your views.

Item 6. Might be submitted with a view to quotations, together with profile of grades—as per copy herewith.

Item 8. Do you still desire quotations as per your letter of 10th August.

Item 11. This item is the main stumbling block. The Manager at Collinsville in reply to my telegram of 13th instant has advised that length and specification of existing main cables and feeder cables required for two units of mechanization initially plus two years extensions will be despatched in a few days. At time of writing this information has not arrived, and as I leave today, I can only give you the position as obtains at present.

See also Mr. Platt's comments under this item.

Item 12. Mr. Platt assures me existing working places are all reticulated with water, with hoses available, and that sufficient water piping and hoses are available.

Everything appears to depend on the question of cables (Item 11.), and I have arranged with Mr. T. H. Smith, who will be acting whilst I am away, to forward on to you copy of Winstanley's information just as soon as it arrives. This is, to my way of thinking, particularly important as delivery time for cables will probably exceed the delivery time for all the other items.

In the meantime, I have prepared a draft letter to State Stores Board so far as I can and enclose a copy thereof for your perusal and any alterations necessary.

It seems to me that further action will have to await clarification on the question of cables, but I await your further advices.

Yours faithfully,

G. F. CLARK,
Under Secretary,
per (Init.) T. H. S.

A. Lightfoot, Esq.,
P.O. Box 13,
Lithgow,
N.S.W.

ANNEXURE NO. 23.

Box 13, Post Office,
Lithgow,
29th August, 1951.

Mr. G. F. Clark,
Under Secretary for Mines,
Department of Mines,
Brisbane, B.7.
Queensland.

Dear Mr. Clark,

Receipt of your letter of the 22nd instant is acknowledged and contents noted.

It is suggested that the letter to " The Manager " State Stores Board be amended to the following items :–

Item 1. Three only high-capacity coal loaders for use under trackless conditions. Seam height 7 ft. 0 ins. plus, and full dip of seam 1 in 6. Floor coal or sandy shale. The machines to operate on 415 volt, 50 cycle 3-phase with headlamps and rear lamps on 32 volts. Each machine to be fitted with 100 yds. T.R.S. trailing cable.

Item 2. Three only high-capacity universal coal-cutting machines to operate on above grades—caterpillar tracks preferable—to have the longest cutter bar available and to operate on 415 volt, 50 cycle 3-phase, with a power take off at 32 volts for head and rear lamps and a li-horse power hand-held boring machine. Each machine to be complete with an automatic cable reel and 100 yds. of 4- or 5-core T.R.S. trailing cable.

Item 3. Unchanged.

Item 4. Unchanged.

Item 5. Five only shuttle cars of highest possible capacity to operate on above grades, separate quotations to be obtained for (a) Cable reel alternating current, *(b)* Cable reel direct current and *(c)* diesel-powered cars. Each cable reel car to be delivered complete with two lengths each 550 ft. of flat, 3-core, nylon braided and neoprene sheathed trailing cable.

Item 6. Belt conveyors for surface and underground in accordance with the attached profile of grades, capable of handling a maximum of 2,000 tons per shift of 51- hours. For the surface and main tunnel conveyors each flight should be of the greatest possible length. Subsidiary conveyors should be suitable for extension or retraction in 150-yd. lengths and of the same capacity as the main tunnel conveyor.

Item 7. Belt and chain face conveyors with a capacity of 200 tons per hour, to permit of simple extensions of 8 ft. to 9 ft., to a total of 180 yds. Such belt conveyors to have a loop take up of 75-ft. centres.

Item 8. Four only 150 kVA portable underground substations with transformation down from 1,050 volt to 415 volt, 50 cycle, 3-phase A.C. and alternatively ;

Four only 150 kVA portable underground substations with transformation down from 2,300 to 415 volt, 50 cycle 3-phase A.C.

Item 9. Unchanged.

Item 10. Unchanged.

Item 11. This additional item should be for the lengths of cable recommended by Mr. Winstanley for each of the following :-

(a) For Loading Machines : 163/-018 4-core T.R.S. cables in multiples of 100 yds.

(b) For Coal Cutters : 163/•018. 4-core and alternatively 5-core T.R.S. cables in multiples of 100 yds.

(c) For 32-volt Borers : 110/-0076 4-core T.R.S. cables—short lay—in multiples of 20 yds.

(d) For shuttle cars : 163/•020-250 volt flat 3-core polychloroprene sheathed flexible cable, with 2 power cores 163/-020 each vulcanised rubber insulated and nylon braided, and centred between the two power cores-1-117/-018 flat earth conductor nylon braided. The whole braided with whipcord and neoprene sheathed overall. In multiples of 550 ft.

(e) Face reticulation : 19/•083 4-core T.R.S. cable in multiples of 300 yds.

(f) High Tension—Paper insulated and lead covered armoured cable of a size to adequately carry the maximum load at the specified voltage in drums of 300 yds.

In respect to primary voltage, I would strongly recommend stepping it up to 2,300 volts at the most suitable point on the surface. This would be beneficial in reduced cost of cables, and also in that it would standardize all the equipment underground with modern Colliery practice and thus simplify purchases of electrical plant and stores.

I trust that this shall be beneficial in that all quotations may be available at a date to coincide with my return from Collinsville and thus avoid unnecessary delay in selection of equipment and placing of orders.

Three important factors, I feel, should be stressed with all quotations, they are—

(a) Definite delivery dates.

(b) Service provided by manufacturers particularly with installation and initial operating period.

(c) Position with regard to adequate stocks of spare parts at the closest possible points.

The matter of purchase of possible equipment from Glen Davis Shale Mine was investigated and information received that to date no decision has been made in respect to sale of such equipment. The mechanical and electrical condition of loaders and shuttle cars is not regarded as being too good. Nevertheless, there is a good deal of cables, and one coal cutter and other equipment that may be of a better standard. Prior to my leaving, I shall make a close inspection and inventory of all equipment there, to enable quotations to be prepared, should it be available for sale later.

With kind regards,

Yours sincerely,

(Sgd.) A. LIGHTFOOT.

ANNEXURE NO. 23.

GFC/G,

13th September, 1951.

Sir,

With reference to previous correspondence regarding the calling of tenders for certain equipment for mechanization of the State Coal Mine, Collinsville, and in lieu of my previous request, I am directed to request that you arrange to call tenders for the following equipment : —

Item 1: Three only high-capacity coal loaders for use under trackless conditions—Seam height 7 ft. plus, and full dip of seam 1 in 6. Floor coal or sandy shale. The machines to operate on 415 volt, 50 cycle, 3-phase A.C., with headlights and rear lamps on 32 volts. Each machine to be fitted with 100 yds. T.R.S. trailing cable 163/.018, 4-core.

Item 2 : Three only high-capacity universal coal-cutting machines to operate on above grades—caterpillar tracks preferable—to have the longest cutter bar available and to operate on 415 volt, 50 cycle, 3-phase A.C., with a power take off at 32 volts for head and rear lights and a li-horse power hand-held boring machine. Each machine to be complete with an automatic cable reel and 100 yds. of 4- or 5-core T.R.S. trailing cable 163/.018.

Item 3 : Three only 32-volt hand-held boring machines.

Item 4 : Three only 415/32-volt Protektrol type transformer units for mounting on coal cutter to power the boring machines.

Item 5 : Five only shuttle cars of highest possible capacity to operate on above grades, separate quotations to be obtained for (a) cable reel alternating current, *(b)* cable reel direct current, and (c) diesel-powered cars. Each cable reel ear to be delivered complete with two lengths each 550 ft. of flat, 3-core, nylon braided and neoprene sheathed trailing cable.

Item 6 : Belt conveyors for surface and underground in accordance with the attached profile of grades, capable of handling a maximum of 2,000 tons per shift. For the surface and main tunnel conveyors each flight should be of the greatest possible length. Subsidiary conveyors should be suitable for extension or retraction in 150-yd. lengths and of the same capacity as the main tunnel conveyor.

Item 7 : Belt and chain face conveyors with a capacity of 200 tons per hour, to permit of simple extensions of 8 ft. to 9 ft. to a total length of 180 yds. Such belt conveyors to have a loop take up of 75-ft. centres.

Item 8 : Four only 150 kVA portable underground substations with transformation down from 1,050 volts to 415 volt, 50 cycle 3-phase A.C. ; and alternatively—

Four only 150 kVA portable underground substations with transformation down from 2,300 volts to 415 volt, 50 cycle, 3-phase A.C.

Item 9 : Three only portable Mercury arc rectifiers Input 415 volt, 50 cycle, 3-phase A.C. Output 250 volt-2 wire D.C. 200 amps.

Item 10 : Ten only double-sided 100 amp. gate-end boxes for cutters and loaders. Eight only single-unit gate-end D.C. boxes for use with shuttle cars.

Item 11 : *(a)* For loading Machines-300 yds. of 163/.018 4-core T.R.S. cables in multiples of 100 yds.

(b) For Coal Cutters-300 yds. of 163/.018 4-core and, alternatively, 5-core T.R.S. cables in multiples of 100 yds.

(c) For 32-volt Borers-100 yds. of 110/.0076 4-core T.R.S. cables—short lay—in multiples of 20 yds.

(d) For shuttle cars-5,500 ft. of 163/.020-250 volt, flat, 3-core polychloroprene sheathed flexible cable, with 2 power cores 163/.020 each vulcanised rubber insulated and nylon braided, and centred between the two power cores-1-117/.018 flat earth conductor nylon braided. The whole braided with whipcord and neoprene sheathed overall. In multiples of 550 ft.

(e) Face reticulation-1,500 yds. of 19/.083 4-core T.R.S. cable in multiples of 300 yds., and, alternatively, 1,500 yds. of 19/083 4-core pliable armoured cable in multiples of 300 yds.

Likely tenderers are :—

For Loaders, Cutters and Shuttle Cars—

Joy Sullivan Machinery Co.—Agents Beiers & Ridwgay Pty., 318 Adelaide street, Brisbane.

Jeffrey Manufacturing Co.—Agents Underhill Day & Co. Pty. Ltd., 135 Queen street, Brisbane

Goodman Manufacturing Co.—Agents John Carruthers, Sydney

Mayor & Coulson Ltd.—Agents Noyes Bros. (Sydney) Ltd., Elizabeth street, Brisbane

Anderson, Boyes Ltd.—Agents Queensland Machinery Co. Ltd., Albert street, Brisbane

For Conveyors, Belt and Chain—

Joy Sullivan Machinery Co.—Agents as above.

Jeffrey Manufacturing Co.—Agents as above.

Goodman Manufacturing Co.—Agents as above.

Mayor & Coulson Ltd.—Agents as above

Huwood & Co. Ltd.

British Jeffrey Diamond Manufacturing Co.

The Mining Engineering Co. Ltd.—Agents Queensland Machinery Co. Ltd., Albert street, Brisbane

Richard Sutcliffe Ltd.

Goodyear Tyre & Rubber Co. Ltd.

Dunlop Perdriau Ltd.

For Gate-End Boxes—

Security Electric Company—Agents Noyes Bros. (Sydney) Ltd., Elizabeth street, Brisbane

Electric Control & Engineering Ltd.—Agents C. F. Willers, Eagle street, Brisbane

For Boring Machines—

Noyes Bros. Ltd.

Electric Control & Engineering Ltd.—Agents as above.

H. 0. McCormacks—Agents Noyes Bros. (Sydney) Ltd.

Siemens Scuckert Ltd.—Agents Collins & Co. Pty. Ltd., Eagle street, Brisbane

Consolidated Pneumatic Tool Coy.—Agents Noyes Bros. (Sydney) Ltd.

For Cables—

W. T. Henleys Telegraph Works Co. Ltd.

Johnson & Phillips Ltd.

Olympic Cables.

Noyes Bros. (Sydney) Ltd.

For Transformers and Switchgear :-

Australian General Electric.

British General Electric.

Coates & Co. Pty. Ltd.

For Rectifiers :

Coates & Co. Pty Ltd.

Hackbridge & Hewittic Electric Co. Ltd.

Australian General Electric.

It is specifically asked that all quotations should include—

(a) Definite delivery dates ;

(b) Advice as to service provided by manufacturers, particularly in connection with installation and initial operating period ;

(c) Advice with regard to adequate stocks of spare parts and where available.

Attached are 10 sets (S7, 58, S9) of plans showing the profiles of grades as mentioned in Item 6.

Yours faithfully,

Under Secretary.

ANNEXURE NO. 24.

State Stores Board (Queensland)
50 Margaret Street,
Brisbane.
20th September, 1951.

CIRCULAR.

Sir,

TENDER No. C259—COAL LOADERS &C. A/C STATE COAL MINE, COLLINSVILLE.

The Board is inviting tenders for the supply, delivery and installation of the equipment as detailed in my tender form attached, on account of the State Coal Mine, Collinsville.

If you are interested, I shall be pleased to recieve your tender in accordance with the following conditions.

1. Tenders must be submitted in *duplicate* on the prescribed form and enclosed in an envelope addressed to the Chairman, State Stores Board, 50 Margaret street, Brisbane, and endorsed on top left-hand corner " Tender No. C259—Coal Loaders &c." Covering letter giving further particulars may be submitted by the tenderer if necessary, but this letter must also be submitted *in duplicate*.

2. Tenders close at the Office of the Board, at 11 a.m. on Thursday, 15th November, 1951.

3. Prices tendered must include delivery and installation of the equipment at the State Coal Mine, Collinsville, and all charges incidental to the delivery of the items such as freight Customs Duty, exchange, cartage &c.

4. Tender prices should be on the basis of exempt from Sales Tax. Successful tenderer shall, if required, enter into an agreement and/or lodge a deposit to ensure the due performance of the contract.

5. The lowest or any tender will not necessarily be accepted.

6. Tenderers should give *Full and Complete Details (with any available illustrations) of the equipment offered,* country of origin, place of manufacture, guarantee and service by manufacturers particularly in connection with installation and the initial operating period.

Advice with regard to adequate stocks of spare parts and where available is to be furnished by tenderer.

7. Tenderers are required to state in respect of manufacturing or other work performed in Queensland, whether such manufacturing or work will be carried out under Queensland State Awards or Federal Awards.

8. All goods, not otherwise specified, to be in accordance with Australian Standard Specifications where such exist, and in their absence, with British Engineering Specifications.

9. Details of trade and cash discounts allowable should be stated.

10. If tender is submitted for the supply of items of Overseas manufacture, *tender must state rates of exchange* upon which the tender prices are submitted. Any variation in the above at time of delivery of the items is to be to the Board's Account.

The contractor, shall, if required, produce to the Board's officers documentary evidence in support of adjustments on account of variations in Exchange as above.

11. Tenderers are to state the *guaranteed* time of delivery, for each item.

12. Tenderers must certify that the prices tendered do not exceed the maximum prices at which these goods may lawfully be sold or supplied.

13. Plans showing profile of grades referred to in Item 6 may be inspected on application to State Stores, 50 Margaret street, Brisbane, Mr. W. D. Sheehan, Queensland Government Liaison Officer, 485 Bourke street, Melbourne or Mr. J. W. Hayes, Queensland Government Liaison Officer, 4th Floor, 61 Hunter street, Sydney.

Yours faithfully,

R. J. WRENCH,
Manager, State Stores.

State Stores Board,
Queensland,
50 Margaret street,
Brisbane, B.7.
4th January, 1952.

Sir,

I have, by direction, to acknowledge receipt of your letter dated 17th December, 1951 concerning the purchase of equipment for use in the mechanization of the State Coal Mine at Collinsville, and I now advise that Letters of Acceptance have been forwarded to the following firms :—

Underhill Day & Co. Ltd.
Beiers & Ridgway Pty. Ltd.
Noyes Bros. (Sydney) Ltd.
The English Electric Co. Ltd.
W. T. Henleys Telegraph Works Co. Ltd.

Copies of such Letters of Acceptance together with copies in duplicate, of my Official Orders are attached.

It will be noted that whilst the order placed with Underhill Day & Co. Ltd. is on the basis of F.O.R. Brisbane, and the order on Beiers & Ridgway Pty. Ltd. P.O.W. Brisbane, each firm has been requested to arrange to extend the insurance cover to provide for delivery at Collinsville—this is necessary in case certain damage occurs to the equipment which might not be readily noticeable when landed in Brisbane.

It will be noted that all orders have been made payable by your Department, and that Underhill Day & Co. Ltd. have particularly requested that payment be made by the establishment of Letter of Credit.

Will you please finalise this direct.

Generally, when Letters of Credit are established, the matter is first taken up with the Treasury, and such Letter established through the Commonwealth Bank of Australia.

You recently advised that this equipment was particularly urgently required, and in connection with any equipment coming from the United Kingdom, it is suggested that the Agent General may be approached through the Chief Secretary's Department to render whatever assistance is possible.

Further, in connection with the equipment coming from America, a Letter was recently received from the Department of Trade and Customs, Sydney, concerning sponsorship of such orders where, if not delivered, would have an adverse effect on-

(i.) Australian Defence Efforts.
(ii.) Australian production of Strategic Material.
(iii.) The basic National Economy of Australia.

In connection with such Sponsorship, further information is available from the Deputy Director of Industrial Development, National House, Ann street, Brisbane, and if considered necessary, I would suggest that you contact this Officer direct.

After recent discussion with you, no action has been taken to order the belting from Noyes Bros. (Sydney) Ltd., the firm being advised that the belting is still receiving consideration.

It will be noted from Letters of Acceptance that each firm has been requested to contact you before proceeding with the order to ensure that your requirements will be fully met.

Yours faithfully,
(Sgd.) R. J. WRENCH,
Manager, State Stores.

The Under Secretary,
Department of Mines,
Brisbane.

SCHEDULE.

Mechanization—State Coal Mine, Collinsville.
Details of Orders placed.

1. Order No. D9426 by State Stores Board, Brisbane, on Underhill Day & Co. Ltd., 135 Queen street, Brisbane :-

Three only Jeffrey 29 U.C. permissible crawler mounted coal cutting machines to operate on grades of 1 in 4.8, generally in accordance with specifications attached to tender dated 8th November, 1951 and as shown on photograph 61-43 and generally as illustrated and described on pp. 12 and 13 of Jeffrey Catalogue 780. Each unit to be complete with 300 ft. of 4-core T.R.S. cable and to operate on 415 volt, 3-phase 50 cycle.

In addition each machine is to be totally fitted with " aeroquip " hydrallic hose attachments and 32-volt lights and the rear end of machine is to be elevated to the utmost degree to prevent " tail drag " when crossing conveyors, &c.

Each unit to be fitted with standard type cutting chain and pick block to take picks of J. & A. Brown manufacture.

The equipment otherwise is to comply with tender dated 8th November, 1951 in all respects.

In the event of any increase in price the approval of the State Stores Board for such increase is to be obtained before supplying the goods.

Price—£21,394 each net, delivered f.o.r. Brisbane.

Delivery—Shipment within six (6) months.

2. Order No. D9425 by State Stores Board, Brisbane, on Underhill Day & Co. Ltd., 135 Queen street, Brisbane :-

Six only Jeffrey " L 600 C " crawler-mounted loading machines to operate on grades of 1 in 4.8 in accordance with detailed specifications attached to tender dated 8th November, 1951, and generally shown on Jeffrey drawing No. D138, including 350 ft. of 4-conductor T.R.S. cable and to operate on 415 volt, 3-phase, 50 cycle.

Each machine to be fitted with two 32-volt headlights and a rear light and to have dual controls with one set on each side of the loader to ensure that operator can be at all times on the top side of the loading machine when operating upon side grades.

Each machine to be totally fitted with " aeroquip " hydraulic hose attachments.

The equipment otherwise is to comply with tender dated 8th November, 1951, in all respects.

In the event of any increase in price the approval of the State Stores Board for such increase is to be obtained before supplying the goods.

Price—£16,340 per unit net delivered f.o.r. Brisbane.

Delivery—Shipment within six (6) months.

3. Order No. D9427, dated 24th December, 1951, by State Stores Board, Brisbane, on Underhill Day & Co. Ltd., 135 Queen street, Brisbane :-

Fifteen only " British Jeffrey Diamond " 61 WH conveyors generally as illustrated and described in catalogue No. 820 attached to tender of 8th November, 1951.

Each conveyor 100 yds. long and comprising equipment as set out in order dated 8th November, 1951, Item 8C, with the following variations :-

All motors, starters and control gear are to be of flameproof type and starters and control gear are to be of Security Electric type and to permit of—

(a) Automatic interlocking with trunk belts and/or subsidiary conveyors.

(b) Isolating of each conveyor for manual operation and reversing of same.

Each unit to be mounted on skids. To enable each conveyor to be extended to its maximum length, the following is to be supplied :-

495 intermediate sections each 6 ft. long and 8/ ins. deep.

495 lengths each 12 ft. 32- ins. of " Hercules 131 " all steel scraper chain with flights.

In the event of any increase in price the approval of the State Stores Board for such increase is to be obtained before supplying the goods.

Prices—(a) Conveyors-0,210 per 100 yds. f.o.r., Brisbane. (£48,150) ;

(b) Each intermediate section complete with chain £31 7s., plus 14 per cent. (£17,691 ls. 8d.).

(Note : Five per cent. increase has taken place since order placed.)

Delivery—Shipment within six (6) months.

4. Order No. D9424 by State Stores Board on Beiers & Ridgway Pty. Ltd., Adelaide street, Brisbane, as agent for Joy Sullivan Machinery Pty. Ltd. :

One only Model 60-E-12 Joy Diesel Shuttle car to operate on grades of 1 in 48 in accordance with details and specifications set out in tender dated 14th November, 1951, and drawings, &c., attached thereto with the following variations :—

The unit is to be reduced in width to not more than 6 ft. 1 in. and it is understood that this shall reduce the width of discharge conveyor accordingly.

Unless the unit can be reduced in width as abovementioned the order shall be cancelled.

This unit to be accompanied by a United States Bureau of Mines Certificate of Approval for use in hard rock mines to the face and also for use in coal mines, if available. It is also to be covered by the Bureau of Mines Certificate of exhaust conditioning.

In the event of any increase in price the approval of the State Stores Board for such increase is to be obtained before supplying the goods.

Price—E14,720 net, delivered f.o.w., Brisbane.

Delivery—Six (6) months F.A.S. New York.

Department of Mines,
Brisbane, 17th December, 1951.

Dear Sir,

Following upon a very close investigation by the General Manager of State Coal Mines of the tenders received in reply to your application for Tenders No. C259, recommendations are made for purchase of the following items:—

Item. 1. High-Capacity Coal Loaders.

Underhill Day & Co. Ltd., 135 Queen street, Brisbane.

Six only Jeffrey "L 600 C" crawler mounted loading machines to operate on grades of 1 in 4.8 in accordance with detailed specifications attached and generally shown on Jeffrey Drawing No. D138, including 350 ft. of 4-conductor T.R.S. cable and to operate on 415 volt, 3-phase, 50 cycle.

Each machine is to be fitted with two 32-volt headlamps and a rear lamp and to have dual controls with one set on each side of loader to ensure that operator can be at all times on the top side of the loading machines when operating upon side grades.

Each machine is to be totally fitted with "aeroquip" hydraulic hose attachments.

The equipment otherwise is to comply with tender No. 12 in all respects at the price quoted of £16,340 per unit, f.o.r. Brisbane.

Total Cost f.o.r. Brisbane—£98,040.

This type of loading unit, which is constructed in the U.S.A., is recommended due to it being the lowest tender received for a machine on crawlers and with an articulated loading head. Due to the extreme grades at Collinsville, both of these features are essential for safety and efficiency.

Due also to these machines being a recent conversion of an established type by the Jeffrey Company, a guarantee of its efficiency is required, and 20 per cent. of the purchase price is to be withheld until such efficiency is established.

Item, 2. *High-Capacity Universal Coal Cutting Machines.*

Underhill Day & Co. Ltd., 135 Queen street, Brisbane.

Three only Jeffrey 29-UC permissible crawler-mounted coal cutting machines to operate on grades of 1 in 4.8 generally in accordance with attached specifications and as shown on photograph 61-43 and generally as illustrated and described on pp. 12 and 13 of Jeffrey Catalogue 780. Each unit to be complete with 300 ft. of 4-core T.R.S. cable and is to operate on 415 volt, 3-phase, 50 cycle.

In addition each, machine is to be totally fitted with "aeroquip" hydraulic hose attachments and 32-volt lights, and the rear end of the machine is to be elevated to the utmost degree to prevent "tail drag" when crossing conveyors, &c.

Each unit is to be fitted with standard type cutting chain and pick blocks to take picks of J. & A. Brown manufacture.

The equipment otherwise is to comply with tender No. 12 in all respects and at the price quoted of £21,394 each, f.o.r. Brisbane.

Total Cost f.o.r. Brisbane—£64,182.

This type of cutting machine, which is constructed in the U.S.A., was the only tender received for a heavy-duty machine on crawlers, which is essential both for safety and efficiency on the extreme grades at Collinsville.

Item 3. *32-volt Hand-held Boring Machines.*

None of these units is required.

Item 4. 415/32-volt *Protektrol type Transformer Units.*

None of these units is required.

Item 5. *Shuttle Car.*

One only Model 60-E-12 Joy Diesel Shuttle Car to operate on grades of 1 in 4.8 in accordance with detailed specification and your covering letters for Tender C 259—item 5 *(c)*, other than in the variation stipulated below.

This unit is to be reduced in width to not more than 6 *ft. 1 in.* and it is understood that this shall reduce the width of discharge conveyor accordingly.

The unit is to be accompanied by a U.S. Bureau of Mines certificate of approval for use in hard rock mines to the face, and also for use in coal mines if available.

It is also to be covered by the Bureau of Mines certificate of exhaust conditioning.

Beiers & Ridgway Pty., 318 Adelaide street, Brisbane.

Total Cost f.o.w. Brisbane—£14,720.

This type of shuttlecar, which is necessary for handling material to the faces from the dumps adjacent to the terminus of the main haulage, is manufactured in the U.S.A. and is the only such tender received.

(Note.—It is necessary for this unit to be reduced in width as abovementioned otherwise the order shall be cancelled.)

Item 6. *Belt Conveyors.*

1. Four only Mayor & Coulson Trunk Conveyors each 42 in. by 450 ft. per minute to deliver 600 tons per hour and fitted with M. & C. No. 5 drives and 175-h.p., 2,300-volt motors.

(a) Two units each 304 yds. to operate on adverse grade of 1 in 5.6;

(b) One unit 656 yds. to operate on grade of 1 in 26.6 favourable and 1 in 7.3 adverse.

(c) One unit 384 yds. to operate on adverse grade of 1 in 7.3.

Each conveyor to be complete with Vulcan Sinclair hydraulic coupling and all necessary head end structure, receiving hopper and totally enclosed tail pulley, and gravity take up (without counterweight).

Noyes Bros. (Sydney) Ltd., 197 Elizabeth street, Brisbane.

All starters, switches, sequence control and protective equipment are included at a total cost of £1,600 and this gear shall be as laid down with Noyes Bros. Engineers at Collinsville on 4th and 5th December and be subject to further discussion and possible amendment when full details of the scheme being prepared by Noyes Bros. are to hand.

No stools are required for these conveyors and the variation of cost for these and for the substitution of 2,300-volt motors is to be plus or minus our account.

Cost f.o.r. Collinsville:—

(a) Two units each £15,573	31,146
(b) One unit at £23,150	23,150
(c) One unit at £13,842	13,842
Plus 156 yds. of extensions structure at £21 10s. Od. per yd.	3,354
Total cost of Trunk Conveyor ..	£71,492

The approximate requirements are 9,912 ft. of 42 ins. by 42 ozs. 6-ply belting with 1/8-in. top and 1/16-in. bottom at 156s. 5d. less 15 per cent. .. £58,171

2. Two only Mayor & Coulson subsidiary conveyors, each 42 ins. by 450 ft. per minute to deliver 600 tons per hour and fitted with M & C No. 3 drives and 45-h.p., 415-volt motors.

Each unit to be 200 yds. in length and complete with Vulcan Sinclair coupling and all head end, receiving hopper and tail pulley structure and 30 ft. loop take up with tensioning winch.

All starters, switchgear, sequence control and protective equipment are included at a total cost of £800 and this gear shall be as laid down with Noyes Bros. Engineers at Collinsville on 4th and 5th December, and be subject to further discussion and possible amendment when full details of scheme being prepared by Noyes Bros. are to hand.

Noyes Bros. (Sydney) Ltd., Elizabeth street, Brisbane.

Cost f.o.r. Collinsville :-

Two units £7,410 each .. £14,820

Approximate requirements of 1,260 ft. of 42 ins. by 42 ozs. 6-ply belting with 1/8-in, top and 1/16-in. bottom at 156s. less 25 per cent. . £7,395

These units otherwise are generally as contained in Tender No. 5 and and in letters of 14th November and 13th December.

These M. & C. conveyors are recommended for the following reasons:—

This is a heavy duty conveyor manufactured in Great Britain and it covers the greater length per unit of any tender. It also has the belt more firmly supported due to its 5 idler pattern and the type of idler, which permit of lubrication by the user, is also an advantage.

The greater length per flight means less machinery underground and less dust producing transfers of coal.

This type of conveyor is also backed up by a distributing firm, which has given an excellent after-sales service in the Coal Industry for many years.

The price is slightly less than that of other tenders, where a comparison can be established.

Item 7. Chain Face Conveyors.

Underhill Day & Co. Ltd., 135 Queen street, Brisbane.

Fifteen only "British Jeffrey Diamond" 61—WEI conveyors generally as illustrated and described in catalogue No. 82 herewith. Each conveyor 100 yds. long and comprising equipment as set out in Tender No. 12, item 8, C. with the following variations :-

All motors, starters and control gear are to be of flameproof type and starters and control gear are to be of Security Electric type and to permit of—

(a) Automatic interlocking with trunk belts and/or subsidiary conveyors.

(1)) Isolating of each conveyor for manual operation and reversing of same.

In respect of this British Jeffrey Diamond engineers are to work in co-operation with Messrs. Noyes Bros. engineers, who shall be designing and installing the belt control equipment.

Each unit is to be mounted on skids.

To enable each conveyor to be extended to its maximum length we also require :-

495 intermediate sections each 6 ft. long and 84 ins. deep.

495 lengths each 12 ft. ins. of "Hercules 131" all steel scraper chain with flights.

These units to be shipped 5-6 months from receipt of order, to coincide with delivery of loaders and cutters in terms of letter of 19th November,

The equipment otherwise is to comply with tender No. 12 (item 8C) in all respects and the price to be £3,210 per 100 yds. unit, and £13 7s. Od. plus 14 per cent. for each 6 ft. intermediate section, complete with 12 ft. ag- ins. of chain.

	£ s. d.
Total Cost f.o.r. Brisbane-	48,150 0 0
	7,533 8 0
	£55,683 8 0

This recommended type of conveyor is constructed in the United Kingdom and was the only tender received to come close to our specifications for capacity and length.

Item 8. 150 *kVA Transformers,* 1,050/415-volt.

(a) None required.

Item 8. 150 *kVA Transformers,* 2,300/415-volt.

(b) Four only English Electric 150 kVA 3-phase, 50-cycle oil immersed air-cooled mobile mining type transformers having a no load voltage ratio of 2,300/415 between phases. Built to comply with B.S.S. 171/1936 and also B.S.S. 355/1939, Part 1 and 2A (Mining-type transformers and with the requirements of the Coal Mining Regulations for the installation in a non-danger zone).

(The transformer tanks are not of flameproof construction as provided in B.S.S. 229/1940 for flameproof enclosures).

Designed for standard iron and copper losses of 656 watts and 2,700 watts, respectively at 75°C. provided with H.V. switchgear and K.V. and L.V. Flit plugs and flit plug adaptors. Other fittings, &c., being as detailed on pages 6-10 of the specifications. Supplied complete in the first instance with a filling of Pool transformer oil.

Price each delivered f.o.r. Collinsville, £1,045.

Total Cost (4 units) f.o.r. Collinsville £4,180.

The English Electric Co. Ltd., 146-160 Mary street, Brisbane.

Each of the above is to be fitted with steel 12-in. diameter wheels for a 2-ft. gauge track.

Switchgear for above price is a H.V. breaker with overcurrent and earth leakage protection of the L.V. windings and outgoing feeder being provided from this breaker.

Each unit to have tappings for plus 5 per cent. and 10 per cent. for both H.V. and L.V. and to be be connected in H.V. Delta/L.V. Star with neutral point brought out.

We desire each of these units to be also fitted with a L.V. circuit breaker, the price of which shall be to our account.

This type of transformer is recommended due to its delivery date being the only suitable one. Its price also is in a very low range.

Item 9. *Portable Mercury Are Rectifiers.*

None required.

Item 10. 100-amp. *Double Outlet Gate-end Boxes.*

Ten only C.P. "Security Electric" 100-amp. double outlet panel gate-end boxes with continuous earth test and core balance earth leakage protection, each fitted with two flit plug receptacles and two B.S. receptacles mounted on skids.

Noyes Bros. (Syd ne) Ltd., 197 Elizabeth street, Brisbane.

	£ s. d.
Price each, £260 3s. Od.	
Price for ten (10)	2,601 10 0
Twenty only Standard flit plugs with clamps for P.I.L.G. S.W.A. cable for use with boxes above	
Price each, £7 17s. Od.	
Price for twenty (20) ..	157 0 0
Twenty only Standard 100-amp. B.S. plugs for use with boxes above	
Price each, £8 2s. Od.	
Price for twenty (20) ..	162 0 0
Total cost f.o.r. Collinsville ..	£2,920 10 0

Item 11. Single Outlet Gate-end Boxes D.C.

None required.

Item 12.
Item 13. *Cables for loading Machines and Coal Cutters.*

Six hundred yds. 4-core 163/ • 018, 660-volt, tinned copper conductor, vulcanised rubber insulated. Four cores twisted around a cradle centre, filled and sheathed with tough rubber, trailing cable, type 2 to A.S. C81.

This cable to be manufactured by C.M.A. of Liverpool, New South Wales, and to be supplied on suitable drums in multiples of 100 yds.

Price per 100 yds., £156 15s. 4d.

Total Cost f.o.r. Collinsville, £940 12s. Od.

W. T. Henleys Telegraph Works Co. Ltd., Elizabeth street, Brisbane.

Whilst all C.M.A. and Olympic cables are of uniform price my experience in use has been in favour of C.M.A. for general service and ability to stand up to the rough usage underground. As the greatest weakness in any mechanized section is the cables, this is most important.

There are decided objections to purchasing cables from more than one supplier and I recommend that all cables for Collinsville be obtained from W. T. Henleys Telegraph Works Co. Ltd., who I understand can provide us with high tension cable, which normally takes an extremely long time for delivery, at very short notice.

If the cables from any colliery are split up amongst many suppliers then we have an impossible task to keep track of service details and allocation of responsibility if one proves faulty.

At a later date we can, if necessary, purchase all the cables for other projects from another supplier to keep a balance.

Item 14. *Cables for 32-volt Borers.*

None required.

Item 15. *Cables for Shuttle Cars.*

None required.

Item 16. *Cables for Face Reticulation.*

Two thousand yds. 4-core 19/ •083, 660-volt C.M.A. cable. Tinned copper conductors, vulcanised rubber insulated twisted together, filled and sheathed with tough rubber, Ref. No. 5184. To be supplied on suitable drums in lengths of 300 yds.

W. T. Henleys Telegraph Works Co. Ltd., Elizabeth street, Brisbane.

Price per 100 yds., £212 ls. 4d.

Total Cost f.o.r. Collinsville, £4,241 6s. 8d.

Whilst all C.M.A. and Olympic cables are of uniform price my experience in use has been in favour of C.M.A. for general service and ability to stand up to the rough usage underground. As the greatest weakness in any mechanised section is the cables, this is most important.

There are decided objections to purchasing cables from more than one supplier and I recommend that all cables for Collinsville be obtained from W. T. Henleys Telegraph Works Co. Ltd., who I understand can provide us with high tension cable, which normally takes an extremely long time for delivery, at very short notice.

If the cables from any colliery are split up amongst many suppliers then we have an impossible task to keep track of service details and allocation of responsibility if one proves faulty.

At a later date we can, if necessary, purchase all the cables for other projects from another supplier to keep a balance.

Yours faithfully,

Under Secretary.

The Manager,
State Stores Board,
Brisbane.

COPY.
LC/JC

STATE STORES BOARD (QUEENSLAND).

Your Reference
51.194
Our Reference
F.2372/3

50 Margaret street,
Brisbane, B.7
16th November, 1951.

Sir,

Following previous correspondence concerning tenders for Coal Loaders, &c., for use in the mechanization of the State Coal Mine, Collinsville, I have now to advise that tenders closed at the Office of the Board at 11 a.m. on 15th November, 1951.

I attach Schedule giving the names of tenders received.

I also attach copies of letters received from the following :-

J. 0. Critchlow,

John Carruthers & Co. Pty. Ltd.

All tenders, including duplicates where submitted, are forwarded for your consideration and advices.

Yours faithfully,

(Sgd) R. J. WRENCH,
Manager, State Stores.

The Under Secretary,
Department of Mines,
Brisbane.

COPY.

SCHEDULE OF TENDERS RECEIVED.

TENDER No. C259—COAL LOADERS ETC. A/c. S.C.M. COLLINSVILLE.

1. John Carruthers and Co.
2. Goodyear Tyre and Rubber Co.
3. Siemens Aust. Ltd.
4. English Elect. Co. Ltd.
5. Noyes Bros. Pty. Ltd.
6. Australian General Elect. Co.
7. British General Elect. Co.
8. Joy Sullivan Co. (Beiers and Ridgway)
9. do. (Alternative)
10. Parbury Henty and Co.
11. Queensland Machinery Co. (Marine and Ind. Power Co. Pty. Ltd.)
12. Underhill Day and Co.
13. do. (Alternative)
14. Gilbert Lodge and Co.
15. Johnson and Phillips Ltd.
16. A. Sargeant and Co. (Railway, Mine and Plantation Equipment Ltd.)
17. E. A. Anderssen
18. Lambert Rectifiers Pty. Ltd.
19. Trackson Bros. Pty. Ltd.
20. The Lawrence and Hanson Elect. Co. (Q) Ltd.
21. W. T. Henleys Telegraph Works Pty. Ltd.
22. Synchronome Elect. Co.
23. Electric Control & Engineering Ltd. (Late)

(COPY)

JOHN CARRUTHERS & CO. PTY. LTD.

90 Ocean street,
Edgecliff, New South Wales,
14th November, 1951.

The Manager,
State Stores Board (Queensland),
50 Margaret street,
Brisbane, QLD.

Dear Sirs,

MECHANIZATION EQUIPMENT-STATE COAL MINES, COLLINSVILLE--SPECIFICATION C.259.

With reference to the belt conveyors covered by the above specification, we did not submit a quotation for these in our tender as our Principals, Messrs. Goodman Manufacturing Company, had not forwarded us the relevant data.

However, we have now received their authorisation to submit a quotation to you for these items, and if you would be prepared to accept an offer for these units as a late tender, we would be able to have the prices and full details in your hands within 14 days.

If this suggestion is acceptable to you, it would be appreciated if you would forward us further copies of the blue prints which accompanied the specification so that we may offer suitable units.

Yours faithfully,

JOHN CARRUTHERS & CO. PTY. LTD.
(Sgd) L. G. GOLOMB
Mining & Metallurgical Dept.

COPY.

J. 0. CRITCHLOW, Secretary, A.C.M.A.
Scottish House,
19 Bridge street,
Sydney.
14th November, 1951.

The Chairman,
The State Stores Board,
50 Margaret street,
Brisbane, QLD.

Dear Sir,

RE TENDER No. C259.

TENDERS CLOSE 15/11/1951.

I have been requested by Cable Makers Australia Pty. Ltd., Liverpool, N.S.W., to inform you, on behalf of those C.M.A. distributors by whom tenders will be submitted for Rubber Insulated Cables against the above Tender, that the cables manufactured by Cable Makers Australia Pty. Ltd. are guaranteed against defect for a period of twelve (12) months from date of delivery into your store.

Yours faithfully,

(Sgd) J. CRITCHLOW,
Secretary,
Australian Cable Makers' Association.

TENDERS.

Folio 1. Cables-32-volt Boring Machines.
2. Cables-Coal-Cutting Machines.
„ 3. Cables-Face loading machines.
„ 4. Cables-Face Reticulation.
„ 5. Cables-Shuttle Cars.
6. Coal-Boring Machines, 32-volt hand-held.
7. Coal-Cutting Machines.
8. Coal Loading Machines.
„ 9. 30-in. Troughed Belt Conveyors.
„ 10. Belt Conveyors-36-in.
„ 11. Belt Conveyors—X12-in.-200-yd. units.
„ 12. Belt Conveyors-42-in. Trunk.
„ 13. Chain Conveyors-100-yd. units.
„ 14. Gate-End Boxes, 100-amp., D.C., single unit.
„ 15. Gate-End Boxes, 100-amp., Double-sided.
„ 16. Rectifiers-Mobile Mercury Arc.
„ 17. Shuttle Cars.
„ 18. Transformers-Boring Machines, 415/32-volt.
„ 19. Transformers, 2,300/415, 1,050/415, Portable Mining Type, 150 kVA.

SCHEDULE OF TENDERS RECEIVED.

TENDER No. C259 COAL LOADERS ETC. A/c. S.C.M. COLLINSVILLE.

1. John Carruthers and Co.
2. Goodyear Tyre and Rubber Co.
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4. English Elect. Co. Ltd.
5. Noyes Bros. Pty. Ltd.

6. Australian General Elect. Co.
7. British General Elect. Co.
8. Joy Sullivan Co. (Beiers and Ridgway)
9. do. (Alternative)
10. Parbury Henty and Co.
11. Queensland Machinery Co. (Marine and Ind. Power Co. Pty. Ltd.)
12. Underhill Day and Co.
13. do. (Alternative)
14. Gilbert Lodge and Co.
15. Johnson and Phillips Ltd.
16. A. Sargeant and Co. (Railway, Mine and Plantation Equipment Ltd.)
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18. Lambert Rectifiers Pty. Ltd.
19. Trackson Bros. Pty. Ltd.
20. The Lawrence and Hanson Elect. Co. (Q) Ltd.
21. W. T. Henleys Telegraph Works Pty. Ltd.
22. Synchronome Elect. Co.
23. Electric Control & Engineering Ltd. (Late)

TENDER C259—CABLES-32-VOLT BORING MACHINES.

Firm.	Description.	Delivery Months Collinsville.	Price per 100 yds. fox. Collinsville.	Conditions of Sale.
			£ s. *d.*	
Siemens (Australia) Pty. Limited, 132-4 Charlotte St., Brisbane	C.M.A. Cables. 110/.0076, 250 volt, 4-core V.I.R., cradle centre, short lay and T.R.S. overall	Approx. 15 months ex Works Liverpool, N.S.W.	..	Based on existing rates and wages and subject to variations
Noyes Bros. (Sydney) Ltd., 197 Elizabeth St., Brisbane	C.M.A. Cables. *Ditto* to Siemens above	As above ..	49 1 11	As above
Gilbert Lodge & Co. Ltd., 127 Eagle St., Brisbane	Olympic Cables. Type S 1492, 322/.0076, 5-core, 250 volt, cores laid around a rubber filler, short lay, filled and sheathed with T.R.S. O.D. 1.08 ins.	9 months Collinsville	80 18 1	As above
Johnson & Phillips Ltd., 80-82 William St., Sydney	*Ditto* to Siemens and Noyes Bros.	Approx. 15 months Liverpool, N.S.W.	50 1 11	As above
Lawrence & Hanson Elec. Co. (Qld.) Ltd., 85 Elizabeth St., Brisbane	*Ditto* to Siemens and Noyes Bros.	Approx. 15 months Liverpool, N.S.W.	50 1 11	As above
W. T. Henleys Tele. Works Co. Ltd., 59 Elizabeth St., Brisbane	*Ditto* to Siemens and others ..	15 months Liverpool, N.S.W.	49 1 11	As above
Synchronome Elec. Co. of Aust. Ltd., 195 Elizabeth St., Brisbane	Olympic Cables. *Ditto* to Gilbert Lodge	9 months	80 0 0	As above

TENDER C259—CABLES—COAL-CUTTING MACHINES.

Firm.	Description.	Delivery Months Collinsville.	Price per 100 yds. f. o.r. Collinsville.	Conditions of Sale.
			£ s. d.	
Siemens (Australia) Pty. Limited, 132-4 Charlotte st., Brisbane	C.M.A. Cables. 163/.018, 660 volt, 4-core, T.R.S. trailing cable, cradle centre, Type 2 to AS. No. C 81	Approx. 6 months ex Works Liverpool, N.S.W. 7 months Collinsville	..	Prices based on existing rates and wages and subject to variations
	Alternatively : 163/.018, 660 volt, 4-core, T.R.S. trailing cable, cradle centre, with galvanised steel strand armoured and T.R.S. overall. Type 21 to A.S. No. C 81	As above		
	Alternatively : 163/-018, 5-core, V.I.R. insulated trailing cable, cradle centre and T.R.S. overall. Type 30 B.S.S. 708	As above ..		
	Alternatively : 163/.018, 5-core, V.I.R. insulated cradle centre, T.R.S., galvanised steel strand armoured and T.R.S. overall. Type 22 to A.S. No. C 81	As above		
Noyes Bros. (Sydney) Ltd., 197 Elizabeth st., Brisbane.	C.M.A. Cables. *Ditto* to Siemens above	As above	156 15 4	As above
	Alternative quote	..	265 7 0	
	Alternative quote	..	224 4 2	
	Alternative quote	..	300 13 9	
Queensland Machy. Co. Ltd., 142 Albert st., Brisbane	British Type 7 to B.S.S. 708-5-core, 163/.018 individually screened	15 months Collinsville	396 0 0	As above
Gilbert Lodge & Co. Ltd., 127 Eagle st., Brisbane	Olympic Cables. Type No. S 669, 163/.018, 4-core, 660 volt grade. Each core V.I.R. insulated, cradle centre, filled and sheathed overall with T.R.S. 1.51 ins. O.D.	8 months	156 15 3	As above
	Alternatively : Olympic as above 5-core, No. S 1887, O.D. 1.67 ins.	8 months	224 4 1	As above
Johnson & Phillips Ltd., 80-92 William st., Sydney	*Ditto* to Siemens and Noyes Bros.	7 months	160 5 0	As above
	Alternative quote	As above	282 7 0	
	Alternative quote	As above	224 10 0	
	Alternative quote	As above ..	309 10 0	
Trackson Bros.Pty.Ltd., 157 Elizabeth st., Brisbane	Olympic Cables. *Ditto* to Gilbert Lodge above	8 months	156 15 0	As above
	Alternative quote	As above	224 10 0	
Lawrence & Hanson (Elec.) Co. (Qld.) Ltd., 85 Elizabeth st., Brisbane	C.M.A. *Ditto* to Siemens and others	7 months	160 5 0	As above
	Alternative quote	7 months	282 7 0	
	Alternative quote	7 months	224 10 0	
	Alternative quote	'7 months	309 10 0	
W. T. Henleys Tele. Works Co. Ltd., 59 Elizabeth st., Briebane	C.M.A. *Ditto* to Siemens and others	..	156 15 4	As above
	Alternative quote	..	265 7 0	
	Alternative quote	..	224 4 2	
	Alternative quote	..	300 13 9	
Synchronome Elec. Co. of Aust. Pty. Ltd., 195 Elizabeth st., Brisbane	Olympic Cables. *Ditto* to Trackson Bros.	..	156 15 0	As above
	Alternative quote	•.	224 10 0	

TENDER 0259—CABLES—FACE LOADING MACHINES.

Firm.	Description.	Delivery Months Collinsville.	Price per 100 yds. f. o.r. Collinsville.	Conditions of Sale.
			£ a. d.	
Siemens (Australia) Pty. Limited, 132-4 Charlotte st., Brisbane	C.M.A. Cables. 163/.018, 660 volt, 4-core T.R.S. trailing cable with cradle centre, type 2 to A.S. No. C 81	Approx. 6 months ex Works Liverpool, N.S.W., 7 months Collinsville	..	Based on existing rates and wages and subject to variations
	Alternatively : 163/.018, 660 volt, 4-core T.R.S. trailing cable, cradle centre, with galvanised steel strand armoured and T.R.S. overall, type 21 to A.S. No. C 81	As above		As above
Noyes Bros. (Sydney) Ltd., 197 Elizabeth st., Brisbane	C.M.A. Cable. *Ditto* to Siemens above	As above	156 15 4	As above
	Alternative quote		265 7 0	
Gilbert Lodge and Co. Ltd., .127 Eagle st., Brisbane	Olympic Cable. Type No. S 669, 163/.018, 4-core, 660 volt grade, four cores, V.I.R. insulated, cradle centre filled and sheathed overall with T.R.S. 1.51 ins. O.D.	8 months	156 15 3	As above
Johnson and Phillips, Ltd. 80-82 William st , Sydney	*Ditto* to Siemens and Noyes Bros.	..	160 5 4	As above
	Alternate quote		272 7 0	
Trackson Bros. Pty. Ltd., 157 Elizabeth st., Brisbane	Olympic Cables. *Ditto* to Gilbert Lodge	8 months	156 15 0	As above
Lawrence and Hanson Elec. Co. (Q1d.) Ltd., 85 Elizabeth st., Brisbane	C.M.A. Cables. *Ditto* to Siemens and Others	7 months ..	160 5 4	..
	Alternate quote		272 7 0	..
Synchronome Elec. Co. of Aust. Ltd., 195 Elizabeth st., Brisbane	Olympic Cables. *Ditto* to Trackson Bros.	8 months	156 15 0	..
W. T. Henleys Tele. Works Co. Ltd., 59 Elizabeth st., Brisbane	C.M.A. Cables. *Ditto* to Siemens and Others	..	156 15 4	..
	Alternative quote	..	265 7 0	..

TENDER C259—CABLES—FACE RETICULATION.

Finn.	Description.	Delivery Months Collinsville.	Price per 100 yds. f.o.r. Collinsville,	Conditions of Sale.
Siemens (Australia) Pty. Limited 132-4 Charlotto st., Brisbane	(A) C.M.A. Cables. 19/-083, 4-core T.R.S. Ref. No. 5184, C.M.A.	Approx. 6 months ex Works Liverpool, i.e. 7 months Collinsville	£ 8 *d.* 217 0 0 ex Bowen Port	Prices based on existing rates and wages and subject to variations
	(B) Alternatively: 19/-083, 660 volt 4-core V.I.R. insulated T.R.S. jute bedded and galvanised steel strand armoured with 7/-036 ins.	As above	285 0 0 ex Bowen Port	As above
	(C) Alternatively : 19/-083, 660 volt 4-core V.I.R. insulated T.R.S. jute bedded and singled galvanised steel wire armoured with 1/-128 ins.	As above	284 0 0 ex Bowen Port	As above
Noyes Bros. (Sydney) Ltd., 197 Elizabeth st., Brisbane	C.M.A. Cables. *Ditto* to Siemens above	As above	284 0 0 ex Bowen Port	As above
Gilbert Lodge and Co. Ltd., 127 Eagle st., Brisbane	(A) Olympic Cable. Type S 429 19/-083, 4-core, 660 volt, T.R.S. cores V.I.R. insulated-rubber centre, and filled and sheathed to O.D. of 1.61 ins.	12 months	212 1 3 Collinsville	As above
	(B) Alternatively : Type S 4345 as above and lapped with galvanised steel strands and sheathed overall with T.R.S. O.D. 2.19 ins.	12 months . .	438 8 3 Collinsville	As above
	(C) Alternatively : Type 5 4346 as above and lapped with galvanised steel strands and sheathed overall with T.R.S. O.D. 2.19 ins.	12 months	460 6 7 Collinsville -	As above
Johnson and Phillips Ltd., 80-82 William st., Sydney	*Ditto* to Siemens and Noyes Bros. above. C.M.A. Cables	. . . .	. . . .	
Trackson Bros. Pty. Ltd., 157 Elizabeth st., Brisbane	Olympic Cables. *Ditto* to Gilbert Lodge and Co. above	12 months . . . . 12 months . .	(A) 213 0 0 (B) 434 0 0 (C) 456 0 0	. . . .
Lawrence and Hanson Elec. Co. (Qld.) Ltd., 85 Elizabeth st., Brisbane	C. M. A. Cables. *Ditto* to Siemens and Others	. .	. .	
W. T. Henleys Telegraph Works Co. Ltd., 59 Elizabeth st., Brisbane	C.M.A. Cables. *Ditto* to Siemens and Others		. .	
Synchronome Elec. Co. of Aust. Pty. Ltd., 195 Elizabeth st., Brisbane	Olympic Cables. *Ditto* to Trackson Bros.	. .	. .	

TENDER C259—CABLES—SHUTTLE CARS.

Firm.	Description.	Delivery Months Collinsville.	Price per 300 yds. f.o.r. Collinsville.	Conditions of Sale.
Siemens (Australia) Pty. Ltd., 132-4 Charlotte st., Brisbane	C.M.A. Cable. 250 volt flat 3-core polychloroprene sheathed flexible cable with 2 power cores of 163/.020 each V.I.R. insulated and nylon braided, and 1-336/.010 nylon braided flat earth conductor centred between 2 power cores, the whole braided with whipcord and neoprene sheathed overall	Approx. 9 months ex Works Liverpool, N.S.W.	£ s. d. 142 0 0 ex Bowen Port	Prices based on existing rates and wages and subject to variations
Noyes Bros. (Sydney) Ltd., 197 Elizabeth st., Brisbane	C.M.A. Cable. *Ditto* to Siemens above	. .	. .	
Gilbert Lodge and Co. Ltd., 127 Eagle st., Brisbane	Olympic Cable. No. S 4112—Two distinct power cores 209/.018 with 326/.010 rubberised braided earth core and heavy-duty Olymprone sheathed overall, oval O.D. F32 ins. x 0.75 ins.	8 months	113 3 6 Collinsville	As above
Johnson and Phillips Ltd., 80-82 William st., Sydney	C.M.A. Cable. *Ditto* to Siemens and Noyes Bros.		. .	. .
Trackson Bros. Pty. Ltd., 157 Elizabeth., st. Brisbane	Olympic Cables. *Ditto* to Gilbert Lodge above	8 months	113 0 0	As above
Lawrence and Hanson Elec. Co. (Qld.) Ltd., 85 Elizabeth st., Brisbane	C.M.A. Cables. *Ditto* to Siemens and Others	7 months	. .	As above
W. T. Henley's Telegraph Works Co. Ltd., 59 Elizabeth st., Brisbane	C.M.A. Cables. *Ditto* to Siemens and Others	. .	. .	. .
Synehronome Elec. Co. of Aust. Pty. Ltd., 195 Elizabeth st., Brisbane	Olympic Cables. *Ditto* to Trackson Bros.	7 months . .	. .	. .

TENDER 0259—COAL-BORING MACHINES. 32-VOLT HAND-HELD.

Firm.	Description.	Delivery Months Collinsville.	Price f.o.r. Collinsville.	Conditions of Sale.
Noyes Bros. (Sydney) Ltd., 197 Elizabeth st., Brisbane	" Homac " 32-volt, 500 r.p.m., flameproof drill. Weight, 36 lb.	Ex stock, 1 month . .	£ s. d. 113 0 0	Price based on existing rates and wages and subject to variations
Balers and Ridgway Pty. 318 Adelaide st., Briebane	" Joy " C.D. 23 hydraulic coal-boring drill. For mounting on 10 R.U. cutter	9 months . .	2,0 0 0	As above, U.S.A.
Marine and Industrial Power Co. Pty. Ltd., Sydney, care of Q.M.C., Albert st., Brisbane	" Victor," 32-volt flameproof type	7 months	99 0 0	As above
Electric Control and Engineering Ltd., Toombul rd., Northgate, Brisbane	" Davy " model C. 700 r.p.m. . .	2 months	1,055 0 0	As above

TENDER C259—COAL-CUTTING MACHINES.

Firm.	Description.	Delivery Months Collinsville.	Price Cox. Collinsville.	Conditions of Sale.
			£ 8. d.	
Noyes Bros. (Sydney) Ltd., 197 Elizabeth st., Brisbane	Mayor and Coulson 34 F.S.T.—C., Caterpillar-mounted Areshearing coal-cutter, 415-volt, 3 phase, 50-cycle, complete with 100 yds. trailing cable	12 months, England 15 months, Collinsville	6,686 0 0	Price based on existing rates and wages and subject to variations
Beiers and Ridgway Pty., 318 Adelaide st., Brisbane	Joy-10 R.U. complete universal permissible rubber-tyred cutter, 415 volt, 3 phase, 50-cycle- Complete with cable reel and 100 yds. of cable. (Est. 15i tons)	9 months, Collinsville	21,097 0 0	As above, U.S.A.
Ditto	Joy-7B. shortwall coal-cutter, with 8-ft. bar and bug-duster and 100 yds. cable. (Est. 3i tons)	9 months, Collinsville	4,349 0 0 Collinsville	As above, ex U.K.
Ditto	Truck—Joy T.2 caterpillar-mounted machine truck for above (Est. 5 tons)	9 months, Collinsville	2,458 0 0 Collinsville	As above, ex U.K.
The Marine and Industrial Power Co. Pty. Ltd., Sydney, care of Queensland Machinery Co., 142 Albert st., Brisbane	Anderson Boyes " Dreadnought " Arcshearer 415 volt, 3-phase, 50 cycle, complete, without cable	15 months, Collinsville	7,970 0 0 Collinsville	As above, U.K.
Underhill Day and Co. Ltd., 135 Queen st., Brisbane	" Jeffrey " 29 U.C. completely universal crawler-mounted cutters with 100 yds. cable. (Est. 12 tons)	9 months, Collinsville	21,610 0 0 Collinsville	As above, ex U.S.A.
Ditto ..	" Jeffrey " U.R.B. approved type completely universal rubber-tyred coal-cutting machine, with 100 yds. cable. (Est. 12 tons)	9 months, Collinsville	20,286 0 0 Collinsville	As above, ex U.S.A.
E. A. Anderssen	" Eickhoff " universal coal-cutter. Very light short cutter bar and entirely unsuitable for Collinsville conditions	6 months	3,500 0 0	As above, ex Germany

TENDER 0259—COAL-LOADING MACHINE.

Firm.	Description.	Delivery Months Collinsville.	Price f.o.r. Collinsville.	Conditions of Sale.
John Carruthers and Co. Pty. Ltd., 90 Ocean st., Edgecliffe, N.S.W.	Goodman 665 trackless type complete with cable reel and 300 ft. of trailing cable. Loader has rate of loading of 9 tons per minute in 7 ft. 2 ins. wide, 28 ft. 10 ins. long, 3 ft. 7 ins. high. Weight 131 tons—Tramming speed 69 ft—90 ft. p.m. Caterpillars 4 ft 11 ins W.B.	Quoted 6-8 months, ex U.S.A. i.e. 9-11 months,	£ s. d. £19,355 f.o.w. Brisbane plus £243 for loading and freight to Collinsville, plus £700 £40 x 13 9 + 9 — £136 for supervising engineer. Price =E19,734, f.o.r. Collinsville	Price based on existing wage rates, handling, freight and insurance charges, and include custom duty 121 per cent., but are exclusive of primage and sales tax. Exchange rate based on 2.2 dollars per LA
Noyes Bros. (Sydney) Ltd., 197 Elizabeth st., Brisbane	Mayor and Coulson 4 T. high-capacity loader. No cable reel and 100 yds. of cable. Loading rate to 5 T. p.m. 5 ft. 4+ ins. wide long, high. Weight tons, tramming speed Caterpillars W.B.	12 months, England 15 months, Collinsville	£8,038 at Collinsville	As above, on rates G.B.
Beiers and Ridgway Pty., 318 Adelaide st., Brisbane	Joy 11 B.U. trackless loader with 100 yds. of cable. Loading rate 5-10 tons p.m., 7 ft. 2 ins. wide, 25 ft. long and 4 ft. 5 ins. high. Weight 10.4 tons. Speed Caterpillars 3 ft. on floor, 50 h.p.	6 months f.a.s. New York 9 months, Collinsville	£13,990 f.o.r. Collinsville	As above, U.S.A.
Ditto	Joy 14 B.U. trackless loader with 100 yds. of cable. Loading rate 5-8 tons p.m., 6 ft. 2 ins. wide, 24 ft. 8 ins. long and 2 ft. 101 ins. high. Weight 7.03 tons. Speed , Caterpillars 5 ft. 6 ins. wheelbase	6 months f.a.s. New York 9 months, Collinsville	£13,065 f.o.r. Collinsville	As above, U.S.A.
Queensland Machinery Co. Ltd., 142 Albert st., Brisbane	Clarkson, U.S.A. dual rubber-tyred Universal loader—With both ends mobile-8-10 tons p.m. 6 ft. wide, 42 ins. high and 28 ft. long. Weight 131 tons, 50-h.p. motor	None given	£14,620 f.o.r. Collinsvile	As above, U.S.A.
Underhill Day and Co. Ltd., 135 Queen st., Brisbane	Jeffrey type L 600 C crawler-mounted loading machine with 300 ft. of cable. Loading rate 8-10 tons p.m., 6 ft. 3 ins. wide, 30 ft. 6 ins. long and 4 ft. 2 ins. high. Weight 161 tons. Crawlers 5 ft. 6 ins. x 1 ft. 0 ins.	9 months, Collinsville	£16,620 f.o.r. Collinsville	As above, U.S.A.

TENDER C259-30-INCH TROUGHED BELT CONVEYORS.

Firm.	Description.	Delivery Months Collinsville.	Price f.o.r. Collinsville.	Conditions of Sale.
Underhill Day and Co. Ltd., 135 Queen st., Brisbane	British Jeffrey Diamond Type 52 B. belt conveyor-480-ft. centres to operate on grade of 1 in 9.5, with or against load. Fluid coupling 30 hp.-400 ft. p.m. and 350 tons per hr. (Est. 10 tons)	15 months, Collinsville	£4,522 Belt for above : nett s. d. Dunlop 84 10 p. f. 90 7 p.f. Goodyear 69 10 p.f. 175 0 p.f.	Prices based on existing rates and wages and subject to variations
	Ditto to above—at 940-ft. centres with 60 h.p. motor. (Est. 19 tonal		£6,068 (Belts as above)	As above

TENDER C259—BELT CONVEYORS, 36-INCHES.

Firm.	Description.	Delivery Months Collinsville.	Price Los. Collinsville.	Conditions of Sale.
Noyes Bros. (Sydney) Ltd., 197 Elizabeth st., Brisbane	Mayor and Coulson, 36 ins. x 600 ft. centres, No. 3 drive-45 h.p., 450 ft. p.m., 450 tons p.hr., inverted trough type structure, with 5 idler top rollers at 4 ft. and bottom rollers at 12 ft. centres and winch take up	12 months, Collinsvile	£6,151	Price based on existing rates and wages and subject to variations
	Extensible pans £13 15s. per yd. Belt for above with 5-yd. loop 36 ins. x 32 oz. x 6 ply Fin. and 1/16-in. at 100s. 3d. — 25 per cent., price per unit complete	..	£4,624	
			£10,775	
Underhill Day and Co. Ltd., 135 Queen st., Brisbane	British Jeffrey Diamond 52 B, 36 ins x 558 ft. with fluid coupling, 3 idler type-60 h.p.—400 ft. p.m., capacity tons per hr.	15 months	£5,705 Belt for above : Dunlop 106s. nett Goodyear 86/10 ins.	As above
Ditto	British Jeffrey Diamond, as above at 540-ft. centres	15 months	£5,610 Belts as above	As above
Ditto	British Jeffrey Diamond, as above at 525-ft. centres	15 months	£5,545 Belt as above	As above
Ditto	British Jeffrey Diamond, as above at 450-ft. centres	15 months	£5,300 Belt as above	As above
Ditto	British Jeffrey Diamond, as above at 673-ft. centres	15 months	£6,250 Belt as above	As above
Ditto	British Jeffrey Diamond, as above at 2,140-ft. centres	15 months	£11,440 . Belt as above	As above
Parbury Henty & Co. Pty. Ltd., 297 Adelaide st., Brisbane	Two units required of this price. " Huwood ' 36-in. conveyor—Zidler 40 h.p.-360 ft. p.m. x 352 tons per hr. 480-ft. centres, 9-ft. sections, 4 ft. 6-ins. top idlers	11 months	£4,150 Belt : £3,212	As above
Ditto	Ditto to above, 1,660-ft. centres with 80-h.p. motor	11 months	£11,260 Belt : £14,573	As above
Ditto	Ditto to above, 2,160-ft. centres with 80-h.p. motor	11 months	£13,415 Belt : £18,255	As above
R.R.M. and P. Equipment Ltd., England, care of A. Sargeant and Co., Albert st., Brisbane	Cowlishaw Walker 36-ins. trunk belt Zidler conveyor, 480-ft. centres, 60 h.p. x 350 p.m.	30 months	£3,884 f.o.b. Belt : England £3,067	As above
	As above, 942-ft. centres (All switchgear extra)	ditto	£6,016 Belt : ditto £6,115	

iSCHEDULE

TENDER C259—BELT CONVEYORS, 42 INCH-200 YARDS UNITS.

Firm.	Description.	Delivery Months Collinsville.	Price f.o.r. Collinsville.	Conditions of Sale.
Noyes Bros. (Sydney) Ltd., 197 Elizabeth st., Brisbane	Mayor & Coulson 42-ins. No. 3 Drive, 45 h.p., 450 ft. p.m., 600 tons per hr.—Stringer type structure-200 yds. centres, 5 idler top rollers at 4 ft. centres and bottom rollers at 8 ft. centres with winch take up Extensible pans £21 10s. per yd. Belt for above, with 5 yd. loop-42 ins. x 42 oz. x 6-ply, 1/8 in. and 1/16 in. at 117.375s. per ft. net (f.o.w. Brisbane)	12 months Collinsville	7,410 £7,219 £14,629 Plus £60 freight to Collinsville on belt.	Prices based on existing rates and wages and subject to variations
Parbury Henty & Co. Pty. Ltd., 297 Adelaide st., Brisbane	Huwood 42-in. conveyor, 3,588 ft. over a total lift of 605.9 ft., 370 ft. p.m. x 508 tons p.h.-80 h.p. motors—(7 units) As above. 859 ft. centres with 80 h.p. As above. 2,140 ft. centres with 80 h.p. Huwood 48-in. conveyor, 566 ft. in length, 306 ft. on level grade and 260 ft. on 1 in 3.5 against the load. Speed 400 ft. Capacity 756 tons p.h. II.P. =130 Belting 6-ply, 42 oz. duck, 1/8 in. and 1/16 in. (Note : Original scheme cost f.o.w. Brisbane) Gear £128,355 Belt £104,194 £232,549	11 months . . 11 months 11 months . . 11 months . .	54,560 32,807 Belt 9,605 7,647 Belt 15,390 17,382 Belt 17,580 7,059	As above F.O.W., Brisbane
A. Sargeant & Co. Pty. Ltd., Brisbane	Cowlishaw Walker 42-in. Trunk belt, 3 idler conveyor, 579 ft. centres-70 h.p. x 350 ft. p.m. As above. 333 ft. centres As above. 690 ft. centres As above. 2,124 ft. centres. As above. 567 ft. centres	30 months . . 30 months 30 months 30 months 30 months	5,296 4,311 Belt 4,363 2,503 Belt 5,722 5,127 Belt 11,161 15,711 Belt 5,250 4,223 Belt	As above ?.F.O.B. England, (Switchgear to be added)

TENDER 0259—BELT CONVEYORS, 42-INCH TRUNK.

Firm.	Description.	Delivery Months Collinsville.	Price f.o.r. Collinsville.	Conditions of Sale.
Noyes Bros. (Sydney) Ltd., 197 Elizabeth et., Brisbane	No. 1 Tunnel—Conveyor from surface to 304 yds. mark —42 ins.—450 ft. p.m. on 1 in 5.6 grade to deliver 600 tons p.h. M.C. No. 5 drive with Vulcan Sinclair coupling-175 h.p. S.C. motor—Stringer type pans-5 idler rollers at 4 ft. centres top and 8 ft. centre return rollers	12 months, f.o.b. England	£ 15,573	Prices based on existing rates and wages and subject to variations
	No. 1 Tunnel—No. 2 Unit similar to above	As above ..	15,573	
	No. 3 Heading (West), No. 1—Conveyor similar to above at 656 yds. centres on grade 1 in 26.6 (favourable) and 1 in 7.3 (adverse)	As above ..	23,150	
	No. 3 Heading (West), No. 2 Conveyor similar to above at 192 yd. centres on grade of 1 in 7.3 (adverse). This shall take 85 h.p. to commence and could be provided with such a motor and fitted with 175 h.p. later. Extensible pans at £21 10s. per yd.	As above	13,843	
	Total for 1,456 yds. complete with switchgear and controls at £400		68,139	
	Belt for above f.o.w. Brisbane, 42 in. x 42 oz. 1/8 in. x 1/16 in. 6-ply Dunlop (1.476 yds. plus 20 yds.) (loops) x 2 x 3 at 156s. 5d. per ft.-25 per cent.		51,973 13 0	
	Total for complete Trunk ..	..	120,113	

TENDER 0259—CHAIN CONVEYORS-100 YARD UNITS.

Firm.	Description.	Delivery Months Collinsville.	Price f.o.r. per 100 yds. lengths Collinsville.	Conditions of Sale.
Noyes Bros. (Sydney) Ltd., 197 Elizabeth st., Brisbane	Mayor and Coulson scraper chain conveyor-180 tons per minute. Speed 135 ft. p.m. with 20 h.p. motor (flameproof). Extensible quickly and readily in 6-ft. sections to a maximum of 100 yds.	12-15 months ..	£ 2,918	Price based on existing rates and wages and subject to variations
Balers and Ridgway Pty., 318 Adelaide st., Brisbane	" Joy " 20-in chain conveyor 300 ft. centres, 20 h.p. motor, 415-V. 50 cycle (Est. 12 tons)	6 months, Glasgow .. 9 months, Collinsville	3,082	As above
Parbury Henty and Co. Pty. Ltd., 297 Adelaide st., Brisbane	" Huwood " H.S. 5 chain conveyor-150 tons p.h., speed 125 ft. p.m.-25 h.p. flameproof motor, 6-ft. extensible sections to a maximum of 100 yds. (Est. 12 tons)	12 months	3,060	As above
Underhill Day and Co. Ltd., 135 Queen st., Brisbane	British Jeffrey Diamond chain conveyors 61—W.H. type, 25 h.p. motor. Extensible to 500 ft. in 6-ft. sections-140 ft. per minute, 180 tons p.h.	15 months	3,270	As above
R.M.P. Equipment Ltd., England, care of A. Sargeant and Co., Albert st., Brisbane	" Cowlishaw Walker," ' 20 ' chain conveyor with 40 h.p. structures and 30 h.p. motor (Est. 12 tons)	12 months	2,966	As above

TENDER C259—GATE-END BOXES, 100-AMP., D.C., SINGLE UNIT.

Firm.	Description.	Delivery Months Collinsville.	Price f.o.r. Collinsville.	Conditions of Sale.
			£ s. d.	
Parbury Henty and Co. Pty. Ltd., 297 Adelaide st., Brisbane	Belmos type G.E.D. 100-amp. units for 250/275-volts D.C. with solenoid overload trips and 2 rate oil dash pots	7 months	171 0 0	Price based on existing rates and wages and subject to variations
Underhill Day and Co. Ltd., 135 Queen st., Brisbane	Electric Control and Engineering type DNL/IVC 100-amp. cones for 250-volt D.C. with continuous test and earth leakage pro- protection	7 months	248 0 0	As above
Electric Control and Engineering Ltd., Toombul rd., North-gate, Brisbane	As item above	7 months	219 3 3	As above

TENDER 0259—GATE-END BOXES, 100-AMP., DOUBLE-SIDED.

Firm.	Description.	Delivery Months Collinsville.	Price f.o.r. Collinsville.	Conditions of Sale.
			£ s. d.	
Noyes Bros. (Sydney) Ltd., 197 Elizabeth st., Brisbane	Security Electric standard 100-amp. double-sided gate-end box, complete with earth leakage protection of core balance type and continuous earth test	9-12 months	260 3 0	Price based on existing rates and wages and subject to variations
British General Electric Company Pty. Ltd., 371-373 Adelaide st., Brisbane	Standard G.E.C. type FMU. 2-panel gate-end switchboards for 450 volt, 3-phase, 50 cycle, 80-amp. purposes complete with overloads and core balance and earth leakage	6 months ..	692 0 0	As above
Parbury Henty and Co. Pty. Ltd., 297 Adelaide st., Brisbane	Belmos type GEA. 130-amp., 415 volt, 3-phase, 50 cycle A.C. double unit gate-end boxes, fitted with overload and earth leakage protection	7 months	445 0 0	As above
Marine, Industrial Power Co. Pty. Ltd., care of Q.M.C., 142 Albert st., Brisbane	Anderson Boyes double-sided units, core balance, earth leakage, &c.	9 months	724 0 0	As above
Underhill Day and Co. Ltd., 135 Queen st., Brisbane	Electric Control and Engineering type CB. 200 BS. boxes with two 100-amp outlets, 3-phase, core balance and continuous test, with circular quick-opening door	6 months	356 0 0	As above
Electric Control and Engineering Ltd., Toombul rd., North-gate, Brisbane	As item above	6 months ..	322 16 7	As above

TENDER 0259—RECTIFIERS—MOBILE MERCURY ARC.

Firm.	Description.	Delivery Months Collinsville.	Price f.o.r. Collinsville.	Conditions of Sale.
The English Electric Company Limited, 140-160 Mary st., Brisbane	English Electric 50 k.W. 250 volt 200-ampere D.C. mobile mercury arc rectifier—A.C. input 415, 3-phase, 50 cycle	11 months England 14 months Collinsville	£2,430	Based on existing rates and wages and subject to variations
Parbury Henty and Co. Pty. Ltd., 297 Adelaide st., Brisbane	Bruce Peebles Portable mercury arc rectifier A.C. input, 415 volt, 3-phase, 50 cycle and D.C. 50 k.W. 250 volt	13 months, Collinsville	£1,555	As above
Underhill Day and Co. Ltd., 135 Queen st., Brisbane	" Nevelin " mercury arc rectifier, portable on four pneumatic wheels, 415 A.C. to 250 D.C.-180-amp. With all instruments and protection	9 months	£1,406	As above
Underhill Day and Co. Ltd., 135 Queen st., Brisbane	*Ditto* to above only a twin unit ..	9 months	£2,162	As above
Lambert Rectifiers Pty. Ltd., 43-49 Crockford st., Port Melbourne	Electric Construction Co., England, single bulb rectifier, 50 k.W. 250 V. 200-amps. On rubber wheels and with all protection and meters	15 months	£2,031	As above

TENDER 0259—SHUTTLE CARS.

Firm.	Description.	Delivery Months Collinsville.	Price f.o.r. Collinsville.	Conditions of Sale.
John Carruthers and Co. Pty. Ltd., 90 Ocean st., Edgecliffe, N.S.W.	Goodman 570-571 type cable reel shuttle cars complete with cable, 4 wheel drive and steer-3-5 to 4 m.p.h., 10 h.p. traction motors–elevated head and automatic cable reel. Weight = 74 tons. Capacity 204 to 197 c.f. 7 ft. 6 ins. wide, 4 ft.-4 ft. 6 ins. high, 23 ft. –25 ft. 2 ins. long	12-15 months ex U.S.A. i.e. 15-18 months Collinsville	£13,272 f.o.w. Brisbane, plus £140 for loading and freight to Collinsville and £136 for supervising Engineer for 13 weeks Price = £13,548	Price based on existing wage, handling, freights, and include custom duty 12i per cent., but exelude primage and sales tax. Exchange based on 2.2 dollars per £A
Beiers and Ridgway Pty., 318 Adelaide st., Brisbane	Joy permissible rubber -tyred 10 S.C. shuttle cars 10 S.C. cable reel type with elevated head-250-volt D.C., 15 h.p. traction motors, 350 c.f. capacity—with automatic reel and 600 ft. of cable (Est. 15 tons)	6 months f.a.s. New York 9 months Collinsville	£14,790	As above U.S.A.
	Joy 5 S.C. *ditto* 260 c.f. (Est. 10 tons)	6 months f.a.s. New York 9 months Collinsville	£11,690	As above, U.S.A.
	Joy 60—E-12 Diesel shuttle car—82 h.p. General Motors diesel engine—completely air-conitioned (U.S. Bureau of Mines No. 24), 0-6 m.p.h., length 25 ft., width 8 ft. 1 in.—capacity 285 c.f. —load to 14 tons. Will operate on 1-4 grade. (Est. 15 tons)	9 months Collinsville	£14,990	As above U.S.A.
Underhill Day and Co. Ltd., 135 Queen st., Brisbane	Jeffrey 66—C shuttle car—cable reel 4 wheel drive and steer with elevated head, 250-volt D.C. 10 h.p. traction motors, 310 c.f. automatic reel and 550 ft. of cable (Est. 9 tons)	9 months Collinsville	£10,100	As above, U.S.A.

TENDER 0259—TRANSFORMERS—BORING MACHINES. 415/32V.

Firm.	Description.	Delivery Months Collinsville.	Price f.o.r. Collinsville. £ s. d.	Conditions of Sale.
Noyes Bros (Sydney) Ltd., 197 Elizabeth st., Brisbane	" Homac " 415/32-volt drill control units for mounting upon coal cutters, or standing upon ground on skids	Ex stock one month to Collinsville	103 0 0	Prices based on existing rates and wages and subject to variations
Marine and Industrial Power Co. Pty. Ltd., Sydney, care of Queensland Machinery Co. Ltd., 142 Albert St., Brisbane	Victor Drill control panel for 32 volt	7 months Collinsville	109 0 0	As above
Electric Control and Engineering Ltd., Toombul Rd., Northgate, Brisbane	C.B.A. 10 S. Type " Protektrol ", 1.5 k.V.A. 3-phase transformer with solenoid overloads	2 months	113 11 4	As above

TENDER 0259—TRANSFORMERS 2,300/415. 1,050/415. PORTABLE MINING TYPE 150 K.V.A.

Firm.	Description.	Delivery Months Collinsville.	Price f.o.r. Collinsville.	Conditions of Sale.
English Electric Corn-pany Limited, 140-160 Mary st., Brisbane	English Electric 150 k.V.A. 3-phase, 50 cycle, 2,300/415 transformer switch units. Built to B.S.S. 171/1936 & B.S.S. 355/1939 and with the requirements of the Coal Mining Regulations for installation in a non-danger zone. (The transformer tanks are not of flameproof construction as provided in B.S.S. 229/1940 for flameproof enclosures.) Designed for standard iron and copper losses of 656 watts and 2,700 watts respectively, at 75°C. With H.V. switchgear and H.V. and L.V. flit plugs and flit plug adaptors and other fittings. Length 8 ft. li ins., width 2 ft. 7 ins., height 3 ft. 2i- ins.	4 months England .. 7 months Collinsville	£1,045	Prices based on existing rates and wages and subject to variations
	Alternatively : As above 1,050/415	As above	£1,045	As above
Noyes Bros. Ltd., 197 Elizabeth st., Brisbane	Crompton Parkinson 150 k.V.A. 2,300/415-240, 3-phase 50 cycles, delta star connected oil immersed national cooled transformer with EV. and LV. switchgear and no volt and earth leakage equipment of Security Electric design	15 months Collins-villa	£1,420	As above
	Alternatively: 1,050/415-240-volts	As above	£1,420	As above
Australian General Electric Adelaide '. st., Brisbane	Metro-Vick. Transwitch 150 k.V.A. 2,300/415 standard portable mining type non-flameproof type with HV. O.C.B. of draw-out type and overload and earth leakage equipment and W.O. LV. switch	13 months Collins-vine	£1,160	As above
	Alternatively : 1,050/415	As above	£1,160	As above
British General Electric Company Pty. Ltd., 371-373 Adelaide st., Brisbane	B.G.E. oil immersed, self-cooled, 3-phase, 50 cycle, non-flameproof mining type transformer, 150 k.V.A., 2,300/415, complete with 11T. and LT. breakers overloads, no volt and earth leakage protection	11 months England 14 months Collins-vile	£1,024	As above
	Alternatively : 1,050/415, as above	14 months Collins-vile	£1,024	As above
Parbury Henty and Co. Pty. Ltd., 297 Adelaide st., Brisbane	Bruce Peebles 3-phase oil immersed self-cooled mining type transformers 2,300/415 or 1,050/415 HV. C.B. and LV. cable box, non-flameproof type, with overload, no volt and earth leakage protection	13 months Collins-vile	£1,068	As above
Underhill Day and Co. Ltd., 135 Queen st., Brisbane	" Foster " 150 k.V.A. oil immersed, 3-phase, 50 cycle, 2,300/415 delta/Star connected, with all protection and tappings and O.C.B. on HT.	13 months	£1,092	As above
	" Foster ", ditto 1,050/415	As above	£1,090	As above
Johnson and Phillips Ltd., 182 William st., Sydney	150 k V A Johnson and Phillips underground mining type transformer 2,300/415 with O.C.B. on HT., and earth leakage and contactor on LT. side and suitable cable entries	14 months	£1,228 ex Bowen Port	As above
	Alternatively : 150 k.V.A. ditto 1,050/415	As above	£1,237 ex Bowen Port	As above

ANNEXURE NO. 26.

(CoPv)

DEPARTMENT OF MINES.

SCHEDULE OF EQUIPMENT RECOMMENDED FOR THE STATE COAL, MINE COLLINSVILLE.

13th December, 1951.

1. Main Trunk Conveyor System, complete with Belt, £130,016.

The recommendation is for four only M avor & Coulson conveyor 42 in. wide, 450 ft. p.m. to deliver 600 tons per hour over a distance of 1,622 yds. The structure to be of Stringer type with five idlers at 4 ft. centres on top and single idler at 8 ft. centres on bottom. Four only No. 5 Driving Units of 175-h.p. each with Vulcan Sinclair fluid drives and all necessary switchgear, automatic sequence and protectio n control gear.

Belt included to be 42 in. x 42 oz. 6-ply with 1/8 in. top and 1/16 in. bottom.

This is a heavy duty conveyor manufactured in the United Kingdom and it covers a greater length per unit, with a consequent reduction in machines to be maintained, and reduction in dust forming points underground. The belting will be manufactured in Australia.

(2.) *Subsidiary Conveyors,* £29,258.

The recommendation is for two only Mayor & Coulson Conveyors, as above, with No. 3 Driving Units for 200-yd. centres complete with 42-in. x 42-oz. belting.

(3.) *Face Conveyors,* £56,725.

Fifteen only "British Jeffrey Diamond" 61-WH 25-h.p. Chain Conveyors, extensible in 6-ft. lengths to 500 ft. Each Conveyor has a capacity of 180 tons per hour at 140 ft. per minute.

These units are manufactured in the United Kingdom and are the only tender received capable of handling the output required over the distance.

(4.) *Coal-Cutting Machines,* £64,830.

Three only "Jeffrey 29 U.C. "Universal heavy-duty Coal Cutters, each complete with 100 yds. of trailing cable.

These machines are manufactured in the U.S.A., and are the only tender received to cover our conditions, i.e., a heavy duty Universal machine on crawlers, which are compulsory due to the extreme grades at Collinsville.

(5.) *Coal-Loading Machines,* £99,720.

Six only "Jeffrey L 600C" Loading Machines complete with 350 ft. of trailing cable.

These machines are manufactured in the U.S.A. and are the lowest priced tender received with an articulated head and on crawlers, which are compulsory on Collinsville grades.

(6.) *Shuttle Cars,* £14,990.

One only "Joy 60-E-12" Diesel Unit, completely flameproof and air conditioned to handle all material from dumps to points adjacent to the faces.

The machine is manufactured in the U.S.A. and is the only such tender received.

(7.) *Transformers,* £4,180.

(a) Four only 150 kVA 3-phase, 50 cycle, 2,300/415-volt "English Electric" mobile underground substations.

Transformers, £4,000.

(b) Two only 1,200 kVA transformers 1,050/2,300-volt, 3-phase, 50 cycle, of "English Electric" construction for surface substation.

These are manufactured in the United Kingdom and are the only tender to comply with our delivery requirements.

(8.) *Gate-end Boxes,* £2,602.

Ten only Security Electric 100-amp. double-sided units with core balance protection and continuous earth test.

These are manufactured in New South Wales and are the lowest priced tender.

(9.) *Cables:—*

(a) Face reticulation, 4-core 19/-083 T.R.S., £4,340, 2,000 yds.

(b) Coal Cutters and Loaders, 4-core 163/•018 £941, T.R.S. 600 yds.

Both types of cables above to be of C.M.A. construction, which is manufactured in New South Wales. This is of standard price.

(c) High-tension reticulation, 3,000 yds., £3,750. 19/-064 P.I.L.C. S.W.A. Cable—W.T. Henley's Pty. Ltd., Flit Plugs and Adaptors, &c., ex Noyes Bros. of Security Electric type, £500.

The above figures do not include provisions for :—

(a) Surface 200-ton capacity Bin and Feeders;

(b) New pit top ;

(c) Spare Parts for the Loaders, Cutters and Shuttle Car.

Each of the above shall have to be provided for.

As the 200-ton bin is essential to comm enee operations and shall take many months to erect and equip, we should attempt immediate provisions for same. This cost is estimated at £15,000 and could, I feel, be designed and constructed chiefly by Colliery labour.

On .the monetary side we are being charged import duty to the following extent :—

(a) On Coal Cutters and Loaders	20,570 (approx.)
(b) On Belt Conveyor Structures	15,927 (approx.)
(c) On Chain Conveyor Structures	8,753
	£45,250

It is felt that as such equipment is not procurable in Australia, and our project is of the utmost National importance, we should receive a total exemption from such charges. This sum would permit of our then proceeding with the other matters for which at present we do not have sufficient funds.

(sgd.) A. LIGHTFQOT,
General Manager.
14th December; 1951.

ANNEXURE NO. 27.

DEPARTMENT OF MINES.

STATE COAL MINE, COLLINSVILLE—MECHANIZATION PROPOSALS

1. Only hand-winning contract methods of production are now in operation at the State Coal Mine, Collinsville.

For various reasons the output of coal from this Mine has been declining for some years despite increases in demands for coal in North Queensland.

Moreover substantial financial losses have been incurred in operating this Mine in recent years.

Present output averages about 500 tons daily.

2. Two of the principal factors retarding production are -

(a) The attitude of employees in limiting and restricting production, with resultant low tonnage per man employed.

(b) Shortage of experienced labour, which is due partly to *(a)* above and partly to the isolated location of Collinsville.

3. The seam in the Mine is from 10 to 16 ft. thick, the coal is of good steaming quality, with excellent coking properties, and the reserves of coal are immense.

4. As a result of the decline in production it has been necessary for the Queensland Coal Board to arrange for very large tonnages of coal from other sources, particularly Blair Athol and Callide, to be sent to North Queensland, at heavy transport costs to consumers, and with some strain on Railways.

3ioreover further large tonnages of coal will be required for additional projected industries such as—

(a) New power house at Townsville,

(b) Cement works near Townsville,

(c) Additional coke works.

5. Mechanization of this State Mine has been under consideration for some yea s and an appropriation of £500,000 was sought for the current financial year.

Following the general percentage reduction in Loan Funds, £420,000 is available for the current financial year for this purpose.

A further essential preliminary was the appointment, of Mr. Athol Lightfoot as General Manager, State Coal Mines and Coke Works.

6. The mechanization proposed by the General Manager comprises—

(a) Mechanical cutting and boring of coal at the face,

(b) Mechanical loading of such coal,

(c) Chain conveyors to the main belt conveyor,

(d), Main belt conveyor to the screening plant.

7. To give effect to the proposed mechanization and with a view to obtaining up to 1,500 tons per shift, the General Manager advises that the following machines and equipment will be necessary:—

(a) Three (3) coal-cutting machines complete with boring machines mounted thereon,

(b) Six (6) coal-loading machines,

(c) One (1) main trunk belt conveyor system,

(d) Two (2) subsidiary conveyors.

(e) Fifteen (15) small chain conveyors,

(f) Necessary cables, transformers, and gate-end boxes,

together with all necessary additional ancillary equipment and spare parts.

8. The proposal is to mechanize No. I Tunnel This will call for considerably less conveyor belt and cables than would mechanization of No. 2 Tunnel, and will also have the additional advantage that—

(a) During installation normal production will continue in No. 2 Tunnel,

(b) After installation surplus labour can be continued in employment in No. 2 Tunnel in hand-winning coal .on day wage conditions.

9. Capacity of the belt conveyor will be such that production could be still further increased by installation of additional cutters and loaders.

10. Tenders were called by the State Stores Board and closed on 15th November last. These tenders have been fully considered by the General Manager, who has also had the opportunity of inspecting certain types of machines recently installed in New South Wales and not previously familiar to him.

In all considerations the physical conditions of the seam at Collinsville, particularly the fairly steep dip, have received much attention to ensure that the machines recommended are not only best suited to the prevailing conditions, but will also, by reason thereof, be not unduly costly to maintain.

11. Attached is a schedule of the items recommended by the General Manager.

These comprise the equipment mentioned in paragraph 7, of a total value, as tendered, of £415,852.

These prices include import duties of not less than £45,000, in respect of which it is suggested that representations be made by the Honourable the Premier to the Honourable the Prime Minister with a view to waivure of such duties.

The above proposed expenditure makes no provision for—

(a) Spare parts for cutters, loaders, and shuttle car,

(b) New pit-top,

(c) Provision of a 200-ton storage bin.

It is essential that when cutters, loaders, and the shuttle car are ordered that spare parts for at least six months be ordered also. Such spare parts will cost approximately £10,000.

In regard to the new pit-top, this can be deferred for the time being, but with a belt conveyor system, it is essential that a 200-ton surge bin and feeders be installed to prevent stoppages of the belt in loading trucks, &c., with consequent loss of production.

This bin will take some months to construct, but it is considered it can be designed and built chiefly by colliery labour at a cost of about £15,000.

With such a bin and certain maintenance and repairs to the existing pit-top, we will be able to defer the construction of a new pit-top for some time.

12. If a remission of import duty can be obtained the amount thereof would more than cover the cost of the necessary spares and storage bin.

13. RE C OMMEND-

(a) Approve purchase of equipment as specified in the schedule hereto at an estimated cost of £420,000, together with spare parts estimated to cost a further g10,000;

(b) Approve expenditure of £15,000 on bin construction;

(c) Seek Executive Council approval to (a) and *(b) ;*

(d) Take up with Premier with view to approach to the Prime Minister for remission of import duty.

(NOTE.—The original estimated cost was £500,000, of which £420,000 is provided for the current financial year. The estimated total cost as above (excluding new pit-top) is £445,000. The bulk of the £420,000 available for this financial year will not be expended, and accordingly if these proposals are approved it is proposed to keep the Co-Ordinator-General fully informed with a view to necessary re-provision for next year).

A. LIGHTFOOT,
General Manager,
State Coal Mines.

G. F. CLARK,
Under Secretary,
14th December, 1951.

The Honourable the Minister

DEPARTMENT OF MINES.

SCHEDULE OF EQUIPMENT RECOMMENDED FOR THE STATE COAL MINE, COLLINSVILLE.

13th December, 1951.

(1) Main Trunk Conveyor System, complete with Belt, £130,016.

The recommendation is for four only Mayor & Coulson conveyors 42 ins. wide, 450 ft. p.m. to deliver 600 tons per hour over a distance of 1,622 yds. The structure to be of Stringer type with five idlers at 4-ft. centres on top and single idler at 8-ft. centres on bottom. Four only No. 5 Driving Units of 175-h.p. each with Vulcan Sinclair fluid drives and all necessary switchgear, automatic sequence and protection control gear.

Belt included to be 42 in. x 42 oz. 6-ply with 1-in, top and 1/16-in. bottom.

This is a heavy duty conveyor manufactured in the United Kingdom and it covers a greater length per unit, with a consequent reduction in machines to be maintained, and reduction in dust forming points underground. The belting will be manufactured in Australia.

(2) Subsidiary Conveyors, £29,258.

The recommendation is for two only Mayor & Coulson Conveyors, as above, with No. 3 Driving Units for 200-yd. centres complete with 42 in. x 42 oz. belting.

(3) Face Conveyors, £56,725.

Fifteen only "British Jeffrey Diamond" 61-WH 25 h.p. Chain Conveyors, extensible in 6-ft. lengths to 500 ft. Each conveyor has a capacity of 180 tons per hour at 140 ft. per minute.

These units are manufactured in the United Kingdom and are the only tender received capable of handling the output required over the distance.

(4) Coal Cutting Machines, £64,830.

Three only "Jeffrey 29-U.C." Universal heavy duty Coal Cutters, each complete with 100 yds. of trailing cable.

These machines are manufactured in the U.S.A. and are the only tender received to cover our conditions, i.e., a heavy-duty Universal machine on crawlers, which are compulsory due to the extreme grades at Collinsville.

(5.) *Coal-Loading Machines,* £99,720.

Six only "Jeffrey L 600 C" Loading Machines complete with 350 ft. of trailing cable.

These machines are manufactured in the U.S.A. and are the lowest priced tender received with an articulated head and on crawlers, which are compulsory on Collinsville grades.

(6.) *Shuttle Cars,* £14,990.

One only "Joy 60-E-12" Diesel Unit, completely flameproof and air conditioned to handle all material from dumps to points adjacent to the faces.

The machine is manufactured in the U.S.A. and is the only such tender received.

(7.) *Transformers,* £4,180.

(a) Four only 150 kVA 3-phase, 50 cycle, 2300/415-volt "English Electric" Mobile underground substations

Transformers, £4,000.

(b) Two only 1,200 kVA transformers 1,050/2,300-volts, 3-phase, 50 cycle of "English Electric" construction for surface substation.

These are manufactured in the United Kingdom and are the only tender to comply with our delivery requirements.

(8.) *Gate-end Boxes,* £2,602.

Ten only Security Electric 100-amp. double-sided units with core balance protection and continuous earth test.

These are manufactured in New South Wales and are the lowest priced tender.

(9.) *Cables:—*

(a) Face reticulation, 4-core, 19[083 T.R.S. 2,000 yds., £4,340.

(b) Coal cutters and loaders, 4-core, 163/.018 T.R.S. 600 yds., £941.

Both types of cables above to be of C.M.A. construction, which is manufactured in New South Wales. This is of standard price.

ANNEXURE NO. 28.

DEPARTMENT OF MINES.

STATE COAL MINE, COLLINSVILLE.

MECHANIZATION.

SUMMARY.

I. Proposals.—Complete mechanization comprising ;

(i.) mechanical cutting, boring and loading at the face,

(ii.) subsidiary chain conveyors and main belt trunk conveyor.

2. Aims.—Increase in production, initially from 500 to 1,500 tons daily, with scope for still further expansion, if and when required.

3. Recommendations.—

(a) Purchase of cutters, loaders and conveyors, with all necessary ancillary equipment, at tendered prices totalling	415,852
(b) Purchase of spare parts for cutters, loaders, &c.	10,000
(c) Expenditure in construction of storage bin of 200-tons capacity in present pit-top	15,000
	£440,852

The totals of (a) and (b) above include import duties of approximately £45,000. It is expected that the whole or at least a substantial portion of such duties will be remitted by the Commonwealth Government so that the total sum required. will be within the amount of £420,000 provided in the Estimates for the current financial year.

(Sgd.) G. F. CLARK,
Under Secretary,
17th December, 1951.

ANNEXURE NO. 29.

SECRETARY FOR MINES.

APPROVED.
(Init.) N.M.
Deputy Governor.

MECHANIZATION—STATE COAL MINE, COLLINSVILLE.

Ministers recommend that an expenditure of up to Four hundred and twenty thousand pounds (£420,000) from Loan Funds be approved for the purchase of—

(a) Three (3) coal-cutting machines complete with boring machines mounted thereon;

(b) Six (6) coal-loading machines;
(c) One (1) main trunk belt conveyor system;

(d) Two (2) subsidiary conveyors;

(e) Fifteen (15) small chain conveyors;

Necessary cables, transformers and gate-end boxes; together with all necessary additional ancillary equipment and spare parts, for the purpose of fully mechanizing production of coal at the State Coal Mine, Collinsville.

Minute ends.

(Init.) W.P.
V.C.G.
J.L. EXECUTIVE
J.E.D. COUNCIL
G.H.D. 5133
P.J.R.H. QUEENSLAND.
E.J.W.
W.M.

An Executive Minute embodying this recommendation was passed and recorded on the 20th December, 1951.

(Sgd.) H. 0. MUHL,
Acting Clerk of the Council.

ANNEXURE NO. 30.

Hon. W. Power, M.L.A.,
Minister for Mines.

PRESS STATEMENT.

MECHANIZATION—STATE COAL MINE, COLLINSVILLE.

20th December, 1951.

The Minister for Mines (Hon. W. Power, M.L.A.) announced today that Executive Council approval had been signified to expenditure of £420,000 on plant and equipment to fully mechanize the winning of coal at a tunnel of the State Coal Mine, Collinsville, the largest underground mine in the State.

Mr. Power said that present demands for coal in North Queensland were increasing and were now in excess of the total production from the State Mine and the adjoining privately-owned Bowen Consolidated Mine. In addition, further new industries for North Queensland were projected, for which additional large tonnages of coal would be required. In particular, a new power-house was in course of construction at Townsville, the North Queensland Cement Works near Townsville were likely to commence production of cement in 1953, and increased manufacture of coke appeared essential.

The present total production of the two existing mines by the use of hand methods was governed by the experienced labour available, and there was a serious shortage of such labour in the rather remote locality.

The seam to be mechanized is from 10 to 16 ft. thick, the coal is of good steaming quality, with excellent coking properties, and the reserves available are immense.

:-Thp present stage has been reached after the appointment by the Government as General Manager of State Coal Mines of Mr. Athol Lightfoot, who has had wide experience in the use of mechanization both in Australia and the United States of America.

The mechanization of the mine will be complete and will comprise—

(a) Mechanical cutting and boring of coal at the face ;

(b) Mechanical loading of such coal;

(c) Chain conveyors to the main belt conveyor ;

(d) Main trunk belt conveyor to the screening plant.

Incidentally, the main trunk belt conveyor will be the biggest project of its type in coal mining in Australia, with a maximum carrying capacity of 600 tons per hour over one mile.

The effect will be that present production of 500 tons will be increased upon completion of the installation to at least 1,500 tons daily. Moreover, the plans provide for even greater production should that later be found necessary. Whilst the output per man employed on mechanized mining will be far greater than the present tonnage per man employed in hand winning methods, there will be no displacement of persons now employed. Of the two existing tunnels, one is to be fully mechanized and all labour now employed and not required in the use of mechanized equipment will be necessary for reconstruction work associated with such a scheme.

Delivery of the numerous items of plant and equipment is expected to be such that installation will be complete and mechanical winning of coal should commence at the beginning of 1953.

State Stores Board is now proceeding to place orders for the plant and equipment required.

The Minister concluded by saying that the action of the Government in this matter will do much to foster and improve development in North Queensland, will create infinitely better working and industrial conditions for employees, which will result in more harmonious relationships and continuity of production, and will no doubt accelerate similar action in privately owned Mines elsewhere in the State.

ANNEXURE NO. 31.

ACTUAL AMOUNT SPENT ON MECHANIZATION AS COMPARED WITH AMOUNT APPROVED BY CABINET.

Unit.	Firm.	Actual Cost.	Accepted Tender.
1. Main Trunk Conveyors (4)	Noyes Bros... Noyes Bros. ..	170,283	130,016 29,258 159,274
2. Subsidiary Conveyors (2)			
3. Face Conveyors (15) ..	British Jeffrey Diamond	69,169	56,725
4. Coal Cutting Machines (3)	Jeffrey ..	59,051	64,830
5. Coal Loading Machines (L. 600C)	Jeffrey ..	97,026	99,720
6. Shuttle Car (1) (60-E-12)	Joy ..	16,975	14,990
7. Transformers (a) (4-150 K.V.A.-2300/415)	English Electric	3,677	4,180
Transformers (b) (2-1200 K.V.A.-1050/2300) (2300/415)	English Electric	4,224	4,000
8. Gate End Boxes (10) ..	Security Electric	2,676	2,602
9. Cables—			
(a) Face Reticulation 2000 yds.-4-core 19/.083 T.R.S.			
(b) Coal Cutters and Loaders-600 yds.-4-core 163/.018 T.R.S.	..	5,336	941
(c) High Tension-3,000 yds. 19/.064	W. T. Henleys Pty. Ltd.		3,750
10. Flit Plugs and adaptors ..	Noyes Bros or Security Electric		500
Sundries and installation expenses to 31-10-53 capitalised		58,697	
(Coal production commenced 1-11-53 and expenses after that date charged to mine working—Details not now available)			
Surge Bin and Coal Handling Bin ..		22,612	15,000
Purchase of spare parts for Cutters, Loaders, &c.			10,000
		£509,726	£440,852

Approval.		Item.	Actual Expenditure.	Charged Mines A/Cs.
	£		£	
E.C.M. 501 7-2-5	8,260 10 0	f 900 yds. cable .. 11,800 yds. Cable ..	1,898 1 5 4,665 0 0	Trust-Electric Stores
E.C.M. 1564 10-4-53	4,000 0 0	2-1200 kVA Transformers	4,223 11 2	Loan Funds-Capital
E.C.M. 1451 16-4-53	9,958 16 8	Spares for Chain Conveyors	9,442 2 3	Trust-Miscellaneous Stores
E.C.M. 1569 23-4-53	15,600 0 0	4 Diesel Generating Sets..	13,972 0 0	Loan Funds-Capital
E.C.M. 2569 25-6-53	32,000 0 0	Spare parts for Jeffrey Cutters and Loaders	28,149 0 4	Trust-Electric Stores
E.C.M. 3405 27-8-53	1;750 0 0	Spare Parts Hydraulic Hoses, fittings and packings for Coal Loaders	1,631 13 9	Trust-Electric Stores
	£71,569 6 8		£63,981 8 11	
	420,000 0 0	Approvals apportioned :	Loan .. 392,000	
	100,000 0 0	..	Trust .. 32,000	
			P.W.R. and Dev. Fund 96,000	
	£520,000 0 0		£520,000	

	£ s. d.	
Mechanization cost as per statement below :	509,726 6 9	charged as follows :-
	372,276 4 6	Loan-Mechanical Equipment.
	13,703 9 2	Loan-Special.
	95,829 8 9	Trust-P.W.R. and Dev. Fund.
	27,917 4 4	Trust-State Coal Mine.
As above	£509,726 6 9	

G.C.
Under Secretary, Department of Mines, 19-1-56.

STATE COAL MINE COLLINSVILLE.

PROFIT AND LOSS ACCOUNT

For year ended 30th June, 1948.

Saleable coal produced : 172,061.2 tons.

	£ s. d.	Cost per ton.	£ s. d.
To Mine Working-			
Wages ..	159,066 12 5	18 5.87	
Coal ..	8,074 13 6	11.26	
Stores ..	7,797 7 1	10.88	
Explosives	356 11 5	-50	
Timber ..	2,357 1 0	3.29	
Water ..	1,796 14 0	2.51	179,448 19 5
Repairs and Renewals-			
Wages	12,826 7 6	1 5.89	
Stores	5,586 10 1	7.79	
Timber	1,753 1 2	2.45	20,165 18 9
Royalty ..		9.63	6,905 18 1
Lease Rents		-01	5 2 0
Insurances- ..			
Workers Compensation	8,353 1 3	8.86	
Fire ..	65 19 3	-09	6,419 0 6
General Expenses-			
General ..	1,714 0 0	2.39	
Pay Roll Tax ..	4,280 9 1	5.97	
Pensions Fund Levy	4,301 10 7	6.00	10,295 19 8
Interest ..		9.64	6,913 13 11
Depreciation		11.22	8,043 2 0
		27 8.25	£238,197 14 4

	Cost per ton.	£ s. d.
By Coal Sales ..		228,642 19 6
Less Stocks 1947		
		228,642 19 6
Plus stock 1948		597 18 6
		229,240 18 0
Rents ..	•04	29 2 2
Sale of Electric Power ..	2.32	1,665 15 11
Loss for year		7,261 18 3
		£238,197 14 4

as

ANNEXURE NO. 32.

STATE COAL MINE, COLLINSVILLE.

BALANCE SHEET AS AT 30TH JUNE, 1948.

LIABILITIES.

	£ s. d.	£ s. d.
Treasury Loan ..	129,323 4 1	
Treasury Trust ..	59,008 1 2	188,331 5 3
Sundry Creditors-		
Wages ..	5;997 16 5	
General ..	5,518 7 9	
Miners' Hut Rents	5,059 13 4	16,575 17 6
Contractor's Deposit		101 2 3
		£205,008 5 0

ASSETS.

	£ s. d.	£ s. d.	s. d.
Development Reopening of old No. 3 West Section		7,909 18 9	
Less Coal won	2,409 2 10		
Less Depreciation	790 19 9	3,200 2 7	4,709 16 2
Machinery and Plant ..		42,752 16 11	
Less Depreciation		4,275 5 8	38,477 11 3
Buildings		3,863 13 4	
Less Depreciation		386 7 4	3,477 6 0
Workshops Buildings and Plant		11,835 1 5	
Less Depreciation		1,183 10 2	10,651 11 3
Motor Lorry ..		945 15 5	
Less Depreciation		94 11 8	851 3 9
Horses and Vehicles		721 9 11	
Less Depreciation		72 3 0	649 6 11
Furniture and Fittings ..		339 19 5	
Less Depreciation		33 19 11	305 19 6
Flood Prevention		8,511 8 5	
Less Depreciation		851 2 10	7,660 5 7
Mines Rescue Station ..			174 3 6
Miners' Houses ..		1,801 13 4	
Less Depreciation		180 3 4	1,621 10 0
Railway Siding ..		1,749 3 0	
Less Depreciation		174 18 4	1,574 4 8
Stocks-			
Stores ..		19,928 9 3	
Plant ex Mount Coolon		690 12 10	
Timber		3,192 18 2	
Coal ..		597 18 6	
Explosives		1,073 9 9	25,483 8 6
Sundry Debtors-			
General		41,077 18 3	
Insurance Commissioner ..		92 6 10	
Mines Department		92 6 10	
Bowen Consolidated Mine ..		26 3 3	41,288 15 2
Petty Cash			10 0 0
Profit and Loss Accumulation		59,999 8 0	
Less stores adjustment ..		83 4 9	
Plus-Adj. Elect. A/c. ..	895 1 3	59,916 3 3	
Loss 1947-48 ..	7,261 18 3	8,156 19 6	68,073 2 9
			£205,008 5 0

STATE COAL MINE, COLLINSVILLE.

PROFIT AND LOSS ACCOUNT.

FOR YEAR ENDED 30TH JUNE, 1949.

Saleable coal produced : 186,605.1375 tons.

	£	s.	d.	Cost per ton. s.	d.		s.	d.
To Mine Working—								
Wages	183,217	7	4	19	7.70			
Coal ..	9,883	17	5	1	0.66			
Stores ..	9,962	14	3	1	0.81			
Explosives	266	19	7		.34			
Timber ..	5,815	10	7		7.48			
Water ..	1,983	17	8		2.55			
						211,130	6	10
Repairs and Renewals—								
Wages	14,105	14	8	1	6.14			
Stores	7,260	19	6		9.34			
Timber	3,513	2	3		4.52			
						24,879	16	5
Royalty ..					6.00	4,665	2	7
Lease Rents					.01	5	2	0
Insurance—								
Workers Compensation	9,843	0	11	1	0.66			
Fire ..	107	14	9		•14			
						9,950	15	8
General Expenses—								
General	2,614	1	1		3.36			
Pay Roll Tax ..	5,108	15	5		6.57			
Pensions Fund Levy	10,148	6	0	1	1.05			
						17,871	2	6
Model of Colliery					•79	613	10	10
Interest ..					9.57	7,436	9	9
Depreciation					10.70	8,321	15	7
				30	6.39	£284,874	2	2

	Cost per ton. d.	£	8.	d.
By Coal Sales .		276,422	19	0
Leas stocks 1948		597	18	6
		275,825	0	6
Plus stocks 1949		1,015	0	. 5
		276,840	0	11
Rents	•26	198	14	3
Sale of Electric Power ..	3.44	2,678	5	11
Loss for year		5,157	1	1
		£284,874	2	2

STATE COAL MINE, COLLINSVILLE.

BALAIrcz Sxi ET As AT 30= JUNE, 1949.

LIABILITIES.

	£ 8. d.	£ s. d.
Treasury Loan ..	140,522 9 3	
Treasury Trust ..	63,344 10 10	203,867 0 1
Sundry Creditors-		
Wages ..	4,142 0 7	
General	3,631 3 1	
Miners' Hut Rents	4,984 10 11	
		12,757 14 7
Contractors' Deposit ..		103 2 8
		£216,727 17 4

ASSETS.

	s. d.	£ s. d.	£ 8. d.
Development-			
Re-opening of old No. 3 West Section .. .		9,134 14 6	
Less coal won ..	631 18 9		
Less Depreciation	913 9 5	1,545 8 2	
			7,589 6 4
Machinery and Plant		45,179 9 6	
Less Depreciation		4,517 19 0	
			40,661 10 6
Buildings .		3,592 7 11	
Less Depreciation		359 4 9	
			3,233 3 2
Workshop Building and Plant ..		11,126 6 9	
Less Depreciation		1,112 18 0	
			10,013 8 9
Motor Lorry .. .		851 3 9	
Less Depreciation		85 2 4	
			766 1 5
Horses and Vehicles . .		793 6 11	
Less Depreciation		79 6 8	
			714 0 3
Furniture and Fittings		318 10 0	
Less Depreciation		31 17 0	
			286 13 0
Flood Prevention . .		8,186 8 11	
Less Depreciation		818 12 11	
			7,367 16 0
Mines Rescue Station			174 3 6
Miners' Houses ..		1,789 10 1	
Less Depreciation		178 19 0	
			1,610 11 1
Railway Siding		1,574 4 8	
Less Depreciation		157 8 6	
			1,416 16 2
Welfare Park		461 5 0	
Less Depreciation		46 2 6	
			415 2 6
Stocks-			
Stores .. .		30,920 18 3	
Plant ex Mount Coolon.		690 12 10	
Timber ..		3,349 14 8	
Coal		1,015 0 5	
Explosives		982 0 7	
			36,958 6 9
Sundry Debtors-			
General		31,961 15 3	
Insurance Commissioner		202 8 4	
Mines Department		202 8 4	
Bowen Consolidated Mines		50 12 8	
			32,417 4 7
Petty Cash		..	10 0 0
Profit and Loss Accumulation		68,073 2 9	
Less Interest Adjustment		136 10 6	
		67,936 12 3	
Plus Loss 1948-49		5,157 1 1	
			73,093 13 4
			£216,727 17 4

STATE COAL MINE, COLLINSVILL .

PROFIT AND LOSS ACCOUNT.

FOR YEAR ENDED 30TH JUNE, 1950.

Saleable coal produced : 126,862.5375 tons.

	£ a. d.	Cost per ton. s. d.	£ s. d.		Cost per ton. d.	£ s. d.
To Mine Working—				By Coal Sales —	..	210,170 19 3
Wages ..	147,310 15 9	23 2.69		*Less* stocks 1949		1,015 0 5
Coal ..	12,242 10 5	1 11.16				209,155 18 10
Stores	8,597 13 3	1 4.27				
Explosives	248 14 0	.47		*Plus* stocks 1950 ..		432 1 10
Timber	4,661 3 9	8.82				
Water	1,852 3 6	3.50				
			174,913 0 8			209,588 0 8
Repairs and Renewals—				Rents—Motors ..	.18	97 8 0
Wages	14,357 17 4	2 3.16				
Stores	5,911 11 5	11.18		Rents—House ..	.40	208 11 5
Timber	1,468 10 6	2.78				
			21,737 19 3	Sale of Electric Power	5.13	2,710 5 11
Royalty ..		6.00	3,171 11 3			
Lease Rents		.01	5 2 0	Loss for year		36,224 0 8
Insurance—						
Workers Compensation ..	12,921 7 3	2 0.44				
Fire ..	88 1 2	.17				
			13,009 8 5			
General Expenses—						
General ..	1,908 5 2	3.61				
Pay Roll Tax	4,150 10 2	7.85				
Pensions Fund Levy ..	10,529 11 6	1 7.92				
Loss on sale of Horses ..	84 0 0	.16				
			16,672 8 10			
Model of Colliery		.09	45 4 9			
Demurrage ..		.04	21 18 4			
Interest ..		1 4.74	8,849 17 6			
Depreciation ..		1 7.58	10,401 17 8			
		39 2.64	£248,828 6 8		5.71	£248,828 6 8

STATE COAL MINE, COLLINSVILLE .

BALANCE SHEET AS AT 30TH JUNE, 1950.

LIABILITIES.

	I	8.	d.	£	s.	d.
Treasury Loan ..	166,765	3	4			
Treasury Trust ..	90,238	10	7			
				257,003	13	11
Sundry Creditors-						
Wages . .	6,377	15	3			
General . . . •	10,440	4	2			
Miners' Hut Rents	6,082	3	0			
				22,900	2	5
Contractors' Deposit ..				105	3	11
Suspense-Miners' Extended Leave				2,257	13	0
				£282,266	13	3

ASSETS.

	£	8.	d.		s.	d.
Development-						
Reopening of old No. 3 West Section	14,701	13	11			
(£ s. d.) *Less* coal won 5,432 13 8						
Less Deprecia-tion . . 1,470 3 5	6,902	17	1			
				7,798	16	10
Machinery and Plant	51,250	6	11			
Less Depreciation	5,125	2	6	46,125	6	3
Buildings	3,319	2	6			
Less Depreciation	331	18	3	2,987	4	3
Workshop Buildings and Plant	10,682	8	0			
Less Depreciation ..	1,068	4	10	9,614	3	2
Store	215	15	3			
Less Depreciation	21	11	6	194	3	9
Motor Lorry . .	766	1	5			
Less Depreciation	76	12	2	689	9	3
Horses and Vehicles	596	10	3			
Less Depreciation	59	13	0	536	17	3
Furniture and Fittings . .	332	0	6			
Less Depreciation . .	33	4	1	298	16	5
Flood Prevention	7,313	9	9			
Less Depreciation	736	15	7	6,576	14	2
Mines Rescue Station				174	3	6
Miners' Houses . .	1,610	11	1			
Less Depreciation	161	1	1	1,449	10	0
Railway Siding ..	1,416	16	2			
L8sS Depreciation	141	13	7	1,275	2	7
Welfare Park . .	704	6	0			
Less Depreciation	70	8	7	633	17	5
Machinery and Plant ex Chillagoe	11,055	8	6			
Less Depreciation	1,105	10	11	9,949	17	7
Stocks-						
Stores	40,502	5	1			
Timber	2,191	3	11			
Coal . .	432	1	10			
Explosives	885	9	10			
				44,011	0	8
Sundry Debtors-						
General . .	35,508	0	10			
Insurance Commissioner	157	4	0			
Mines Department .	157	4	0			
Bowen Consolidated Mine	54	6	10			
Refrigerators . .	4,634	15	7			
				40,511	11	3
Petty Cash . .				10	0	0
Profit and Loss Accumulation	73,093	13	4			
Add Explosives Adjustment	112	4	11			
Add Loss 1949-50	36,224	0	8			
				109,429	18	11
				£282,266	13	3

STATE COAL MINE, COLLINSVILLE.

PROFIT AND LOSS ACCOUNT.

FOR YEAR ENDED 30TH JUNE, 1951.

Saleable coal produced : 116,385.4375 Tons.

	£	s.	d.	Cost per ton. s.	d.	£	s.	d.
To Mine Working—								
Wages	157,721	9	7	27	1.24			
Coal ..	15,126	13	10	2	7.19			
Stores ..	8,879	7	1	1	6.31			
Explosives	208	4	11		-43			
Timber ..	4,194	8	7		8.65			
Water ..	1,896	19	2		3.91			
						188,027	3	2
Repairs and Renewals—								
Wages ..	15,094	9	0	2	7.13			
Stores ..	9,800	19	11	1	8.21			
Timber ..	1,700	18	1		3.51			
						26,596	7	0
Royalty ..					6.00	2,909	12	8
Lease Rents					.01	5	2	0
Insurance—								
Workers Compensation ..	6,420	7	9	1	1.24			
Fire ..	100	0	6		•20			
						6,520	8	3
General Expenses—								
General ..	1,127	13	0		2.32			
Pay Roll Tax .	4,664	3	1		9.62			
Pensions Fund levy	9,144	12	6	1	6.86			
Miners' Extended leave ..	2,909	12	8		6.00			
						17,846	1	3
Interest ..				1	944	10,397	3	7
Depreciation				1	11.88	11,578	18	5
				45	4.15	£263,880	16	4

	Cost per ton. d.	£	s.	d.
By Coal Sales ..		233,345	17	0
Less stocks 1950		432	1	10
		232,913	15	2
Plus stocks 1951		1,002	7	6
		233,916	2	8
Rents—Motors ..	•17	80	5	0
Rents—House ..	-43	208	2	2
Sale of Electric Power	7.77	3,768	15	8
Loss for Year .		25,907	10	10
	8.37	£263,880	16	4

STATE COAL MINE, COLLINSVILLE.

BALANCE Sid. ET AS AT 30TH TUNE, 1951.

LIABILITIES.

	£ s. d.	£ s. d.
Treasury Loan	198,539 13 3	
Treasury Trust	28,905 19 7	227,445 12 10
Sundry Creditors-		
Wages ..	8,420 12 1	
General ..	5,353 19 9	
Miners' Hut Rents	1,417 11 0	15,192 2 10
Contractors' Deposit		117 11 4
Suspense-Miners' Extended Leave ..		5,167 5 8
		£247,922 12 8

ASSETS.

	£ s. d.	£ 8. d.	8. d.
Development-			
Re-opening of old No. 3 West Section ..		14,178 17 6	
Less Coal won	6,047 19 10		
Development	1,417 17 9	7,465 17 7	6,712 19 11
Reconstitution West Back Heading ..		1,605 7 1	
Less Depreciation ..		160 10 9	1,444 16 4
Machinery and Plant		69,081 2 1	
Less Depreciation ..		6,908 2 3	62,172 19 10
Buildings ..		3,250 0 6	
Less Depreciation ..		325 0 0	2,925 0 6
Workshops Buildings and Plant ..		9,772 12 11	
Less Depreciation ..		977 5 3	8,795 7 8
Store ..		194 3 9	
Less Depreciation ..		19 8 4	174 15 5
Motor Lorry		2,963 9 3	
Less Depreciation ..		296 6 11	2,667 2 4
Horses and Vehicles		525 7 3	
Less Depreciation ..		52 10 9	472 16 6
Furniture and Fittings		350 11 2	
Less Depreciation ..		35 1 1	315 10 1
Flood Prevention ..		6,576 14 2	
Less Depreciation ..		657 13 5	5,919 0 9
Mines Rescue Station			174 3 6
Miners' Houses ..		1,449 10 0	
Less Depreciation ..		144 19 0	1,304 11 0
Railway Siding ..		1,275 2 7	
Less Depreciation ..		127 10 3	1,147 12 4
Welfare Park ..		633 17 5	
Less Depreciation ..		63 7 9	570 9 8
Machinery and Plant ex Chillagoe		3,932 8 8	
Less Depreciation ..		393 4 11	3,539 3 9
Stocks-			
Stores .		40,820 8 11	
Timber .. .		786 19 10	
Coal .. .		1,002 7 6	
Explosives ..		357 18 0	42,967 14 3
Sundry Debtors-			
General		34,575 0 6	
Insurance Commissioner ..		27 7 11	
Mines Department		27 7 11	
Bowen Consolidated Mine		11 13 5	
Refrigerators ..		3,215 0 1	37,856 9 10
Petty Cash			10 0 0
Profit and Loss Accumulation		109,429 18 11	
Add Stores Adjustment	3,414 9 3		
Less 1950-51	25,907 10 10	29,322 0 1	
		138,751 19 0	
Less Grant from Consolidated Revenue		70,000 0 0	68,751 19 0
			£247,922 12 8

STATE COAL MINE, COLLINSVILLE.

PROFIT AND LOSS ACCOUNT.

Fox YEAR ENDED 30TH JUNE, 1952.

Saleable Coal Produced : 123,127.8 Tons.

	£	s.	d.	Cost per ton. s.	d.	£	s.	d.
To Mine Working—								
Wages	198,894	0	4	32	3.68			
Coal	18,620	7	4	3	0.29			
Stores	10,984	4	3	1	9.41			
Explosives	332	2	9		•65			
Timber ..	4,606	12	11		8.98			
Water ..	2,014	3	5		3.93	235,451	11	0
Repairs and Renewals—								
Wages	17,833	0	7	2	10.76			
Stores	7,665	14	1	1	2.94			
Timber	1,390	2	7		2.71	26,888	17	3
Repairs, Renewals, &c.—								
Staff Houses ..					•51	262	0	7
Royalty ..					6.00	3,078	3	11
Lease Rents					.01	5	4	9
Insurance—								
Workers' Compensation ..	9,529	14	5	1	6.58			
Fire ..	110	9	2		•22	9,640	3	7
General Expenses—								
General	2,277	6	4		4.44			
Pay Roll Tax ..	5,649	3	4		11-01			
Pensions Fund Levy	13,748	5	0	2	2.80			
Miners' Extended Leave ..	3,675	9	9		7.16			
Coal Output Levy	4,318	18	0		8.42	29,669	2	5
Interest ..				1	7.44	9,974	13	9
Depreciation				2	4.69	14,721	5	1
				53	6.63	£329,691	2	4

	Cost per ton. s.	d.	£	s.	d.
By Coal Sales ..			317,153	10	0
Less Stocks 1951			1,002	7	6
			316,151	2	6
Plus Stocks 1952 ..			2,330	19	10
			318,482	2	4
Rents—Motors ..		-11	56	10	0
Rents—House		•25	129	0	0
Sale of Electric Power ..		10.91	5,595	17	10
Sale of Scrap Material ..		1.54	792	14	8
Loss for Year ..			4,634	17	6
	1	0.81	£329,691	2	4

STATE COAL MINE, COLLINSVILLE.

BALANCE SHEET AS AT 30TH *JUNE,* 1952.

	£ s. d.	£ s. d.
Treasury Loan ..	238,538 8 10	
Treasury Trust ..	47,593 19 8	
		286,132 8 6
Sundry Creditors-		
Wages	1,016 16 8	
General ..	20,588 7 3	
Miners' Hut Rents	1,571 14 10	
		23,176 18 9
Contractors' Deposit		177 2 8
		£309,486 9 11

ASSETS.

	£ s. d.	£ s. d.	s. d.
Development-			
Re-opening of old No. 3 West Section		11,763 9 2	
Less Coal won	1,802 1 11		
Deprecia-tion	1,176 6 11		
		2,978 8 10	8,785 0 4
Machinery and Plant		84,219 19 1	
Less Depreciation ..		8,421 19 11	
			75,797 19 2
Buildings		6,176 1 9	
Less Depreciation ..		617 12 2	
			5,558 9 7
Workshops, Buildings and Plant ..		8,943 9 11	
Less Depreciation ..		894 7 0	
			8,049 2 11
Store ..		8,664 19 2	
Less Depreciation ..		866 9 11	
			7,798 9 3
Motor Lorry		2,667 2 4	
Less Depreciation ..		266 14 3	
			2,400 8 1
Horses and Vehicles		465 6 6	
Less Depreciation ..		60 0 8	
			405 5 10
Furniture and Fittings		362 10 1	
Less Depreciation ..		36 5 0	
			326 5 1
Flood Prevention ..		5,919 0 9	
Less Depreciation ..		591 18 1	
			5,327 2 8
Mines Rescue Station			174 3 6
Miners' Houses .		1,304 11 0	
Less Depreciation ..		130 9 1	
			1,174 1 11
Railway Siding ..		1,147 12 4	
Less Depreciation ..		114 15 3	
			1,032 17 1
Welfare Park		609 18 10	
Less Depreciation ..		60 19 11	
			548 18 11
Machinery and Plant ex Chillagoe		3,539 3 9	
Less Depreciation ..		353 18 4	
			3,185 5 5
Reconstitution-			
West Back Heading		2,257 4 3	
Less Depreciation ..		225 14 5	
			2,031 9 10
Residence-General Manager		3,965 3 11	
Less Depreciation ..		396 10 5	
			3,568 13 6
Residence Electrical Engineer ..		4,216 18 3	
Less Depreciation ..		421 13 9	
			3,795 4 6
Motor Car		855 0 0	
Less Depreciation ..		85 10 0	
			769 10 0
Stocks-			
Stores		55,731 13 6	
Timber		1,082 5 11	
Coal		2,330 19 10	
Explosives		672 7 2	
			59,817 6 5
Sundry Debtors-			
General		43,376 11 1	
Insurance Commissioner ..		15 2 10	
Mines Department ..		15 2 11	
Bowen Consolidated Mine		6 12 7	
Refrigerators ..		1,880 3 9	
			45,293 13 2
Petty Cash			10 0 0
Profit and Loss Accumulation		68,751 19 0	
Add Stores Adj. A/c. 1950/51 ..	354 10 0		
Loss 1951/52	4,634 17 6		
		4,989 7 6	
		73,741 6 6	
Less Stores Adj. A/c. Previous years		104 3 9	
			73,637 2 9
			£309,486 9 11

STATE COAL MINE, COLLINSVILLE.

PROFIT AND LOSS ACCOUNT.

FOR YEAR ENDED 30TH JUNE, 1953.

Saleable Coal Produced : 152,016.9 tons.

	£	s.	d.	Cost per ton. s.	d.	£	s.	d.
To Mine Working—								
Labour ..	273,993	5	10	36	0.57			
Coal	24,592	13	4	3	2.83			
Stores	15,113	13	2	1	11.86			
Explosives	2,415	16	2		3.18			
Timber	7,989	1	0	1	0.61			
Water	2,238	6	2					
					3.53	326,342	15	8
Repairs and Renewals—								
Labour ..	28,023	1	8	3	8.24			
Stores ..	12,443	4	9	1	7.65			
Timber ..	1,032	10	5		1.63			
						41,498	16	10
Repairs and Renewals— Staff Houses . .					2.75	1,741	5	6
Royalty					6.00	3,800	8	5
Lease Rents . .					.01	5	10	8
Insurance—Fire					•12	74	16	1
General Expenses— General ..	2,693	5	7		4.25			
Pensions Fund Levy	20,098	0	0	2	7.75			
Miners' Extended Leave ..	5,067	4	7		8.00			
Coal Output Levy	4,005	0	0		6.32			
Long Service Leave	871	4	3		1.38			
Stockpiling of coal ..	415	19	9		•66			
						33,150	14	2
Interest				1	11.41	14,829	0	0
Depreciation ..				1	11.85	15,104	16	6
Profit for year						10,017	8	3
				57	4.58	£446,565	12	1

	Cost per ton. s. d.	£	s,	d.
By Coal Sales ..		437,220	6	8
Less Stocks 1952		2,330	19	10
		434,889	6	10
Plus stocks 1953		1,168	13	6
		436,058	0	4
Rents—Motors ..	08	52	0	0
Rents—House ..	•20	129	0	0
Sale of Electric Power ..	1 2.04	8,890	3	9
Sale of Scrap Material ..	•16	100	0	0
Miscellaneous Receipts ..	2.11	1,336	8	0
	1 4.59	£446,565	12	1

STATE COAL MINE, COLLINSVILLE.
BALANCE SHEET AS AT 30TH JUNE, 1953.

	£	s.	d.	£	s.	d.
Treasury Loan	613,921	3	7			
Treasury Trust	14,335	2	1			
Treasury Trust (Post War Recon.) ..	95,829	8	9			
				724,085	14	5
Sundry Creditors-						
Wages	2,121	19	3			
General ..	38,210	6	6			
Holiday Pay	5,700	0	0			
Pay Roll Tax	197	5	6			
Miners' Hut Rents	1,602	7	11			
				47,831	19	2
Contractors' Deposit				103	16	4
				£772,021	9	11

ASSETS.

	£	s.	d.	£	s.	d.
Development-						
Re-opening of old No. 3 West Section ..	10,051	7	9			
Less Coal won £517 19s. 9d.						
Depreciation £1,005 2s. 9d.	1,523	2	6			
				8,528	5	3
Machinery and Plant	233,287	9	11			
Less Depreciation ..	9,018	6	0			
				224,269	3	11
Buildings ..	5,959	17	10			
Less Depreciation ..	595	19	9			
				5,363	18	1
Workshops, Plant and Buildings	8,418	15	4			
Less Depreciation ..	841	17	6			
				7,576	17	10
Store ..	11,624	18	11			
Less Depreciation ..	1,162	9	11			
				10,462	9	0
Motor Lorry .	2,400	8	1			
Less Depreciation ..	240	0	10			
				2,160	7	3
Horses and Vehicles	388	5	10			
Less Depreciation ..	38	16	7			
				349	9	3
Furniture and Fittings	326	5	1			
Less Depreciation ..	32	12	6			
				293	12	7
Flood Prevention ..	5,327	2	8			
Less Depreciation ..	532	14	3			
				4,794	8	5
Mines Rescue Station				174	3	6
Miners' Houses ..	1,174	1	11			
Less Depreciation ..	117	8	2			
				1,056	13	9
Railway Siding .	1,032	17	1			
Less Depreciation ..	103	5	9			
				929	11	4
Welfare Park	548	18	11			
Less Depreciation ..	54	18	0			
				494	0	11
Machinery and Plant ex Chillagoe ..	3,118	15	11			
Less Depreciation ..	311	17	7			
Reconstitution				2,806	18	4
West Back Heading	2,031	9	10			
Less Depreciation ..	203	3	0			
				1,828	6	10
Residence-General Manager	3,568	13	6			
Less Depreciation ..	356	17	4			
				3,211	16	2
Residence-Electrical Engineer	3,872	10	2			
Less Depreciation ..	387	5	0			
				3,485	5	2
Motor Car	769	10	0			
Less Depreciation ..	76	19	0			
				692	11	0
New Bathroom				18,000	0	0
Ramp at Slipway-Bowen ..				426	6	3
Surge Bin				21,496	0	0
Equipment-Staff House ..	251	6	1			
Less Depreciation	25	2	7			
				226	3	6
Coal Sampling Bins				346	7	7
Stocks-						
Stores	356,334	10	1			
Timber	3,125	19	10			
Coal ..	1,168	13	6			
Explosives ..	1,201	9	6			
Sundry Debtors				361,830	12	11
General . ..	48,058	1	2			
Insurance Commissioner	391	16	0			
Mines Department . •	391	16	0			
Bowen Consolidated Mine	195	18	0			
Refrigerators ..	3,396	2	7			
Long Service Leave	154	12	10			
				52,588	6	7
Petty Cash .. . ••				10	0	0
Profit and Loss Accumulation	73,637	2	9			
Less grant from Con. Rev. .. £25,000 0s. 0d.						
Profit 1952/53 £10,017 8s. 3d.	35,017	8	3			
				38,619	14	6
				£772,021	9	11

STATE COAL MINE, COLLINSVILLE.

PROFIT AND LOSS ACCOUNT.

FOR YEAR ENDED 30TH JUNE, 1954.

Saleable Coal Produced : 124,154.25 tons.

	£ s. d.	Cost per ton. s.	d.	£ 8. d.
To Mine Working—				
Labour	274,611 14 0	44	2.85	
Coal	40,962 8 3	6	7.18	
Stores ..	19,443 2 10	3	1.59	
Explosives	4,818 9 11		9.31	
Timber ..	11,281 11 8	1	9.81	
Water ..	2,694 8 3		5.21	
				353,811 14 11
Repairs and Renewals—				
Labour ..	37,237 14 6	5	11.98	
Stores ..	13,440 0 8	2	F98	
Timber ..	2,493 16 8		4.82	
				53,171 11 10
Repairs and Renewals—Staff Houses			1.29	666 14 10
Royalty ..			6.00	3,103 17 2
Lease Rents			•01	5 10 8
Insurance—Fire			.14	74 0 4
General Expenses—	4,010 17 3		7.75	
Pensions Fund Levy	21,493 5 2	3	5.55	
Miners' Extended Leave ..	4,138 9 6		8.00	
Coal Output Levy	4,320 0 0		8.35	
Long Service Leave	393 3 0		.76	
Demurrage	790 9 8		1.53	
				35,146 4 7
Interest ..		5	3.54	32,867 11 2
Depreciation		7	11.51	49,405 19 5
Loss on Overseas Shipment of Coal ..		2	11.44	18,335 14 6
		88	0.60	£546,588 19 5

	Cost per ton. s.	d.	s. d.
By Coal Sales ..			373,989 9 4
Less stocks, 1953 ..			1,168 13 6
			372,820 15 10
Plus stocks, 1954 ..			3,187 4 4
			376,008 0 2
Rents—Motors ..		•10	52 0 0
Rents—House		48	244 2 6
Sale of Electric Power	1	7.00	9,830 5 4
Miscellaneous Receipts		.36	184 9 5
Loss for year			160,270 2 0
	1	7.94	£546,588 19 5

STATE COAL MINE, COLLINSVILLE.

BALANCE SHEET AS AT 30TH Juno, 1954.

LIABILITIES.

	£	s.	d.	£	s.	d.
Treasury Loan ..	697,295	10	1			
Treasury Trust ..	55,485	14	1			
Treasury Trust (Post War Reconstruction)	95,829	8	9	848,610	12	11
Sundry Creditors ..	2,234	19	2			
Wages ..	29,019	2	10			
General .. .	5,600	0	0			
Holiday Pay ..	55	17	6			
Pay Roll Tax ..						
Miners' Hut Rents	1,824	11	5	38,734	10	11
Contractors' Deposit				208	0	0
				£887,553	3	10

ASSETS.

	£	s.	d.	£	s.	d.
Development-						
Re-opening of Old No. 3 West Section	8,528	5	3			
Less Depreciation . .	852	16	6	7,675	8	9
Machinery and Plant .	589,176	13	7			
Less Depreciation ..	42,490	0	3	546,686	13	4
Buildings . .	5,363	18	1			
Less Depreciation	536	7	10	4,827	10	3
Surge Bin . .	22,033	8	0			
Less Depreciation	1,468	17	6	20,564	10	6
New Bathroom .. .. •.				36,806	0	2
Workshops, Plant and Buildings	7,576	17	10			
Less Depreciation ..	757	13	9	6,819	4	1
Store . .	10,545	7	5			
Less Depreciation .	1,054	10	9	9,490	16	8
Motor Lorries . .	2,160	7	3			
Less Depreciation	216	0	9	1,944	6	6
Horses and Vehicles	349	9	3			
Less Depreciation	34	18	11	314	10	4
Furniture and Fittings	293	12	7			
Less Depreciation ..	29	7	3	264	5	4
Flood Prevention	4,794	8	5			
Less Depreciation	479	8	10	4,314	19	7
Mines Rescue Station ..				174	3	6
Miners' Houses ..	1,056	13	9			
Less Depreciation ..	105	13	4	951	0	5
Railway Siding ..	929	11	4			
Less Depreciation	92	19	2	836	12	2
Welfare Park ..	494	0	11			
Less Depreciation	49	8	1	444	12	10
Machinery and Plant ex Chillagoe	2,806	18	4			
Less Depreciation ..	280	13	10	2,526	4	6
Reconstitution-						
West Back Heading ..	1,828	6	10			
Less Depreciation . .	182	16	8	1,645	10	2
Residence-General Manager ..	3,211	16	2			
Less Depreciation ..	321	3	7	2,890	12	7
Residence-Electrical Engineer	3,545	10	2			
Less Depreciation	354	11	0	3,190	19	2
Motor Car	692	11	0			
Less Depreciation	69	5	1	623	5	11
Equipment-Staff Houses	293	3	4			
Less Depreciation ..	29	6	4	263	17	0
Stocks-						
Stores	101,825	3	4			
Timber	4,695	3	1			
Coal	3,187	4	4			
Explosives	2,729	17	8	112,437	8	5
Sundry Debtors-						
General .. ., .. •	69,705	7	9			
Insurance Commissioner	281	4	6			
Mines Department .. .	281	4	6			
Bowen Consolidated Mine	140	12	3			
Refrigerators	1,827	4	6			
Long Service Leave ..	725	1	8	72,960	15	2
Petty Cash .				10	0	0
Profit and Loss Accumulation ..	38,619	14	6			
Add Loss for year	160,270	2	0			
	198,889	16	6			
Less Grant from Consolidated Revenue	150,000	0	0	48,889	16	6
				£887,553	3	10

STATE COAL MINE, COLLINSVILLE.

PROFIT AND LOSS ACCOUNT.

HALF YEAR ENDED 31ST DECEMBER, 1954.

Production : 54,912.15 tons.

	£	s.	d.	Cost per ton. s.	d.	£	s.	d.
To Mine Working-								
Labour ..	111,449	8	9	40	7.10			
Coal ..	25,494	15	7	9	3.43			
Stores ..	6,088	5	11	2	2.61			
Explosives	2,418	5	3		10.37			
Timber ..	4,313	9	10	1	6.85			
Water ..	1,359	0	1		5.94			
						151,123	3	5
Repairs and Renewals-								
Labour	23,693	12	6	8	7.56			
Stores	12,721	16	9	4	7.60			
Timber	1,822	11	9		7.97			
						38,238	1	0
Repairs and Renewals- Staff Houses ..					1.10	253	0	3
Royalty ..					6.00	1,372	16	1
Lease Rents ..					•02	5	10	8
Insurance-Fire ..					.01	0	16	11
General Expenses-								
General ..	1,770	2	0		7.74			
Pensions Fund Levy	9,211	0	1	3	4.26			
Miners' Extended Leave	1,830	8	1		8.00			
Coal Output Levy	4,284	18	11	1	6.73			
Rescue Brigade	2,008	13	9		8.78			
Scale Model-Machine Area	641	1	9		2.80			
						19,746	4	7
Interest ..				7	3.41	20,000	0	0
Depreciation				11	11.56	32,847	13	0
				96	0.04	£263,587	5	11

	Cost per ton. s.	d.	£	s.	d.
By Coal Sales			170,207	10	7
Less Stock 30-6-54 ..			3,187	4	4
			167,020	6	3
Plus stock 31-12-54 ..			3,770	5	9
			170,790	12	0
Rents-Motors ..		•11	26	0	0
Rents-House ..		.35	79	0	0
Sale of Electric Power ..	1	9.20	4,850	17	6
Loss for Half-Year ..			87,840	16	5
	1	9.66	£263,587	5	11

COLLINSVILLE STATE COAL MINE.

PROFIT AND LOSS ACCOUNT.

YEAR ENDED 30TH JUNE, 1955.

Production 87,204.4 tons.

	£	s.	d.	£	s.	d.
To Mine Working-						
Labour ..	218,626	13	9			
Coal .	54,439	3	6			
Stores ..	10,622	14	10			
Explosives	3,104	14	10			
Timber ..	5,465	15	0			
Water ..	2,091	12	9			
				294,350	14	8
Repairs and Renewals-						
Labour ..	43,908	16	0			
Stores ..	21,202	12	10			
Timber ..	2,616	12	4			
				67,728	1	2
Repairs and ReneWals-Staff Houses-				471	9	8
Royalty ..				2,180	2	0
Lease Rents				5	10	8
Insurance-Fire				75	3	8
General Expenses-						
General ..	3,778	6	0			
Pensions Fund Levy ..	17,085	10	2			
Miners Extended Leave	2,906	16	3			
Coal Output Levy	4,284	18	11			
Long Service Leave	289	15	7			
				28,345	6	11
Interest ..				35,687	0	10
Depreciation				65,739	15	10
				£494,583	5	5

	£	s.	d.
By Coal Sales	292,940	14	4
Less Stock 1954 ..	3,187	4	4
	289,753	10	0
Plus Stock 1955 .	3,703	19	0
	293,457	9	0
Rents-Motors	52	0	0
Rents-House	93	5	0
Sale of Electric Power	9,969	17	0
Sale of Scrap Material	49	15	10
Miscellaneous Receipts	353	15	2
Loss for year ..	190,607	3	5
	£494,583	5	5

All of the above figures are estimates only and cannot be regarded as in any way accurate. It is intended to seek approval to increase the rate of depreciation charged on machinery and plant in view of the long period of inactivity and impossibility of adequate maintenance. If this approval is given the loss will be considerably increased.

COLLINSVILLE STATE COAL MINE.

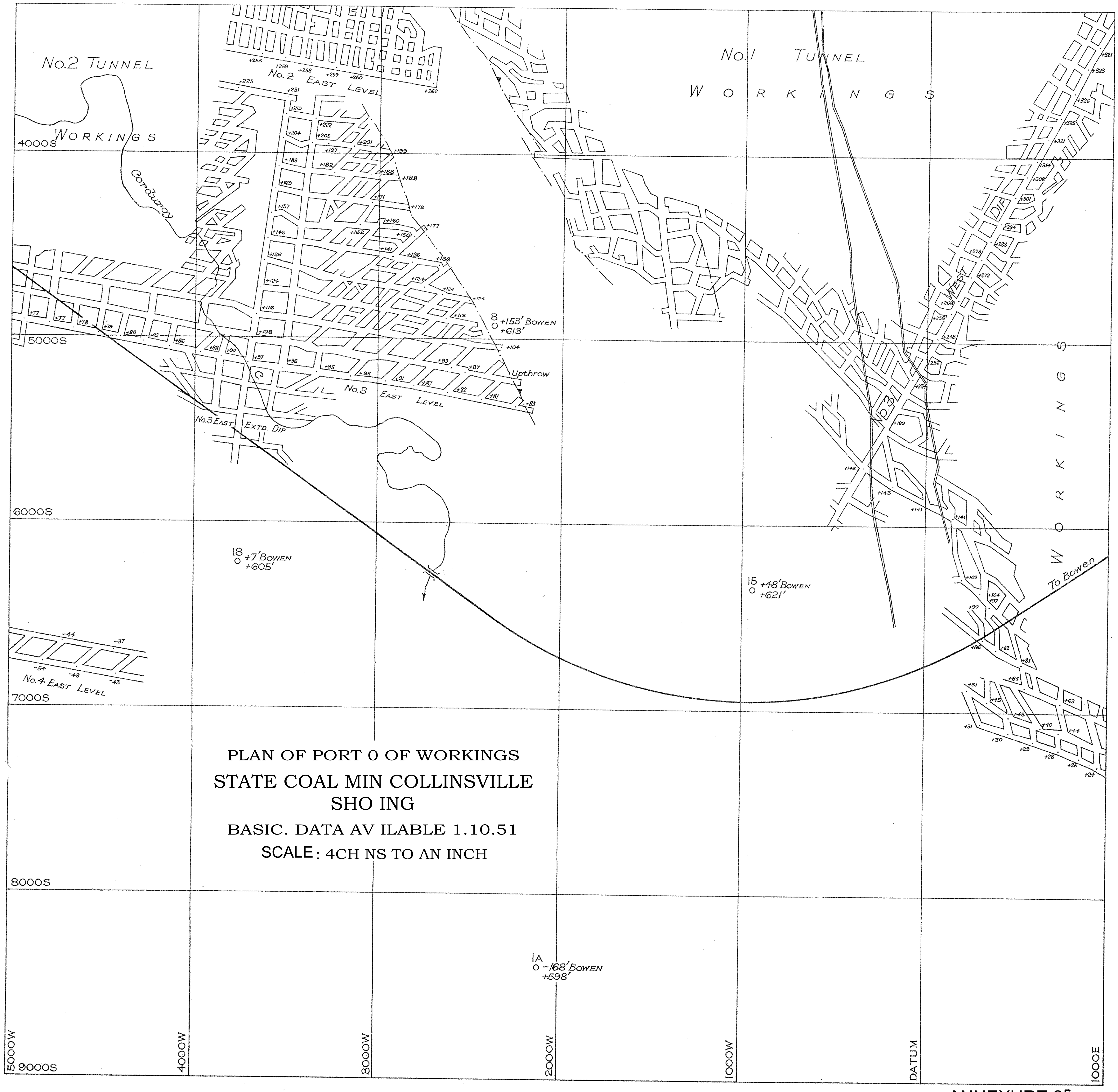
BALANCE SHEET AS A'S 30TH JUNE, 1955.

LiAnrarins.

	£	s.	d.	£	8.	d.
Treasury Loan	716,096	3	3			
Treasury Trust .. .	17,096	12	11			
Treasury Trust (Post War Reconstruction) ..	95,829	8	9	829,022	4	11
Sundry Creditors-						
Wages	2,898	13	9			
General ..	4,574	4	5			
Holiday Pay ..	5,500	0	0			
Pay Roll Tax ..	73	2	0			
Miners' Hut Rents	2,128	14	6	15,174	14	8
Contractors' Deposit				210	5	10
				£844,407	5	5

ASSETS.

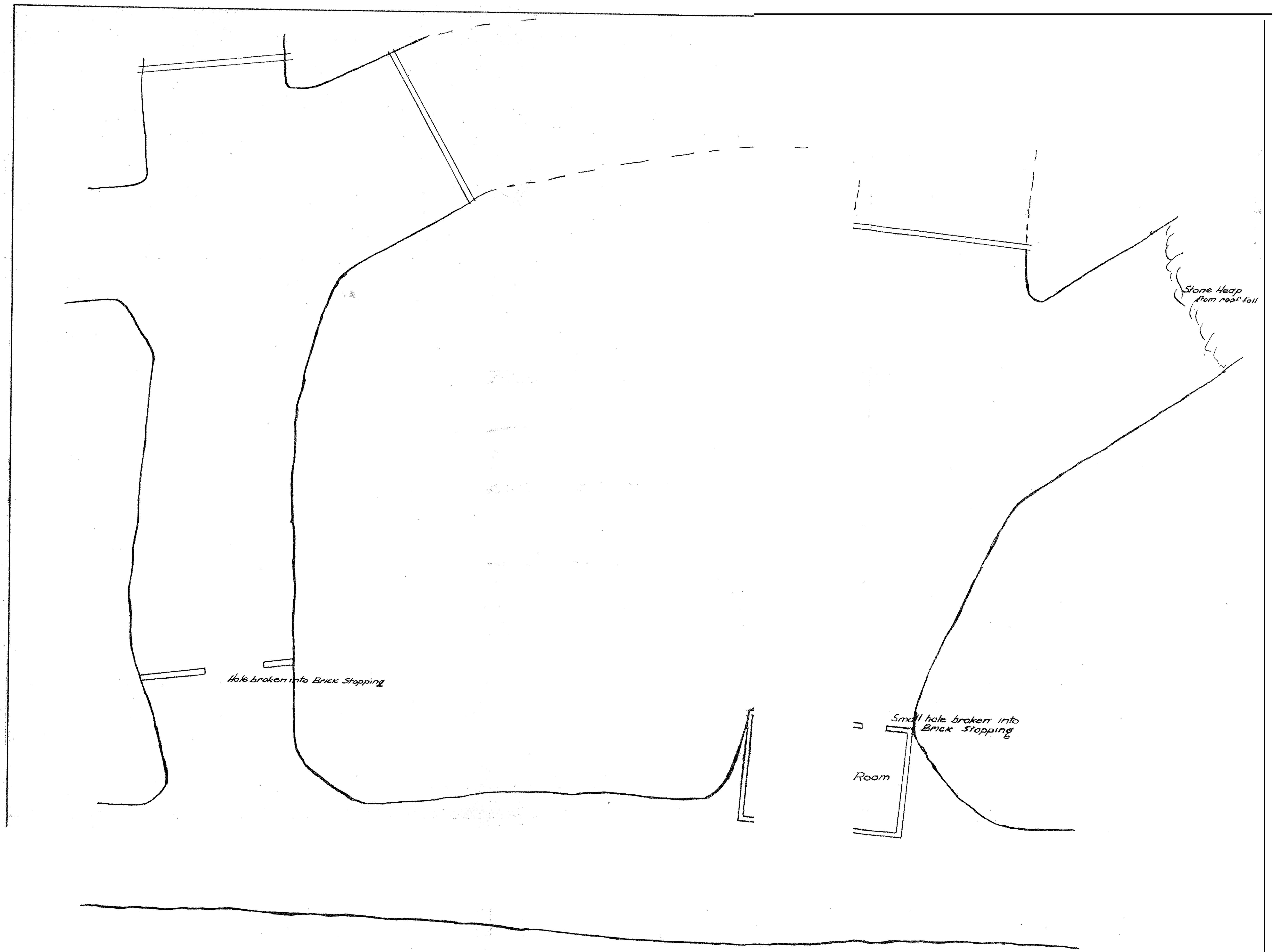
	£	s.	d.	£	s.	d.
Development-						
Re-opening of old No. 3 West Section	7,675	8	9			
Less Depreciation	767	10	10	6,907	17	11
Reconstitution-						
West Back Heading	1,645	10	2			
Less Depreciation	164	11	0	1,480	19	2
Machinery and Plant ..	550,863	19	9			
Less Depreciation ..	55,086	8	0	495,777	11	9
Buildings ..	4,677	10	3			
Less Depreciation	467	15	0	4,209	15	3
Surge Bin ..	20,564	10	6			
Less Depreciation	2,056	9	0	18,508	1	6
New Bathroom .	37,264	15	8			
Less Depreciation	3,726	9	7	33,538	6	1
Workshops, Buildings and Plant	6,819	4	1			
Less Depreciation .	681	18	5	6,137	5	8
Store	9,643	11	10			
Less Depreciation	964	7	2	8,679	4	8
Motor Lorries ..	1,944	6	6			
Less Depreciation	194	8	8	1,749	17	10
Horses and Vehicles	519	4	4			
Less Depreciation	53	2	9	466	1	7
Furniture and Fittings	264	5	4			
Less Depreciation	26	8	6	237	16	10
Flood Prevention	4,314	19	7			
Less Depreciation	431	10	0	3,883	9	7
Mines Rescue Station				174	3	6
Miners' Houses ..	951	0	5			
Less Depreciation	95	2	0	855	18	5
Railway Siding ..	836	12	2			
Less Depreciation	83	13	2	752	19	0
Welfare Park ..	444	12	10			
Less Depreciation	44	9	3	400	3	7
Machinery and Plant ex Chillagoe	2,526	4	6			
Less Depreciation ..	252	12	6	2,273	12	0
Residence-General Manager ..	2,909	12	7			
Less Depreciation ..	290	19	3	2,618	13	4
Residence-Electrical Engineer	3,190	19	2			
Less Depreciation ..	319	1	11	2,871	17	3
Equipment-Staff Houses	315	7	0			
Less Depreciation	31	10	8	283	16	4
Stocks-						
Stores	122,326	5	11			
Timber	8,398	9	7			
Coal	4,063	1	2			
Explosives	1,788	14	6	136,576	11	2
Sundry Debtors-						
General ..	49,512	1	2			
Insurance Commissioner	215	1	1			
Mines Department ..	215	1	1			
Bowen Consolidated Mines	107	10	7			
Refrigerators ..	1,003	18	10			
Long Service Leave ..	289	15	7	51,343	8	4
Petty Cash				10	0	0
Profit and Loss Accumulation	48,889	16	6			
Add Loss for year	196,244	8	5			
	245,134	4	11			
Less Grant from Consolidated Revenue 180,000 0 0 (s. d.)						
Stock Adj. .. 464 10 3	180,464	10	3	64,669	14	8
				£844,407	5	5



PLAN OF PORT 0 OF WORKINGS
STATE COAL MIN COLLINSVILLE
SHO ING
BASIC. DATA AV ILABLE 1.10.51
SCALE : 4CH NS TO AN INCH

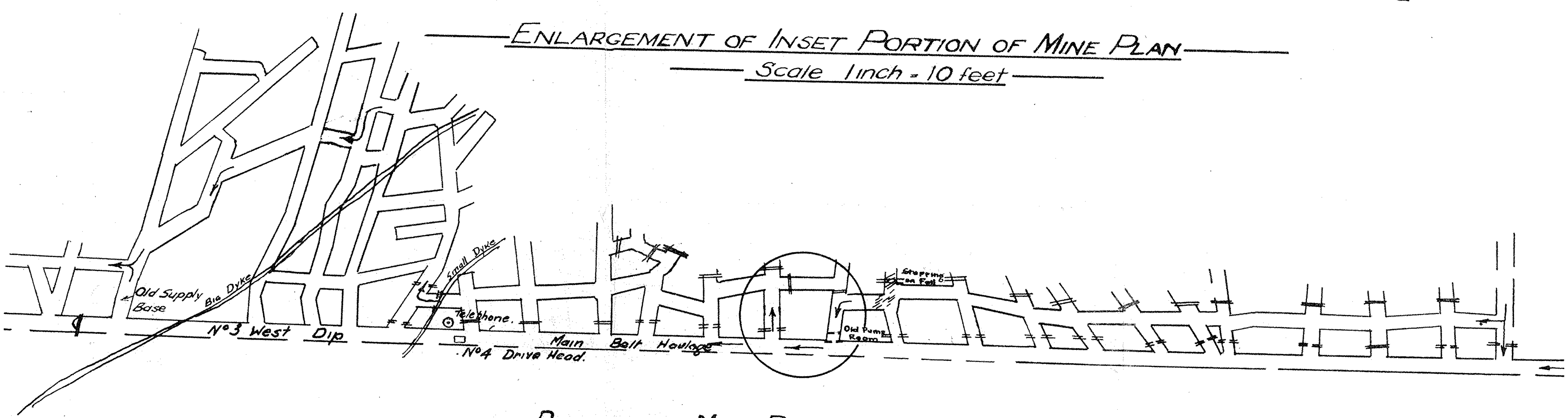
ANNEXURE 25


COLLINSVILLE STATE COAL MINE
POSSIBLE METHOD OF WORKING WITH EXISTING PLANT
SCALE: 1 CH. TO AN INCH
AREA OF BAD ROOF ENCOUNTERED COLOURED GREEN
ANNEXURE 34
FAULT
DYKE
LEVEL



ENLARGEMENT OF INSET PORTION OF MINE PLAN

Scale 1inch = 10 feet



PORTION OF MINE PLAN

Scale 1inch = 2chains

STATE COAL MINE

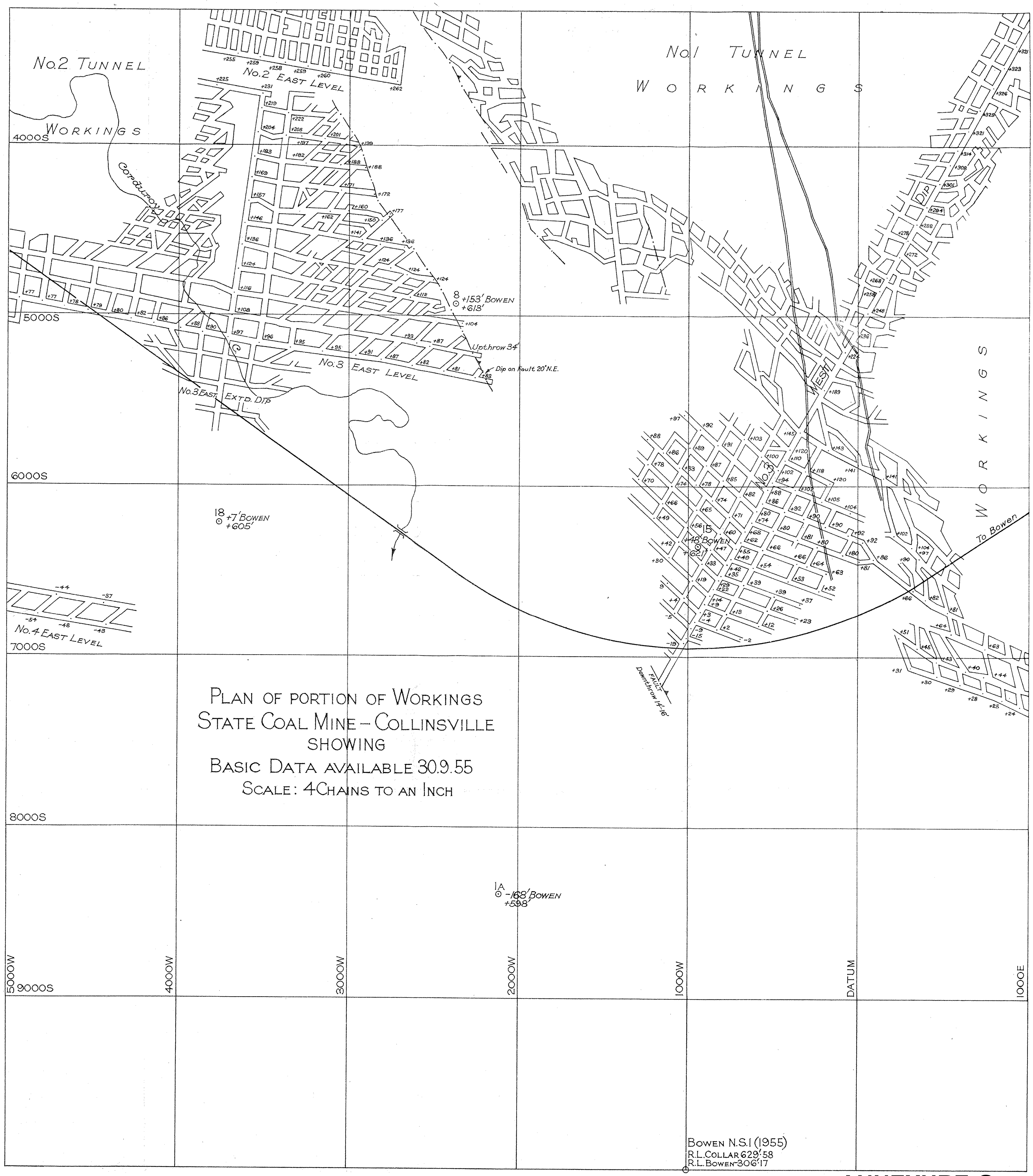
COLLINSVILLE

Plan shewing enlarged view of the pillar which requires splitting to make a complete second intake roadway from the surface to the machine sectio. N°3 West Section, N°1 Tunnel.
Also shewn is a portion of the Mine Plan from where the two intakes become parallel to each other near the Direct Haulage Winch down to the first Bords of the Machine Section.

S Bullock Mine Surv.

ANNEXURE

ANNEXURE 80



PLAN OF PORTION OF WORKINGS
STATE COAL MINE – COLLINSVILLE
SHOWING
BASIC DATA AVAILABLE 30.9.55
SCALE: 4 CHAINS TO AN INCH
No.2 TUNNEL WORKINGS
No.1 TUNNEL WORKINGS
WORKINGS
No.2 EAST LEVEL
No.3 EAST LEVEL
No.3 EAST EXTD. DIP
No.4 EAST LEVEL
Corduroy
8 +153' BOWEN +613'
18 +7' BOWEN +605'
1A -168' BOWEN +598'
15 +48' BOWEN +621'
Upthrow 34'
Dip on Fault 20° N.E.
FAULT Downthrow 14'-16'
To Bowen
Bowen N.S.1 (1955)
R.L. COLLAR 629.58
R.L. BOWEN 306.17
4000S
5000S
6000S
7000S
8000S
9000S
5000W
4000W
3000W
2000W
1000W
DATUM
1000E

ANNEXURE NO. 33.

PRODUCTION PER EMPLOYEE FROM 30TH JITNE, 1950 TO 30TH JUNE, 1953.

Name of Colliery.	At Coal Face.					
	July-Dec. 1950.	Jan.-Juno 1951.	July-Dec. 1951.	Jam-June 1952.	July-Dec. 1952.	Jan.-June 1953.
West Moreton District ..	6.33	6.24	6.47	6.41	6.35	6.37
Darling Downs District	5.64	5.53	5.92	5.95	6.00	5.46
Maryborough District ..	5.12	5.11	5.42	5.13	5.04	4.81
Rockhampton District ..	6.57	6.28	6.35	6.39	6.57	7.27
Bowen District ..	8.03	8.07	8.70	8.04	8.68	8.98
j Collinsville State ..	7.88	8.06	8.44	8.41	8.87	8.84
1Bowen Consolidated	8.23	8.08	9.04	7.48	8.34	9.24
Chillagoe District	5.07	4.96	5.35	5.30	4.1)2	4.98
Underground Mines	6.26	6.16	6.44	6.31	6.36	6.34
Callide District ..						
Clermont District						
Open-cut Mines ..						
Queensland ..						

i ,4Ille IA uuluery .	Overall.					
	July-Dec. 1950.	Jan.-June 1951.	July-Dec. 1951.	Jan.-June 1952.	July-Dec. 1952.	Jan.-June 1953.
West Moreton District	2.70	2.67	2.84	2.79	2.75	2.79
Darling Downs District	3.07	2.86	3.02	3.08	3.04	2.80
Maryborough District	2.30	2.39	2.56	2.33	2.35	2.30
Rockhampton District ..	2.48	2.30	2.29	2.19	2.19	2.13
Bowen District	2.08	F95	2.11	1.93	2.18	2.02
f Collinsville State	f 1.83	1.78	1.84	1.92	2.15	1.891
Bowen Consolidated	1 2.52	2.26	2.58	1.94	9.24	2.32f
Chillagoe District	F03	1.08	1-27	1.32	1.13	•93
Underground Mines	2.53	2.47	2.62	2.55	2.56	2.52
Callide District	15.09	18.98	24.60	21.78	20.83	22.64
Clermont District	7.67	8.74	8.99	9.18	7.82	7.69
Open-cut Mines	8.98	10.60	12.77	12.08	11.54	10.93
Queensland	2.91	2.98	3.33	3.21	3.24	3.07

ANNEXURE NO. 37.

GEOLOGICAL SURVEY OF QUEENSLAND.

Old Railway Offices,
George street, Brisbane, B.4,
15th November, 1955.

MEMORANDUM :

The Under Secretary for Mines,
Brisbane.

RE BowEr. N.S. 1 (1955) -STATE MINE AREA, COLLINSVILLE.

At the request of the Royal Commission on the State Mine, Collinsville, the Department of Mines undertook the drilling of a diamond drill hole to gain information as to the grade and quality of the Bowen seam to the south of No. 1 tunnel workings beyond the fault met in No. 3 W. Dip.

Following discussion with members of the Commission, a site was selected at 10,000 S., 1,000 W. on the State Mine grid, some 19-1 chains on a true bearing of 146 degrees front No. 1A bore drilled in 1940.

The site was pegged and levelled by the Mine Surveyor, R.L. of collar being determined as 629.58 ft. on State datum.

Drilling commenced on 16th August and the hole was completed at 1,066 ft. 5 ins. on 12th October, after intersecting the Blake Seam. Openholing was carried to 30 ft., below which coring was continuous to total depth.

The core was examined and logged at the drill site by J. B. Cameron, Assistant Geologist, who was stationed on the field while the coal measures were being drilled. His report and log of the drill hole are attached.

Correlation of the bore section with those of previous bores in the area presents no difficulty. The results, set out in the following table, confirm the previous correlation of bore 1A, in particular with regard to the identification of the seam at 755 ft. 6 ins.-766 ft. as the Bowen.

CORRELATION OF COAL SEAM IN BORE SECTIONS—STATE COAL MINE AREA, COLLINSVILLE.

——	Bowen N.S.1.		1A.		18.	
	Ft. ins.	Ft. ins.	Ft. ins.	Ft. ins.	Ft. ins.	Ft. ins.
Porphyrite Sill ..	404 2	443 2	245 0	288 0	97 6	138 7
Garrick Seam ..	551 5	558 111	398 2	399 0	237 0	243 10
	589 11	591 111				
	734 31 754 31	734 61 754 81			457 10	458 8
Scott Seam ..	*769 11	776 6	*640 0	645 0	*466 2	473 0
Denison Seam ..	794 1	798 51	665 0	670 0	*485 0	493 0
Potts Seam ..	830 7	833 1			518 9	521 11
Vale Seam ..	893 Sī *897 10	894 5 899 7	741 0	747 0	576 0	573 0
Bowen Seam ..	922 1	935 9	755 6	766 0	583 2	597 8
	954 41 959 6	956 9 959 9				
Blake Seam ..	*1,037 0	1,059 21			690 0	701 0

——	15.		14.		13.	
	Ft. ins.	Ft. ins.	Ft. ins.	Ft. ins.	Ft. ins.	Ft. ins.
Porphyrite Sill ..	90 0	130 0	44 0	85 6		
Garrick Seam ..	225 0	233 0	186 0	194 41-	56 0	64 0
	*263 5	265 7	227 3	228 6	95 3	97 6
Scott Seam ..	440 8	447 0	*406 4	413 6	276 0	282 4
Denison Seam ..	*464 7	468 0	430 0	434 4	295 8	300 5
Potts Seam ..	492 0	495 0	458 7	462 6	324 11	327 9
Vale Seam ..	551 2	553 2	525 1	526 10	375 0	376 11
Bowen Seam ..	557 11	571 10	533 0 544 11	544 2 546 3	381 10	395 11
					427 0	429 0
Blake Seam ..					483 9'	490 8

* Affected by intrusion.

Points of correlation to which attention might be drawn are :-

(1) The occurrence of coaly material immediately underlying the porphyrite sill at 404 ft. 2 ins.-443 ft. 2 ins. in N.S. 1 and overlying it at 97 ft. 6 ins.-138 ft. 7 ins. in 18, suggesting destruction of a seam at that horizon.

(2) Intrusion of the Scott Seam at 769 ft. 11 ins.-776 ft. 6 ins. in N.S. 1 corresponding with 640 ft.-645 ft. in 1A, 466 ft. 2 ins. 173 ft. in 18 and 406 ft. 4 ins. 113 ft. 6 ins. in 14.

Evidence of faulting above the Bowen Seam was obtained at depths of 732-735 ft. and :816-840 ft. where slickensiding was present in shale bands in sandstone. Neither of these can be calculated satisfactorily as equivalent to the movement recorded in 1A at 605 ft. nor do they fit in with observed data on the fault as exposed on the workings.

Bowen N.S. 1 presents the first record of intrusion of the Vale and Blake Seams in this part of the field. The former lies at an unusually great interval above the Bowen Seam (22 ft. 6 ins.) which itself shows no sign of being affected.

Results of drilling show no change in average grade of the seam to the south of present workings that can be related to faulting. A section drawn through the No. 2 Tunnel workings and bores 18, 1A, and N.S. 1 approximately parallel with the direction of the fault met in No. 3 W. Dip shows a progressive increase in grade but this is considered to be due to the influence of the plunging anti-clinal structure on which No. 4 W. Dip is sited. This view is supported by the evidence of a section through the bore at right angles to the fault which shows the average grade below the No. 4 Dip workings to be uniform with that up Dip in the lower workings.

Visual examination of the Bowen Seam core suggested that, with the exception of a 5 in. inferior band at approximately 932 ft., the coal was of good quality. Recovery amounted to 93.75 per cent., the loss being attributed largely to soot bands.

For analysis, the seam was sampled in three sections, the core being split to provide duplicates for reference. A fourth sample was prepared to include 1 ft. 6. ins. of coal and stone bands in the floor of the seam.

Results of examination by the Government Analyst are as follows :-

Sample Number.	404/55 G.S.	405/55 G.S.	406/55 G.S.	407/55 G.S.
Depth	Ft. ins. 922 1— 925 9	Ft. ins. 925 9- 930 9	Ft. ins. 930 9- 935 9	Ft. ins. 935 9- 937 3
Proximate Analysis-				
Moisture at 105°C	0.7	0.8	0.8	0.9
Volatile Matter	19.8	22.4	20.8	13.2
Fixed Carbon	65.6	58.5	59.9	28.6
Ash	13.9	18.3	18.5	57.3
Calorific Value-				
Joules	30,580	28,680	28,640	12,930
B.T.U./lb.	13,160	12,340	12,320	5,560
Sulphur	2.53	0.97	0.50	0.23
Specific Gravity	1.438	1.459	1.457	1.922
Coking Properties-				
Coke Classification	Cw	Cm	Cm	Af
Swelling Index (1 gm. sample) ..	1	1i	1·1·	1

The analysis of the full seam section (922 ft. 1 in.-935 ft. 9 ins.) as calculated from the above sectional analyses is as follows :-

Proximate Analysis-	
Moisture ..	0.8 per cent.
Volatile Matter	21.1 per cent.
Fixed Carbon	60 9 per cent.
Ash ..	17.2 per cent.
Sulphur ..	1.22 per cent.
Calorific Value-	
Joules	29,175
B.T.U./lb.	12,550
Specific Gravity	1.453

The drilling of Bowen N.S. 1 has thus proved the complete strata section and shown no evidence of appreciable disturbance by faulting. The quality of the Bowen Seam as shown by ,analysis is comparable with that at present being worked in the State Mine.

H. G. S. CRIBB,
Senior Geologist.

GEOLOGICAL SURVEY OF QUEENSLAND.

Old Railway Offices,
George Street,
Brisbane, B.4.
9th November, 1955.

MEMORANDUM :

The Chief Government Geologist,
Brisbane.

55/2083/442.

BOWEN N.S. 1 (1955)

STATE MINE AREA, COLLINSVILLE.

As instructed in your memo. of 9th September, I visited Collinsville from 14th September to 12th October to carry out geological work associated with the drilling of diamond drill hole Bowen N.S. 1. I attach hereto my log of the strata penetrated in this bore and offer the following comments on the geological column, structure and core recovery. Correlations have been based on the stratigraphic succession set out by J. H. Reid in G.S.Q. Publication No. 276- Geology of the Bowen River Coalfield."

Bowen N.S. 1 (1955).

Location.—State Mine Grid 10,000 S 1,000 W.

Reduced Level.—R. L. Collar 629.58 ft. on State Datum.

Geology.—Drilling commenced on the outcrop of the Big Strophalosia Horizon and continued in this bed to a depth of 25ft. In all approximately 400 ft. of *Middle Bowen Marine* sediments were penetrated. These are essentially siltstones, medium grey and light grey in colour and frequently calcareous. Although only three horizons containing fossil marine shells occur in the top 280 ft. the remaining 120 ft. is richly fossiliferous, there being no less than ten , separate fossil beds. Evidence of glaciation in the form of erratics was first noticed in these marine rocks by Jack (1879). Portion of one such glacial arratic composed of grey granite was cored in N.S. 1 at a depth of approximately 330 ft. The base of the Middle Bowen Marine is represented by a few feet of pebbly fine-grained sandstone containing fragments of marine shells.

Practically at the top of the underlying *Collinsville Coal Measures* there occurs a dark porphyrite sill 39 ft. thick. The intrusive nature of this igneous rock is well demonstrated by the occurrence of 5 ins. of coked coal and burnt carbonaceous shale above it and of burnt carbonaceous shale below. In places the original carbonaceous material in these floor shales has been converted into graphite. This sill has been recorded in previous bores in the area (Nos 27, 18, 15,. and 14), its association with coal being noted in bore holes, Nos. 27 and 18. It is possible that a coal seam of considerable thickness has been intruded and destroyed by this porphyrite.

The four upper seams in the succession at Collinsville—Garrick, Scott, Denison, and Potts—were all encountered in N.S. 1. The thickness of these seams and the strata separating them are given in the following table :—

	ft.	ins.
Porphyrite Sill ..	39	
Shale; sandstone ..	108	
Garrick	7	6-1
Siltstone ; sandstone	211	
Scott ..	6	7
Shale; siltstone and sandstone		17-.1
. Denison	4	$4\frac{1}{2}$
Sandstone ; siltstone ; sandstone	32	
Potts	2	6

In addition to these named seams, a seam 2-ft. thick occurs 31 ft. below the Garrick while two narrow coal bands 3 ins. and 5 ins. thick lie 35 ft. and 15 ft. respectively above the Scott.

As was the case in the old workings in the Garrick Seam in State Reserve No. 1, the top two to three feet of that seam in N.S. 1 contains a considerable amount of pyrite. The rest of the seam, however, appears of good quality. The Scott seam, here, except for the top 9 ins. and the bottom 15 ins., has been coked, although the intruding sill is apparent only as small white veins in the burnt coal. Both the Denison and Potts Seam are free from igneous intrusion.

Approximately 60 ft. below the Potts, the Vale, or Little Bowen Seam, was encountered.. It consists of 111. ins. of coal, 3 ft. 5 ins. of shale and 1 ft. 9 ins. of white altered sill. This sill possibly represents the bottom split of the Vale Seam as seen in the State Mine No. 1 Tunnel workings. The interval between the Vale and the Bowen Seams in N.S. 1 (22,4 ft.) is considerably greater than the 5 ft. between those scams in the State Colliery. However, in the shaft of the Bowen Consolidated Coal Mine at Scottville two bands of coal 9 ins. and 14 ins. thick separated by 4 ft. of sandstone occur 34 ft. 8 ins. above the Bowen Seam and 83 ft. below the Denison. Although it is thought locally that the Vale and Bowen Seams have come together at Scottville I consider that the Vale there is represented by the two coal bands some 34 ft. above the Bowen. This correlation is strengthened by the occurrence of two 7 ins. bands of coal 34 ft. above the Bowen and 40 ft. below the Potts in borehole No. 29. This bore is situated approximately 20 chains south-west of the Bowen Consolidated Shaft.

The Bowen Seam was encountered in N.S. 1 at a depth of 922 ft. 1 in. and consisted of 13 ft. 8 ins. of good quality coal underlain by 18 ins. of carbonaceous shale and coal bands.. Owing to their powdery nature, the soot bands so characteristic of the Bowen Seam in the State Mine Workings were not recovered. However, a trace of sooty material was evident in the core approximately 3 ft. 4 ins. from the floor.

For up to an hour after being brought to the surface the coal core from the Bowen Seam in N.S. 1 emitted gas. This was discernible only when the coal was wet, the gas then bubbling through the thin film of water around the core. It was not possible to collect any of this gas for analysis but indirect evidence indicates that it was most likely Carbon Dioxide :—

(a) Carbon Dioxide under pressure of varying magnitude has been encountered in the adjacent State Colliery workings from both No. 1 and No. 2 Tunnels.

(6.) No other coal gases have been. detected in any appreciable quantity in those workings.

(c) Deterioration in the drilling mud while the Bowen Seam was being cored in N.S. 1 may have been due to contamination of the mud by the gas. This would indicate that the gas was reactive chemically; for instance, weakly acidic Carbon •.Dioxide. -

The presence of this gas in the Bowen Seam in N.S. 1 suggests conditions similar to those obtaining in some of the present working places in the No. 2 Tunnel workings of the State Colliery where Carbon Dioxide is resident in the coal under a pressure of a few lb. per sq. in.

Previous boring in the State Reserve No. 1 has proved the occurrence of a seam of variable thickness up to 46 ft. below the Bowen. In N.S. 1, this seam 2 ft. 41 ins. thick, lies 181 ft. below the floor of the Bowen Seam. In contrast to the sandy lithology of the rest of the Coal Measures, the strata between this thin seam and the Blake is characterised by a considerable thickness of fine conglomerate. The occurrence of pyrite in large quantities in the sandstones immediately above the Blake Seam also appear to be fairly persistent as that feature is very noticeable in the open-cut on that seam at Scottville.

Approximately 101 ft. below the floor of the Bowen in N.S. 1 the Blake Seam was encountered. It is 22 ft. 21 ins. thick here but has been intruded by a sill, now white and altered, from 13 ft: to 16 ft. 3 ins. from the roof. The coal is coked for 5 ft. above this intrusion and for 3 ft. 3 ins. below. The top 8 ft. of the seam is of fair quality but the unburnt coal near the floor is much banded.

Drilling in Bowen N.S. 1 ceased at a depth of 1,066 ft. 5 ins., 7 ft. 3 ins. below the floor of the Blake Seam.

A summary of the depths at which the more important strata were encountered in N.S. 1 and their thicknesses is given in the following table :—

Strata.	Depth.		Thickness.
	Ft. ins.	Ft. ins.	Ft. ins.
Strophalosia Horizon	0	— 25 0	Plus 25 0
Base of Middle Bowen Marine	403 5		Plus 403 5
Porphyrite Sll	404 2	— 443 2	39 0
Garrick Seam ..	551 5	— 558 111	7 61
Seam below Garrick ..	589 11	— 591 111	2 01
Coal Horizons above Scott	734 31	— 734 61	0 3
	754 31	— 754 81	0 5
Scott ..	769 11	— 776 6	6 7
Denison	794 1	— 798 51	4 41
Potts ..	830 7	— 833 1	2 6
Vale or Little Bowenf Sill	893 51	— 894 5	0 111
Coal	897 10	— 899 7	1 9
Bowen	922 1	— 935 9	13 8
Seam below Bowen	954 41	— 956 9	2 41
Coal Horizon ..	959 6	----j 959 9	0 3
Blake ..	1,037 0	— 1,059 2½	22 21

Structure.—Because of the sandy lithology of the strata encountered in this Bore, reliable dip measurements could not be taken as frequently as one would have desired. However, from the readings taken the average true dip in N.S. 1 would be approximately 6 degrees. Dip measurements throughout the hole ranged from 4 to 9 degrees.

In view of the faulting encountered in No. 3 West Dip in No. 1 Tunnel workings, particular attention was paid to recording all evidence of faulting in the core recovered from N.S. 1. No evidence of faulting of any magnitude was noted. However, between 730 ft. and the bottom of the hole several horizons showed evidence of having been subjected to stress. This evidence is as follows:—

Depth.	Remarks.
Ft. ins.	
732 21	3 ins. fractured sandstone—dip of zones 20 deg.
733 10	1 in. fractured sandstone
734 8	1 in. fractured sandstone The dark-grey shale laminae in the adjacent sandstone are slickensided along the bedding planes.
816 0	1 ft. 51 ins. fractured and slickensided siltstone
821 41	1 in. fractured shale—dip of zone 10 deg.-15 deg.
835 6	61 ins. fractured sandstone
839 10	11 ins. fractured sandstone
974 7	11 ins. fractured sandstone—dip of zone 15 deg.-20 deg.
993 11	11 ins. fractured and slikensided conglomerate—dip of zone 30 deg.-45 deg.
1,032 5	3 ins. fractured sandstone.

The low angle of these fractured zones indicates that they have been produced by lateral compression. In view of the similar lithology above and below these zones and the absence of any repetition of strata in the bore, thrusting movement, if any, at these points would be very small.

Recovery.—in Bowen N.S. 1 was very satisfactory. Overall recovery throughout the hole averaged 99 per cent. The percentage recoveries for the various seams are listed below :—

Seam.	Recovery.
	Per cent.
Garrick .. .	93.2
Seam 31 ft. below Garrick	76.5
Scott ..	95.6
Denison ..	93.3
Potts ..	93.3
Vale or Little Bowen	96.6
Bowen ..	93.75
Seam 18i ft. below Bowen	80.7
Blake ..	83.2
Average recovery for coal sections was	88.4

J. B. CAMERON,
Assistant Geologist.

By Authority: A. H. Tucxalt, Government Printer, Brisbane.

QUEENSLAND
DEPARTMENT OF MINES
DRILL SECTION
BORE N NS./495-5 _BOWEN_

Location : ATE MINE AREA, COLLINSVILLE.
State 1117e _glyi '100 00,...1000
Inclination t, Direction of Hole: zert ./
D ri ll : fyiliy_ap0224 Size of Core: ffe
Drilling Period:
Forern an: IEShie/d
Logg edby : 6g_p(Gegv:4-55:S'e<21
Plotted

Depth	Section

Sh.2

QUEENSLAND DEPARTMENT OF MINES
DRILL SECTION
BORE Nº N.S.1/1955 BOWEN

Continued from previous column :

Depth	Description
210'2"	Rec. 4'2¾"; m.gy.siltst.→lt.gy.siltst. from 1'8"–3'10" from top; marine shells 3'8"–3'10" from top (calc. in btm. 3'). Rec. 8'11½"; med.gy.siltst. (slightly calc. in top 5').
219'	Rec. 8'9"; 4'10" m.g.slts. (calc. in btm. 9" & with marine shells in btm. 1'0"); 2'10" (broken) med.gy.slts.; 1'1" m.g.slts.
228'	Rec. 8'9½"; m.g.slts. (calc. in top 4'6").
237'	Rec. 8'10½"; 2'1" m.gy.slts. (calc.); 4'0" d.gy.slts. with vert. fracture in top 2'6"; 2'1½" l.gy.slts. (calc.); 8" m.gy.slts.
246'	Rec. 8'10"; d.gy.slts. → m.gy.slts.
254'6"	Rec. 8'11¼"; m.gy.slts. (calc. 2'–3' from top).
263'6"	Rec. 8'9¾"; m.gy.slts. calc. in top 1'6" & with 1" pebbly band 1'1" from btm.
272'6"	Rec. 8'8¼"; 7'6" m.gy.siltst. calc. from 2'8"–4'0" from top; fract. dipping at 55° in btm. 2½"; core on f'wall is bkn. but still m.gy.slts.; 2" m.gy.slts., impreg. with calcite; 8" impure lst.; ½" clay cont. lst. frags.; 1' l.gy.sh. (much fract.); 1" m.gy.sh.; 1¾" m.g.sh. imp. with calcite, with coaly parting at base.
281'	Rec. 8'9½"; 2½" slts. impreg. with iron carb. & with few coaly lam.; 11½" l.gy.slts. (calc., with marine shells); 7'7½" m.gy.slts. with 3" lt.gy.slts. 4'10" from top (slightly calc. in btm. 2').
290'	Rec. 8'11"; l.gy.slts. → m.gy.slts. (calc. in top 4'3" & with marine shells 3'0"–3'9" from top.
299'	Rec. 8'9½"; 2" m.gy.slts.; 2'1½" lt.gy.slts. (calc.) with irreg. lam. of m.gy. slts.; 6'6" m.gy.slts. → l.gy.slts. in middle 6".
307'9"	Rec. 8'11½"; 3'11" m.gy.slts.; 5'0½" l.gy.slts. → l.gy.sa. impreg. with iron carb. 8½"–18½" from top & with marine shells 1'3½"–1'6½" & 3'11"–4'8" from top (calc. partic. in btm. 2'6").
316'6"	Rec. 8'10¾"; m.gy.slts. → l.gy.slts. (calc.) with few marine shells 1'3"–1'6" & 5'4"–5'10" from top & impreg. with iron carb. 6'5"–6'10" from top.
325'6"	Rec. 8'9¾"; 10" l.gy.slts. (calc.); 7'9¾" m.gy.slts. with granite boulder 3'3"–4'3½" from top & with calc. pebbly band 4'1"–4'10½" from top (?glacial erratic).
334'6"	Rec. 6'7¼"; m.g.slts. with irreg. lam. & lenses of l.gy. slts. & with pebbly band of marine shells 2'8"–3'2" from top.
340'11"	Rec. 8'7½"; 3'0½" m.gy.slts.; 4'3" l.gy.slts. (calc.) with irreg. lam. of m.gy.slts. & with fracture dipping at 80° from 1'8"–3'2" from top; 1'4" m.gy.slts.
	Rec. 5'1¼"; m.gy.slts. → l.gy.slts.
4	Rec. 8'1¾"; 1'6" l.gy.slts. (calc.), with few marine shells in mid. 6"; 1'7½" m.g.slts. (calc. in bottom 1'0"); 5'0¼" m.gy.slts. with irreg. lam. of l.gy.slts. & d.gy. sh. & a few regular thin bands of l.gy.slts. Rec. 8'11¾"; irreg. interbᵈ med. & l.gy.slts. with fine irreg. lam. of dk.gy.sh. in top 4'8".
371'8"	Rec. 8'4½"; m.gy.slts. (calc. except for 9" at top) → l.gy.slts. in places in last 3', with marine shells from 4'–5'3" from top.
380'2"	Rec. 5'10"; 8½" interbedded l. & m.gy.slts.; 1'10" thinly interbedded l. & m.gy.slts. & d.gy.sh.; 3'3½" m.gy. slts. impreg. with iron carb. in btm. 5½" & with 8½" l.gy. f.sa. 1'4" from top.
386'	Rec. 9'0"; 1'11½" l.gy.slts. with irreg. lam. of m.gy.slts.; 7'0½" m.gy.sh. & slts. with d. & l.gy.sh. lam.
395'	Rec. 8'1¼"; 1'11½" m.gy.slts., irreg. lam. of d.gy.sh. & l.gy.slts.; 1'3" m.gy.slts. (calc.) impreg. with iron carb. in places & with few marine shell fragments & pebbles; 10" m.gy.slts.; 4'0¾" l.–m.gy.slts. → f.sa. (calc.) with pebbles up to 2" diam. thru-out & few marine shell fragments.
403'6"	Rec. 8'7"; 4" l.gy. f.sa. with pebbles & boulder 3" diam.; Base of Middle Bowen Marine. 1¼" m.g.sh.; 2½" l.g.slts. with pyrite; 4¼" burnt coal & carb.sh.; 1'1¾" l.gy. f.-grained sill, gy.wh. in top 2", slight vesicular structure in top 4"; 6'4¾" greenish gy. porphyrite.
412'	Rec. 5'9"; gn.-gy. porphyrite.
417'6"	Rec. 8'6"; " "
426'	Rec. 8'4"; " " "
434'6"	Rec. 8'10½"; 7'8¼" gn.-gy. porphyrite, 1'2¼" gy.-wh. f.-grained sill with few fragments of baked bk.sh. in btm. 1".
443'3"	

Continued in next column

Sh.3

QUEENSLAND DEPARTMENT OF MINES
DRILL SECTION
BORE Nº N.S.1/1955 BOWEN

Continued from previous column :

Depth	Description
	Rec. 7'1"; ½" bk.sh. intruded by gy.wh. sill material at top; 1½" coked coal; 4'7" bk.sh. with coaly lam. coked & even graphitised in places; 1'4" interbedded d.gy.sh. & l.gy. slts.; 1'0" d.gy.sh. with few l.gy.slts. lam. & 2½" l.gy.slts. in middle.
452'0"	Rec. 8'9¼"; 8¼" dk.gy.sh. with l.gy.slts. lam.; 8'1" l.gy.slts. lam. with d.gy.sh. lam.
459'1"	Rec. 8'5½"; 5¼" l.gy.slts. with d.gy.sh. lam.; 8'0¼" l.gy.sa. with fracturing (sm. visible displacement) 4'3"–4'4" from top.
467'7"	Rec. 8'8½"; l.gy. f.sa. with few lam. of d.gy.sh.
476'4"	Rec. 8'6½"; 2'0" l.gy. f.sa.; 4'9" interbedded l.gy.slts., f.sa. & d.gy.sh.; 1'9½" l.gy. f.sa.
485'	Rec. 2'6¼"; l.gy. f.sa. with few d.gy.sh. lam. & with 2" wh.m. sa. 8½" from top & 9½" m.g.slts. 10½" from top.
491'6"	Rec. 8'10"; 7'6½" m.gy.slts. with few lam. & thin bands of l.gy. f.sa. → l.gy.slts.; 1'3½" v.irreg. interbedded d.gy. & l.gy. slts.
496'5"	Rec. 8'6¾"; 7½" d.gy.slts.; 7'11¼" wh. f.sa. with d.gy.slts. lam. & lenses → l.gy. f.sa.
505'	Rec. 8'9"; wh. f.sa. with d.gy. siltst. lenses & few carb.sh. & coaly lam.
513'7"	Rec. 8'7"; 8'1" wh.m.sa. with 1'10" wh. f.sa. 4'8" from top; 6" l.gy. f.sa. with d.gy.slts. lam.
522'3"	Rec. 8'7¾"; wh.m.sa. → gy.wh. f.sa. with pebbly bands 1'7"–2'0" from top.
530'11"	Rec. 8'1"; 2'3½" gy.wh. f.sa.; 3'10" interbedded l.gy.slts. & d.gy.sh. with 4" wh.m.sa. 2'3" from top; 1'11½" l.gy. f.m.sa.
539'6"	Rec. 7'6"; wh.med.sa.
546'6"	Rec. 7'9"; 4'11" wh.med.sa. → wh.coarse sa.; 7½" coal with numerous lenses & lents. of pyrite; 10½" (broken) coal with lents. of pyrite; 9" " " " " " ; 7" coal.
551'5"–558'11½" GARRICK SEAM 555'	Rec. 2'3"; 2'3" coal.
557'	Rec. 1'11"; 1'10" coal; 1" (bkn.) coal (few slickensided fragments).
560'	Rec. 7'11½"; ¼" carb.sh.; 2'3¼" d.gy.sh. with l.gy.slts. lam.; 5'8" interbedded d.gy.sh. & l.gy.slts.
567'	Rec. 8'4¾"; thinly interbedded d.gy.sh. & l.gy.slts. & f.sa.
575'7"	Rec. 8'5½"; interbedded d.gy.slts. & l.gy.slts.
584'3"	Rec. 6'6"; 4'7½" interbedded l.gy. f.sa. & d.gy. slts.; 1'4" m.gy. f.sa. impreg. with iron carb.; 6½" (broken) coal.
590'9"	Rec. 2'4"; 10½" (bkn.) coal; 1'3½" dk.gy. f.sa. (carb.).
593'6"	Rec. 6'2"; m.gy. f.sa. with f. bands of f. wh.sa.
599'6"	Rec. 8'9"; 5'0¾" m.gy. f.sa. with bands & lam. of wh.m.sa. 3'8¼" m.gy.slts. with 1½" d.gy.sh. 4½" from top.
608'2"	Rec. 8'6½"; m.gy.slts. → l.gy. f.sa.
616'10"	Rec. 8'7½"; m.gy.slts. with few bands of wh.m.sa. 1'6"–1'0" from btm.
625'6"	Rec. 2'1"; 2'0" l.gy. f.sa.; 1" med.gy.siltst.
627'6"	Rec. 8'7"; l.gy. f.sa. & slts. with irreg. lenses of d.gy.slts. 1'6"–4'0" & from 5'9"–6'3" from top.
636'1"	Rec. 8'6"; l.gy. f.sa.
644'8"	Rec. 5'1½"; 1'11" l.gy. f.sa.; 2'8½" m.gy.slts. with d.gy.slts. lam.; 6" l.g. f.sa.
649'9"	Rec. 8'9½"; l.gy. f.sa. with 2½" m.gy.slts. with few pebbles 3'7" from top.
658'5"	Rec. 8'5¾"; l.gy. f.sa.
667'	Rec. 8'5"; l.gy. f.sa. with 2" d.gy.slts. 2'1" from top & 1" d.gy.sh. impreg. with iron carb. 4'7½" from top.
675'6"	Rec. 8'11"; 7'4" l.gy. f.sa. with 5" d.gy.slts. impeg. with iron carb. 3'10" from top; 5" wh.m.sa. → coarse wh.sa. with f.pebbles

Continued in next column

Sh.4

QUEENSLAND DEPARTMENT OF MINES
DRILL SECTION
BORE Nº N.S.1/1955 BOWEN

Continued from previous column :

Depth	Description
	in btm. 2"; 3½" d.gy.slts. with irreg. lenses of l.gy. f.sa.; 10½" wh. m.sa.
684'3"	Rec. 8'6"; 1'7½" irreg. interbedded d.gy.slts. & l.gy. f.sa.; 1'11" l.gy. f.sa. → wh. f.sa. with bands of d.gy.sh. & slts. 11"–1'3" fr. top; 3'6¼" wh. m.sa.; 1" d.gy.sh. imp. with a little iron carb.; 1'4½" v.irreg. intbᵈ d.gy.sh. with iron carb. & wh. f. & m.sa. with almost vert. irreg. fracture in btm. 1'1".
693'	Rec. 8'3¼"; wh.med-grained sa.
701'2"	Rec. 8'8¼"; 4¼" wh.m.sa.; 8'4" wh. f.sa. → l.gy. f.sa.
709'9"	Rec. 8'9¾"; l.gy. f.sa.
718'6"	Rec. 8'9", l.gy. f.sa.
727'3"	Rec. 3'0½"; 10" l.gy. f.sa.; 1'0" wh. m.sa. with d.gy.sh. & coaly lenses in btm. 4"; 1'2½" l.gy. f.sa.
730'6"	Rec. 8'6½"; 3'10" l.gy. f.sa. with d.gy.sh. pebbles, some imp. with iron carb., 7"–8½" from top & in btm. 2½"; also bds. of fractured sa. 1'9"–2'0" & 3'4½"–3'5" fr. top (dip abt. 20°) —d.gy.sh. lam. slickensided (b.pl.); 1" inf. coal; 2" coal; 1" d.gy. sh. (slkd., b.pl.); 5½" l.gy. f.sa. with d.gy.sh. lam. & lenses (sl., b.pl.) & with 1" brecciated sa. ½" from top; 4¼" wh. f–m. sa.; 3'6¾" l.gy. f.sa. with few irreg. lam. of d.gy.slts. & m.gy.sh.
739'2"	Rec. 8'6¾"; 8'1¾" l.gy. f.sa. with irreg. lam. & lenses of d.gy.sh. & slts.; 5" irreg. interbedded l.gy. f.sa. & d.gy.slts.
747'8"	Rec. 8'9"; 6'8" l.gy. f.sa. with lam. of d.gy.slts. in btm. 2'10"; 5" (bkn) coal; 1'8" l.gy. f.sa. with d.gy.slts. lam.
756'5"	Rec. 8'9½", interb. l.gy. f.sa. & slts. & slts. & d.gy.sh. with 2'3" wh. f–m.sa. 1'10" from top.
765'2"	Rec. 6'10¾"; 2'0½" interb. l.gy. f.sa. & d.gy.sh.; 2'8½" l.gy. f.sa. with d.gy.sh. lam. in btm. 1'5"; 9" (p.b.) coal; 1'4¾" coked coal, with veinlets of wh. altered sill.
769'11"–776'6" SCOTT SEAM 773'9"	Rec. 8'3½"; 2'11" coked coal; 1'2¾" (p.b.) coal; 2'4½" d.gy.sh.; 10" m.gy.slts.; 11¼" l.gy. f.sa. → slts.
781'3" 780'9"	Rec. 6", m.gy.slts. with 2½" wh. f–m.sa. in middle. Rec. 8'9¾"; 6'8¾" interb. l.gy. f.sa. & wh. f–m.sa.; 1'9½" l.gy. f.sa.; 3½" m.gy.slts.
790'	Rec. 5'5"; 1'7¼" m.gy.slts. with irreg. l.gy. f.sa. lam.; 1'4" wh. f.sa. with bands of l.gy. f.sa.; 6" d.gy.sh. with coal lenses top 1"; 8½" m.gy.slts.; 1'3¼" (p.b.) coal.
794'1"–798'5½" DENISON SEAM 795'8"	Rec. 4'1"; 2'9½" (p.b.) coal; 11" d.gy.sh. impreg. with iron carb.; ½" (p.b.) carb.sh.; 4" m.gy.slts.
799'10"	Rec. 8'6"; 6" l.gy. f.sa.; 1'4" interb. l.gy.slts. & d.gy.sh.; 2¾" d.gy. sh.; 6'5¼" l.gy. f.sa. → wh. f.sa. in places.
808'5"	Rec. 8'11", l.gy. f.sa. → l.gy.slts., slickensided & fract. in btm. 1'2".
817'2"	Rec. 8'8½"; 2'9" l.gy.slts., fractured & slkd. in top 2"; 8" d.gy.slts.; 1½" thinly interb. l.gy.sh. & d.gy.sh.; 8" d.gy.sh. with l.gy.sh. lam. in places & with ½" fract. zone dipping 10°–15°, 6½" from top; slickensided btm. 2"; 4'6" d.gy.slts.
826'1"	Rec. 4'8"; 4'7" l.gy. f.sa. with d.gy.slts. lam.; 1" (bkn) coal.
830'7"–833'1" POTTS SEAM 830'11"	Rec. 3'10½"; 2'4" (bkn.) coal; 1'6½" wh. f.–m.sa.
834'8"	Rec. 8'7½", wh. f.–m.sa. fractured 10½"–1'5" & 5'2½"–5'4" from top.
843'3"	Rec. 8'11", wh. f.–m. sa.
852'3"	Rec. 8'5", wh. f.–m.sa.
860'9"	Rec. 8'8½"; 1'1½" wh.m.sa.; 7'7" m.gy.slts. with thin bands of wh. f.sa. in top 2'3".
869'6"	Rec. 8'1¼"; 5½" m.gy.slts.; 7'7¾" wh. & l.gy. f.sa. with lam. of m.gy.slts. in top 1'2".
877'8"	Rec. 8'7¾"; 6'1¼" wh. f.–m.sa.; 2'6½" l.gy. f.sa. → slts.
886'4"	Rec. 7'1¾"; 1'1½" m.gy.sh.; 6'0¼" l.g. f.sa.
893'5½"–899'7" LITTLE BOWEN SEAM 893'8"	Rec. 4'0½"; 9½" (p.b.) coal with some pyrite; 1" carb.sh.; 5" d.gy.sh.; 2'9" m.gy.slts. → d.gy.slts. in btm. 1½".
898'	Rec. 8'0½"; 1½" burnt carb.sh.; 1'9" gy.–wh. altered sill; 6" burnt carb.sh.; 5'7½" d.gy.slts. → m.gy.slts.
906'	Rec. 8'10½"; m.gy.slts. → l.gy. f.sa. in places.
914'8"	

Continued in next column

Sh.5

QUEENSLAND DEPARTMENT OF MINES
DRILL SECTION
BORE Nº N.S.1/1955 BOWEN

Continued from previous column :

Depth	Description
	Rec. 7'6½"; 7'5¾" med.gy. fine sa.; ¾" coal.
922'1"–935'9" BOWEN SEAM 922'6"	Rec. 2'9" (p.b.) coal;
925'7"	Rec. 2'0¼" (p.b.), coal.
927'8"	Rec. 3'4¼" (p.b.), coal with 5" inf. coal 2'10½" from top.
930'8"	Rec. 2'9" (bkn), coal, slight trace of soot band 1'0" from top.
933'8"	Rec. 2'9"; 1'10" (p.b.) coal; 6½" carb.sh. & coal bands; 1¾" (p.b.) coal; 3" carb.sh. with numerous coal lents.
937'1"	Rec. 8'0½"; 1" inf. coal; 2¼" carb.sh.; 2¾" (bkn) coal & inf. coal; 1'4¾" carb.sh. with coal lents. & ½" coal 1¼" from top; 1'4" d.gy.slts. → med.gy.slts.; 4'9¾" l.gy. f.sa. with few ¼" coal lenses.
945'2"	Rec. 8'3½"; 7" l.gy. f.sa. with carb. lam.; 2'9¼" d.gy.slts.; 1'8¼" wh. f.sa. with carb. lam.; 3'3" interbedded l.gy. f.sa. & d.gy.slts.
953'6"	Rec. 3'0"; 1" l.gy. f.sa.; 5" d.gy.slts.; 7½" l.gy. f.sa. with d.gy. sh. & slts. lenses & lents.; 1'10½" (p.b.) coal.
956'8"	Rec. 3'3¾"; ¾" coal; 3½" d.gy.slts. carb. in top 1"; 1'6" m.gy.slts. → d.gy.slts.; 6" l.gy.slts. with d.gy.slts. lam.; 5" d.g.sh. with m.gy.slts. lam.; 2" (b.) coal & inf. coal; 4" d.gy.sh., coal lents.
960'8"	Rec. 8'9"; 3'11¼" d.gy.sh. → d.gy.slts. with irreg. lam. of l.gy.slts.; 2'0" l.gy. slts. → f.sa.; 1'1" d.gy.slts. with lam. of l.gy.slts.; 1'8¾" wh. f.sa.
968'11"	Rec. 8'10"; l.gy. f.sa., fractured 5'9½"–5'11" from top; dip of zone 15°–20°.
977'8"	Rec. 8'7½"; 4'5½" l.gy. f.sa.; 3'9" l.gy. coarse sa. → m.sa.; 5" m.gy. m.sa.
986'4"	Rec. 8'9¾"; 6'2½" m.gy. f.sa. with 6" pebbly coarse sa. 8" from top, 2'7¼" f.congl. with slickensided & fract. zone dipping at 30°–45° 1'5½"–1'7" from top & with ½" coaly lens dipping at 65° at base.
995'1"	Rec. 8'5¾", interbedded f.congl. & coarse sa. (beds up to 1'0" thick).
1003'8"	Rec. 8'4¾"; 1'2½" l.gy. → wh. coarse sa. with steeply dipping coal lenses 3"–5" from top; 7¼" wh.m.sa.; 6'2½" l.gy. f.sa. with 4" f.congl. 2" from top; 1¾" d.gy.slts.; 2¾" (p.b.) wh.m.sa.
1012'2"	Rec. 8'9¼"; 1'0" wh.m.sa. → coarse sa.; 5'0" f.sa.; 2'9¼" l.gy. f.sa.
1020'10"	Rec. 8'10½", l.gy. f.sa. → wh.m.sa. in middle.
1029'10"	Rec. 7'6¼"; 1'0" l.gy. f.sa.; ½" d.gy.sh.; 2'7" gy.wh. f.sa. with fractured zone 1'8"–1'11" from top; 2'4" l.gy. f.sa. with few carb. lam. & with pyrite in btm. 1'0"; 1'3½" l.gy. m.sa. with few pebbles & a lot of pyrite; 1" coal imp. w. iron carb.; 2½" (bkn) coal.
1037'0"–1059'2½" BLAKE SEAM 1037'10"	Rec. 3'0" (p.b.) coal.
1041'11"	Rec. 4'10½"; 2'10" (p.b.) coal with ½" carb.sh. 1'10" from top; 2'0½" (p.b. in top 11"), coked coal.
1047'9"	Rec. 3'9"; 2'6½" coked coal with veinlets of sill material in btm. 1'6"; 1'2½" wh. altered sill.
1051'2"	Rec. 3'6"; 2'0½" wh. alt. sill; 2¼" coked coal; 1½" burnt carb.sh.; 1½" coked coal; ¾" burnt carb.sh.; 11½" (p.b.) coked coal.
1054'10"	Rec. 2'0"; 4½" (p.b.) coked coal; 4½" (p.b.) burnt carb.sh.; 7½" (p.b. in btm. 1½") slightly coked coal; 1" (b) carb.sh.; 2" coal; 1½" carb.sh.; 3¼" coal.
1057'9"	Rec. 8'0"; 6¼" coal → inf. coal; 1" carb.sh.; ¾" (bkn) inf. coal; 1" carb.sh.; 4" (p.b.) coal; 1¼" carb.sh.; 1" (bkn.) inf. coal, 1'0" carb.sh. with few bands of coaly sh.; 4¼" d.gy.sh.; 5½" inf. coal → coal; 1½" d.gy.sh. slightly carb.; 4'9½" d.gy.slts. → sh. in places with m.gy. f.sa. 1'4" from top.
1066'5"	

ANNEXURE 37

COLLINSVILLE STATE COAL MINE

POSSIBLE METHOD OF WORKING WITH EXISTING PLANT

SCALE: 1 CH. TO AN INCH

ANNEXURE 38


N
COLLINSVILLE STATE
POSSIBLE FUTURE
FAULT
DYKE
No.3 WEST LEVEL
No.3 EAST LEVEL
No.4 WEST LEVEL
No.4 EAST LEVEL
WESTERN BOUNDARY
39

No 3 WEST LEVEL
No 3 EAST LEVEL
No 4 WEST LEVEL
No 4 EAST LEVEL
METHOD OF WORKING BORDS RETREATING
METHOD OF WORKING BORDS ADVANCING
FAULT
DYKE
WESTERN BOUNDARY
N
COLLINSVILLE STATE COAL MINE
ALTERNATE POSSIBLE FUTURE LAYOUT COMBINING No.1 & No.2 TUNNELS
SCALE: 4 CHS. TO AN INCH.

ANNEXURE 40