

REVIEW OF EVIDENCE IN THE MOURA MINE DISASTER 16 JULY 1986
REPORT TO MR G.E. HARDIE CHIEF INSPECTOR OF COAL MINES
Authors Dr Sally Leivesley and Dr K Ramaniuk (12 September 1988)
By Stuart Vaccaneo

FINDINGS

Three (3) State Government Secret Reports that refute the Flame Safety Lamp as the cause of the Moura No 4 Mine Disaster have been kept from the Coal Mining Workers and the General Public for 30 years.

Twelve Underground Coal Mine Workers were lost in the Disaster.

The first is a Report by Dr Sally Leivesley and Dr K Ramaniuk written on the 12 September 1988.

A paper copy of this report has recently been discovered by unofficial means.

A copy minus detailed injury and forensic information is attached.

The second is a report prepared by a *“comprehensive multidisciplinary research team was set up to re-examine all the original and new evidence.”*

According to written evidence a further report was then prepared by SIMTARS.

The Third, is a major report was presented to the Queensland Government by SIMTARS in May 1990.

These reports need to be comprehensively searched for in the relevant archives and if found released to the public.

If possible, the Cabinet in Confidence Documents opened to find these Reports.

BACKGROUND

These Review documents have until very recently been Queensland Government State Secret.

They have never been made available to the Coal Mining Union Representatives in some 30 years since it was written.

They were never referenced in any Mines Department or Queensland Government documentation.

The Leivesley Report totally dismisses the Flame Safety Lamp as the likely cause of ignition of the explosion at Moura No 4 Mine.

While not saying what caused the explosion, they identify where the explosion occurred and flame path.

That is from the goaf.

Most likely cause by a Frictional Ignition from falling sandstone causing the methane gas explosion which caused the death of Twelve Coal Miners.

This Report was provided to the then Chief Inspector of Coal Mines (CIOCM) on the 12th of September 1988.

In the Summary and Recommendations on page 11 and 12 of the report are the following statements.

'In summary, while we cannot comment on what caused the ignition, we can provide the hypothesis that the initiation of the explosion was forward and to the right of the rover.

There is no evidence to suggest from this information that an ignition started close to the shuttle car and then proceeded throughout the mine.

It is recommended that the Chief Inspector of Coal Mines consider the following items:

- 1. Whether the details of this report warrant further investigation. It is suggested that the blast experts from the British Home Office including forensic experts review the information as they are skilled in interpreting the pressures and differential impact from blast. In addition, the National Coal Board would have experts who have investigated blast patterns and the specific pattern of blast in mines.*
- 2. Whether it is advisable to make this information known to the Minister and available to industry for comment. It is considered by the authors that an incorrect judgement on the role of the flame safety lamp could mean that false assumptions are being made in industry on the causes of the Moura mine explosion.*
- 3. The authors stress that the investigation has been undertaken for the purpose of determining whether other hypotheses could be developed which would counter the present assumptions about the Moura mine explosion. It is further suggested that the finding of the origin of the explosion being forward of the rover establishes another hypothesis which should be examined by the relevant experts until there is conclusive evidence on the cause of the Moura mine explosion.*

The authors emphasise that this has been a limited study which requires much more detailed analysis.

Signed Sally Leivesley and K Romaniuk

WHY THE REVIEW WAS UNDERTAKEN

In July 1988, Dr Sally Leivesley (PhD Lond., MSPD, BA (Hons) Qld., FICPEM, FRSA, MACE) was developing a *"detailed emergency planning training programme for managers and miners in underground mines"*

Dr Leivesley is a specialist in catastrophic and extreme risk, experience in business continuity and major incident response, including security, CBRNE* incidents, cyber events and general disasters.

*CBRNE = Chemical, biological, radiological, nuclear and explosives incidents.

Dr Leivesley had “read the Warden’s Report of the Inquiry and heard a detailed scientific paper of the involvement of the flame safety lamp at a Department of Mines Spontaneous Combustion Seminar. The Chief Inspector of Coal Mines had allowed Dr Leivesley access to the Wardens Inquiry and to obtain copies of photographs of the explosion following a request”

“Once the photographic evidence was viewed Dr Leivesley decided that there were indications that the initiation of the disaster was not related to the findings of the scientific reports to the Warden’s Inquiry.

The Chief Inspector of Coal Mines was consulted and he made available additional map information and agreed for Mr Mel Bell to contribute his expertise to part of the investigation.”

The analysis went forward with the assistance of Dr K Romaniuk a Forensic Odontologist present at the Moura 4 victims post mortems.

The Review commenced with “viewing the mine map and enlarged photographs of the wreckage and attempting to determine the direction of blast”

Post mortem photographs and “A second set of photographs was obtained after Dr Leivesley had visited Moura and realised that the police had a different set of photographs that had been taken prior to the post mortem when the bodies had been brought to the surface. These photographs provided clearer detail of the bodies and in particular showed the direction of the blast and some additional details on the damage to clothing.”

“The area of the two shuttle cars was viewed in greater detail than the other alternatives because of the current findings on the explosion of a flame safety lamp in that vicinity. No evidence could be found in the pattern of injury on the men to support this contention”

“The analysis of the information was pursued until there was adequate factual information, the initial hypothesis established by Dr Leivesley had been considered alongside the alternative hypothesis, and **there was agreement that the evidence was of sufficient significance to bring to the attention of the Chief Inspector of Coal Mines**

The Leivesley Hypothesis is contained in the second sentence of Recommendation 2

2. Whether it is advisable to make this information known to the Minister and available to industry for comment. It is considered by the authors that an incorrect judgement on the role of the flame safety lamp could mean that false assumptions are being made in industry on the causes of the Moura mine explosion.

The concluding sentence of the report states

The authors emphasise that this has been a limited study which requires much more detailed analysis.

SECOND SECRET REPORT

While researching I happened to come upon a number of Statements in the reference book
“AUSTRALIAN COAL MINING PRACTICE 1993 EDITION”

Chapter 31 is entitled “EXPLOSIONS AND FIRES”

It was authored by D Rowlands, Professor of Mine Engineering, University of Queensland in 1993.

The following are Quotes from page 550

In 1989 the Qld Government decided to carry out a further investigation into the incident after new interpretations of the blast and forensic evidence were formally reported to the Chief Inspector of Coal Mines.

A comprehensive multidisciplinary research team was set up to re-examine all the original and new evidence. The members consulted with overseas experts in the United Kingdom, the United States of America, the Federal Republic of Germany and New Zealand.

As a result, a major report was presented to the Queensland Government by SIMTARS in May 1990. The author of this Chapter was invited to review that report and as a result wrote the following as part of the review:

“In spite of all the extra material provided in this Report it came to the conclusion that there is no evidence that clearly establishes the cause of the Moura No 4 mine explosion”

MINES MINISTER/CHIEF INSPECTOR OF COAL MINES ACTION/INACTION

What is most relevant is that the Leivesley document has never, ever been made public.

Note, that the Leivesley Report to Chef Inspector of Coal Mines was dated 12 September 1988.

Professor Rowlands mentions it but not by name in 1993.

He then goes on to mention that the Queensland Government actually has taken up the Recommendations for a more comprehensive investigation.

A comprehensive multidisciplinary research team was set up to re-examine all the original and new evidence. The members consulted with overseas experts in the United Kingdom, the United States of America, the Federal Republic of Germany and New Zealand.

As a result, a major report was presented to the Queensland Government by SIMTARS in May 1990.

So obviously the CIOCM got the suggestions done for the study mentioned by Leivesley in 1989.

Where is the formal report? It is obviously been held under ultra-tight secrecy needs?

Professor Rowland actually got to read it I assume in 1990, when the report was finalised.

It is not only was the Leivesley Report of the 12 September 1988 held as a State Government Secret.

A Second Comprehensive Investigation has also been kept secret.

No known copies exist in the public domain

How is that possible?

THIRTY YEAR CABINET IN CONFIDENCE

I have made formal Enquiries both to The Queensland Mines Department and SIMTARS whether they have copies of the identified SIMTARS report.

Both the DNRME and SIMTARS cannot locate said SIMTARS Report or the formal Expert Investigation.

The evidence suggests that the then Mines Minister took it to Cabinet and it has remained under lock down under the 30-year confidential ever since.

A Statement attributed at the time was

“It is not in the interests of the Industry or the Relatives or Survivors for this Information to become Public”.

This confidentiality should logically expire shortly.

The most galling part of this decision it seems the only people that got to examine the Reports were SIMTARS nominated people who authored the Report (unknown), Professor Rowland, the Chief Inspector of Coal Mines and the Minister.

The evidence suggests that the then Mines Minister took it to Cabinet and it has remained under lock down under the 30-year confidential ever since.

A Statement attributed at the time was

“It is not in the interests of the Industry or the Relatives or Survivors for this Information to become Public”.

From personal knowledge and experience I know that no Coal Mine Worker, what are now called Industry Safety and Health Representatives or Union Officials was ever aware of, let alone seen these Reports.

Maybe Mining Company Representatives at the time were shown.

Whatever the findings of the Investigations and Reports it is completely unacceptable that Mine Workers and the Relatives were never allowed to know what a tax payer funded Investigation found.

REASONS

The main reason in my view is this forensic examination totally refutes the flame safety lamp as the ignition source.

Why is the decision by the Minister to take it to cabinet and bury it for 30 years so significant?

The Mines Inspectors and Industry were only concerned and committed to the Flame Safety Lamp worn by the Section Deputy as being the ignition source.

Reason being that the risk of frictional ignition from falling rocks in the goaf absolutely terrified both the Companies and obviously the Department and Government.

This is because there is really nothing that could be done to eliminate the risk of frictional ignition in roof of this sort.

It basically broke down to 2 sides to the argument.

Hundreds of tests were performed on the actual Flame Safety Lamp recovered and then standard models.

To actually get the lamp to propagate an explosion to a methane rich atmosphere became itself a long running saga and in most people's eyes was a process of validating a theory no matter how much facts did not back it up.

Most actual underground workers believed the frictional ignition theory while and Mines Inspectorate wanted to believe flame safety lamp.

There Industry in Queensland continues to deny the possibility of a frictional ignition in a goaf.

This despite the identification of at least 4 occurrences in the United States between 1983 and 2005.

<https://www.cdc.gov/niosh/mining/UserFiles/works/>

On page 2 of the Report there is the following statement

The four ground fall frictional ignitions were given their own classification because their occurrences led to destructive mine fires.

MOURA No 4 MINES INSPECTOR REPORT

The Mines Inspectors Report to the Moura No 4 Wardens Inquiry put forward an alternative to the Flame Safety Lamp as potential causes of Ignition.

One totally backed up by the Review Report.

Inspector John Brady stated that the explosion in his Opinion was from the goaf (waste area where coal has been extracted, roof has fallen and high methane levels accumulate).

He further stated that the ignition source was from frictional ignition during a roof fall in the goaf.

The friction was caused by high strength sandstone blocks impacting together and causing frictional heat high enough to ignite methane.

My understanding is that the Senior Mines Inspectorate did not support his Theory and he was put under considerable pressure to retract his Opinion from the Report, which he refused to do.

This caused him to have to defend his theory on the stand at the Mining Warden Inquiry for some 4 days under aggressive cross examination in particular by Counsel Assisting and the Company representatives.

APPENDIX 1

MOURA 4 WARDENS ENQUIRY EXCERPTS

(B) Other ignition sources

Two other ignition sources are considered possible. These are frictional ignition and the flame safety lamp carried by Deputy Keyworth.

(a) Frictional Ignition

The possibility of frictional ignition was considered in three separate contexts:—

(i) the possibility of the cutter picks of the continuous miner striking the sandstone roof and causing ignition in the working place;

(ii) the possibility of sandstone falling in the goaf and striking steel such as a roof bolt or W strap; and

(iii) the possibility of friction between adjacent blocks of sandstone during a roof fall.

Extensive research carried out overseas has indicated that certain sandstones are capable of creating incendive sparks when impacted upon steel objects or rotating cutter picks.

The orderly withdrawal of the equipment from the working area suggests that the impact of rotating picks of the continuous miner is a highly unlikely source of ignition. The evidence of tests undertaken by Mr Poppitt reinforces the view that sandstone striking steel is also highly unlikely as the source of ignition.

This leaves the possibility of frictional ignition between blocks of sandstone. The National Coal Board have issued a standard classifying the incendivity of rocks within the United Kingdom according to their quartz content. It was stated by Dr Roberts that they measure the quartz content by the point counting petrological method. By this standard Moura sandstone could not be considered as incendive.

However, both Mr Poppitt and Dr Roberts were able to ignite methane in the laboratory by creating friction between a grinding wheel made of Moura sandstone and similar piece of sandstone pressed against the wheel.

Further assessment of quartz content was then undertaken using the x-ray diffraction method by which the finer grains of quartz contained with other similar fine grained minerals can be measured. Although witnesses seem to agree that the point counting petrological method should be more appropriate in assessing the incendivity of the rock, it is apparent that the significance of total quartz

content should be further assessed by research so that a more appropriate standard can be established to cover the Permian strata of the Queensland coal fields.

Mr Poppitt and Dr Roberts were able to ignite gas in their grind wheel experiments. Mr Poppitt estimated that the rock had almost reached its melting point before ignition was achieved. He expressed the view that the likelihood of such temperatures being reproduced as a result of friction between rocks during a roof fall is remote.

The members of the Inquiry are of the view that frictional ignition from sandstone on sandstone of the type found at Moura is highly unlikely to have been the source of ignition.

(b) The Flame Safety Lamp

The second possible source to be considered is the flame safety lamp carried by Deputy Keyworth. This lamp was found close to the body of Keyworth and an initial inspection at the disaster site showed it to be full of fine dust. The lamp and its contents were sent to the Safety in Mines Testing and Research Station at Redbank where it was subjected to intensive examination and testing under the direction of Dr Golledge.

The examination and tests revealed:—

(i) that except for minor superficial damage, the lamp was correctly assembled and in good order;
(ii) both inner and outer gauzes of the lamp had been subjected to temperatures of about 900 deg. C;
(iii) that the internal surface of the lamp glass was evenly coated with fine coal dust particles which were fused to the glass;

(iv) that the outer surfaces of the bonnet and the glass were evenly coated with dust particles. In this respect the experiments showed that this effect and the fusing of coal dust on the glass could only be reproduced by an explosion source close to the lamp itself;

(v) that by igniting an atmosphere of coal dust and methane within an identical lamp and maintaining the same explosive atmosphere, ignitions continued to develop inside the lamp after the wick was extinguished;

(vi) that the ignition temperature necessary to ignite an atmosphere of methane and coal dust was significantly lower than that for methane alone, and that such lower temperatures were easily attained in the outer gauze of a flame safety lamp.

The testing and experimental programme under the direction of Dr Golledge has established that it is possible for an explosive mixture of coal dust and methane to be ignited by the heat generated in the gauze of a flame safety lamp.

He has also established that the temperature necessary for such ignitions can exist following repeated internal explosions when the fuel is a mixture of fine coal dust and methane.

At the time Dr Golledge presented his evidence to the Inquiry he reported he had been unable to ignite explosive atmospheres outside the outer gauze. This may have been associated with the inability to maintain the necessary explosive mixture around the lamp throughout the experiment and this indicates the need for further immediate research.

Dr Golledge has now reported that during his continuing research and experiments he was able to ignite an explosive mixture outside the outer gauze. Dr Golledge's further report is annexed as Appendix "H".

These matters, plus the fact that metallurgical examinations of the gauzes in Deputy Keyworth's flame safety lamp confirmed that temperatures of about 900 deg. C. had been generated, indicate that the flame safety lamp could have been the source of ignition.

Considering all the evidence and the expert opinions presented, the members of the Inquiry have formed the view that the most likely source of ignition was the flame safety lamp.