

SAFETY EDUCATION INITIATIVES AT THE UNIVERSITY OF QUEENSLAND

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SUMMARY

The Minerals Industry Safety and Health Centre is a new initiative of the Australian Minerals Industry, Government and The University of Queensland. The Centre reflects the recognition by all parties that education at both tertiary and continuing education levels has a critical role in improving the safety performance of the industry. This paper discusses the thinking which has led to the formation of the Centre and the plans and activities which are under development.

INTRODUCTION

There is no sector of Australian industry which does not seek to improve its workplace safety performance, and vast sums are spent in the endeavour. The reasons are obvious and need little discussion. The Minerals Industry is totally committed to improvements in safety standards and performance. The challenge is to identify and then put into practice the range of measures and activities which demonstrably result in improvement.

This paper describes the way in which a tertiary institution, in this case The University of Queensland, has become involved in a partnership with Industry and Government to contribute to improved safety through education and research.

BACKGROUND TO THE EDUCATION NEED

Management of Safety and Health in the Australian mining industry has undergone major changes during the last ten years. These changes have been driven by many factors

- Unacceptability of high lost time injury frequency rates (LTIFR)
- Inquiries on single and multiple fatality disasters
- Reviews of Mining Safety, Tripartite Project Committees and other mining industry studies

- Recognition that the traditional methods of managing Safety and Health are not sufficiently effective.

As a result of these factors, mines and mining companies have trialed and adopted initiatives such as the following:

- OH&S Audit Systems
- Behaviour/Culture Improvement Programs
- Design and Operational Risk Assessments
- Major or Principal Hazard Management Systems
- Training in many general and specific OH&S/Risk Management areas

The mining regulatory authorities are also changing. In Queensland, as well as in other major mining States and Countries, the Inspectorates are moving away from mining legislation that includes prescriptive detail on required hazard controls. The new direction involves various methods of prescribing the process of managing safety and health where the mine, rather than government, deduces the risk and determines the appropriate control. Also, Queensland and New South Wales are suggesting that mining increase its focus on major or principal mining hazards that can kill more than one person. Of course, mining fatalities are not new to the industry. The change relates more to the decreasing acceptance of mining related deaths by the community, and perhaps the mineworker.

A recent article published on the Internet by the British Nuclear Power Industry noted the following figures for risk of death per year by various causes.

Risk of being killed by lightning	1 in 10 million
Risk of death by fire or explosion at home	1 in 1 million
Risk of death in a 'safe' industry	1 in 100,000
Risk of death in a road traffic accident	1 in 10,000
Risk of death in mining	1 in 1,000

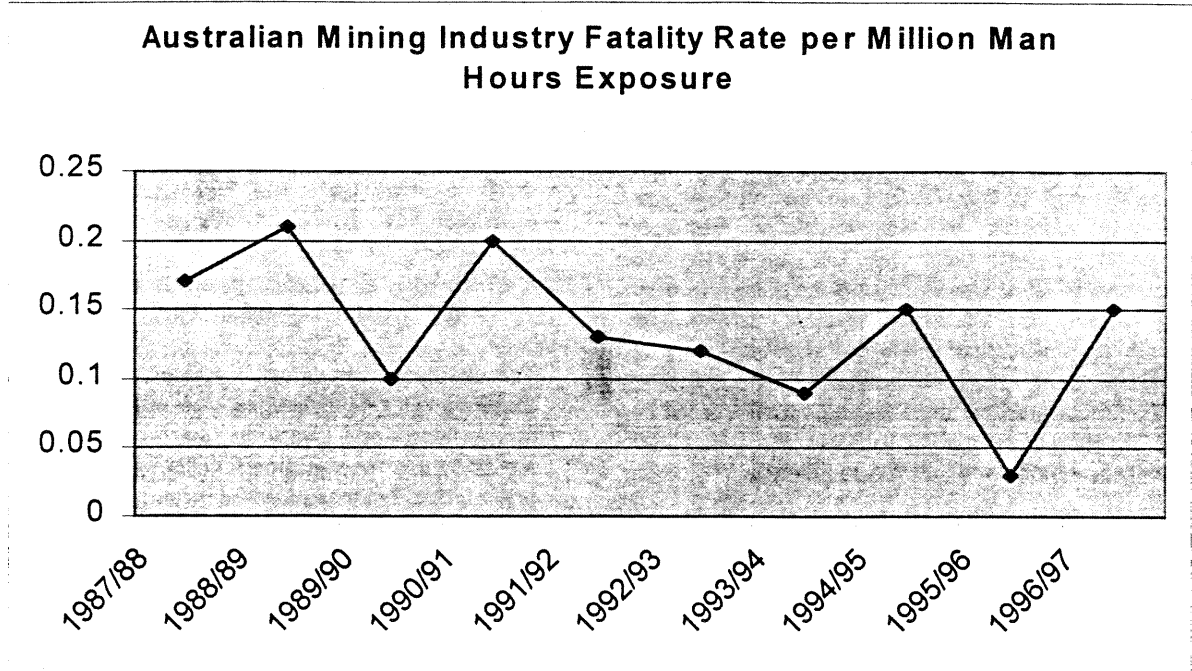
According to the Minerals Council of Australia, there are about 26 fatalities in Australian mining and minerals processing each year, based on a ten-year average. The mining workforce totals approximately 80,000 people. This means that Australian miners face a risk of death of about 1 in 3,000 per year. This figure has not been

normalised to consider exposure hour differences between British and Australian figures. If we accept that it is generally comparable, 1 in 3,000 is a lower risk than the British figure but still a much higher risk than 'safe' industry.

If we were to examine the trend in Australian mining fatalities over the last ten years using the

graph below, we might conclude that there is a downward trend. This should be expected after considerable efforts to improve across the industry.

However, the 1 in 3,000 risk figures indicates that considerable improvement is still required to be a 'safe' industry.



Source of data – Minerals Council of Australia

There are no readily available data to examine the cost of unwanted events that damage assets or production goals, but not people. It is likely that the cost of major unwanted events in mining is very significant and possibly rising, due to changes in mining technology. For example, in the past a cable damage delay in a pillar extraction mine would affect one unit but not necessarily other production in the mine. Today's longwall technology usually involves a single coal production process. Face cable damage on a longwall can cost a million dollars in lost production, or more. Even damage to a shuttle car cable in a development panel will eventually affect longwall production.

A paper on the economic effects of mining losses (1) was presented by BP International at a 1992 OH & S in Mining Conference in the UK. The author presented a 1988 study that collected loss related data over a six week period from one of their US underground coal mines. The mine produced about 1.7 million saleable tonnes per year with a workforce of 352.

The summary of findings stated:

“Operating costs generated by accidental loss during the six week study period were US\$1.08 million, a figure approaching one quarter of the cash operating costs, or some US\$5 per saleable ton.”

The findings went on to state:

“It is clear that a modest reduction would certainly improve profitability.”

One final quote from the paper is also important, especially if it is believed that the apparently better LTIFR performance in the US mines indicates a 'safer' and, possibly, better managed work place:

“The size of cost came as a surprise; the mine was regarded as reasonably productive and well run when measured against its peers.”

We can only speculate on the magnitude of this problem in Australia since we have little data to

identify the cost of 'non-safety' losses in mining. Anecdotal evidence would suggest that many Australian mines still have frequent unwanted events that cause major losses such as blasting problems, subsidence, equipment collisions, roof control problems, cable damage and so on.

In summary, Australia is improving the mining fatality rate but performance remains at a level that is considered unacceptable by the community. The 'non-safety' mining losses, though not the moral priority, are likely to be a major financial problem, possibly threatening the existence of many mines.

Some other industries have been faced with similar actual or potential problems. Some continue with traditional Safety, Health and Risk Management approaches. Others, such as chemical, nuclear and aerospace, have developed their own industry specific approaches to the management of risks. The chemical industry has developed Process Safety Management and other technology. The nuclear industry developed System Safety. Once developed, these industry-specific approaches to managing risks became the basis for the development of competence and, subsequently, systematic applications to reduce the risks.

Despite the many issues and changes in Australian mining, this industry-specific technology does not clearly exist. Formal education in Mining Safety, Health and Risk Management remains limited.

THE MINERALS INDUSTRY SAFETY AND HEALTH CENTRE

Discussions with industry in 1997 revealed a unanimous agreement that improved education of engineers should be a priority goal. The industry view has subsequently been clearly stated by the National Tertiary Education Taskforce of the Minerals Council of Australia (2) as follows:

Thorough and relevant occupational health and safety education for minerals specialist professionals is one of the essential steps towards improving the safety performance of the minerals industry in Australia. The teaching of process safety and risk analysis as in chemical engineering courses is considered to be a good role model for minerals courses and should be coupled with other aspects of occupational health and safety including the statutory obligations imposed on employers and mine officials.

Students' awareness of safety, their critical thinking and their understanding of the

chain of minerals activities are priorities for improvement.

The industry discussions rapidly led to the concept of a University based Centre led by a Professor of Mining Safety. The MISHC was formed on 1 January, 1998 with financial support from the following companies and in kind support from the Queensland Department of Mines and Energy.

BHP Ltd
North Ltd
QCT Resources Ltd
QNI Ltd
Rio Tinto
Shell Coal Australia Ltd
WMC Ltd

The Centre is part of the Sir James Foots Institute of Mineral Resources within UQ. A Management Committee consisting of representatives of the core supporters and the University oversees the operations of the MISHC. Professor Jim Joy has accepted the position of Professor of Mining Safety and Director of the MISHC.

The Minerals Industry Safety and Health Centre aims to become the distinctive and recognised national focus for safety related education and research for the Australian minerals industry by virtue of its quality programs and integration of the relevant activities of other safety groups.

The principal objectives of the MISHC are:

- To develop education programs at undergraduate, postgraduate and continuing education levels based on an integration of safety values and safety systems.
- To initiate, coordinate and conduct research in topics relevant to safety.

THE EDUCATION ROLE

The Centre is planning the following educational activities.

- Development of a suite of appropriate courses covering the generic areas of mining safety.
- Presentation of these courses as an integral and compulsory component of the Mining and Minerals Engineering Degrees, starting in September 1998.
- Development and presentation of Continuing Education and Higher Degree courses in mining safety, starting in early 1999.

- Development of mechanisms for presenting the courses using modern communications methods so the material is accessible at remote sites.
- Provision of the courses to other Australian Universities with the broad objective of contributing to an Australian education network.
- Development of linkages with other Universities and Government institutions (e.g. SIMTARS in Queensland) to ensure active participation of these groups in the education programs.

Starting in 1999, the University of Queensland plans to provide mining, minerals processing and materials engineers with undergraduate training in principles and methods of managing safety, health and other risks related to mining.

To prepare new engineers for a career in mining, their potential roles in mining will be considered to identify the competencies required to design, maintain, modify and manage with acceptable risk.

Accomplishing this objective will involve integration of relevant information from the disciplines such as:

Ergonomics/Human Factors
Occupational Hygiene
Safety Engineering
Risk Assessment and Risk Management

Engineers will be introduced to aspects of the above disciplines that relate to mining methods, equipment, competencies and the environment. This approach is an attempt to integrate the management of safety, health and other risks into engineering methods.

The detail of the engineering education content will be discussed with the seven sponsors of the Minerals Industry Safety and Health Centre, as well as other key mining and university personnel. At this point the curriculum is being developed based on three criteria.

- There must be an applied focus on traditional mining risk issues such as ground control, equipment design, derivation of work procedures, changes in production methods and others.
- There must be methods for proactive analysis of relevant designs and operations, including various tools of risk assessment and system auditing.

- There must be clear integration of safety, health and risk information into the systems of mine management such as Purchasing and Acquisition, Maintenance and Modifications, Mine Planning, Training, Work Method Development and Monitoring.

Possibly the undergraduate design will involve progressing the engineers from a foundation based on understanding the ethical responsibility of an engineer through to detailed project design and management with integrated safety, health and risk controls.

Finally, the same approach will be included in the "Interdisciplinary Programs for the Minerals Industry". The Sir James Foots Institute of Mineral Resources operates this education program at the University of Queensland. It currently offers degree and short courses to graduate mining personnel.

CONCLUSION

The issues and changes in the Australian mining industry warrant a more aggressive industry-specific approach to managing safety, health and other risks. The development of curriculum for undergraduate engineers and postgraduate studies will create a foundation of expertise for the next century. The goal will be to establish Australia as the safest, most productive mining industry in the world.

ACKNOWLEDGMENTS

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