Proactive Measures for Fatality Prevention in the Mining Industry — Why Fatalities Persist While Lost Time Injuries Decline

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Proactive Measures for Fatality Prevention in the Mining Industry — Why Fatalities Persist While Lost Time Injuries Decline

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ABSTRACT

The traditional measure of Lost Time Injury Frequency Rate (LTIFR) as a measure of improvement in safety performance is recognised as inadequate and misleading, lulling managers into believing that safety is improving. It is a reactive measure, and steadily declining LTIFRs around the world have failed to be accompanied by a similar reduction in the fatality rate.

This paper confronts the industry with the attitudes of some mining managers, such as one that allowed fatalities to occur in the case of a gold mining company at a rate of one death per 150 000 ounces of gold produced while claiming their safety record has improved, as shown by a falling LTIFR, and viewing fatality reductions as a long-term goal instead of an immediate priority.

A quantum shift in management attitudes is required to focus on proactive measurements to detect the indicators of an impending disaster, and to predict conditions conducive to fatalities. Corporate CEOs are challenged to attend the funerals of all workers killed in the workplace. CEOs who fail to attend such funerals send a message to employees that the CEO's priorities lie elsewhere, and that profits take priority over workers' lives. The dichotomy of whether mining companies are run for the benefit of shareholders or whether companies owe social responsibility to the community is examined.

The role of individual responsibility for personal safety is examined, together with the psychology of employees in the mining industry.

A number of proactive measurable indicators are suggested to stimulate discussion on developing robust measuring tools to predict and therefore prevent fatalities.

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INTRODUCTION

The mining industry worldwide has strived to reduce the number and rate of injuries and fatalities in the industry for well over 100 years. The Lost Time Injury Frequency Rate (LTIFR), measured as the number of lost-time injuries per million hours worked, has been steadily reducing over the last ten years (Figure 1). However, the Fatal Injury Frequency Rate (FIFR) measured as the number of fatalities per 1000 employees over a nominated period (usually 12 months) has remained relatively stable over the same period. It is also difficult to find accurate and detailed data, as many public file data list the number of fatalities but not the rate per thousand employees. Many fatal incident investigation reports are kept confidential due to the possibility of litigation and for privacy considerations. This makes it difficult to compare companies, states or countries with vastly different employment levels, and to compare coal, metalliferous and quarrying operations and to compare the causes of fatalities. Multiple fatalities in single incidents are often not discriminated from total fatalities. A selection of Australian multiple fatalities involving five or more fatalities over the last 100 years is shown in Figure 2.

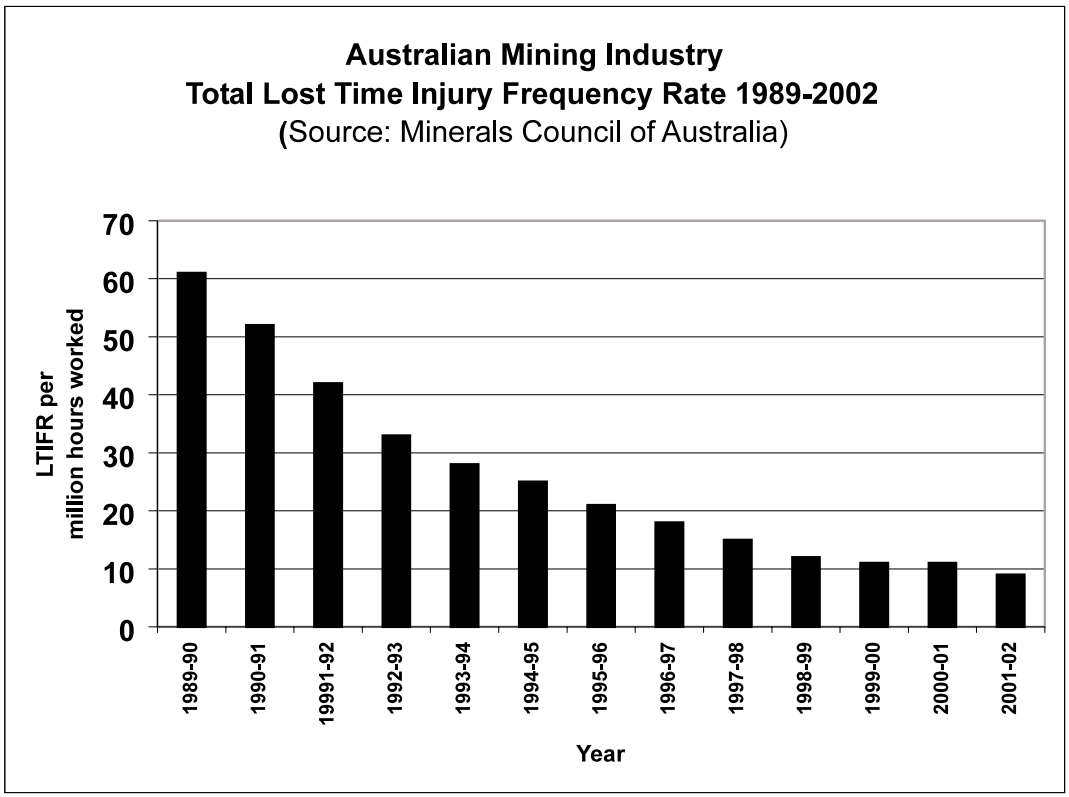

FIG 1 - Lost Time Injury Frequency Rates in the Australian mining industry 1989 to 2002 (source: Minerals Council of Australia 2002).

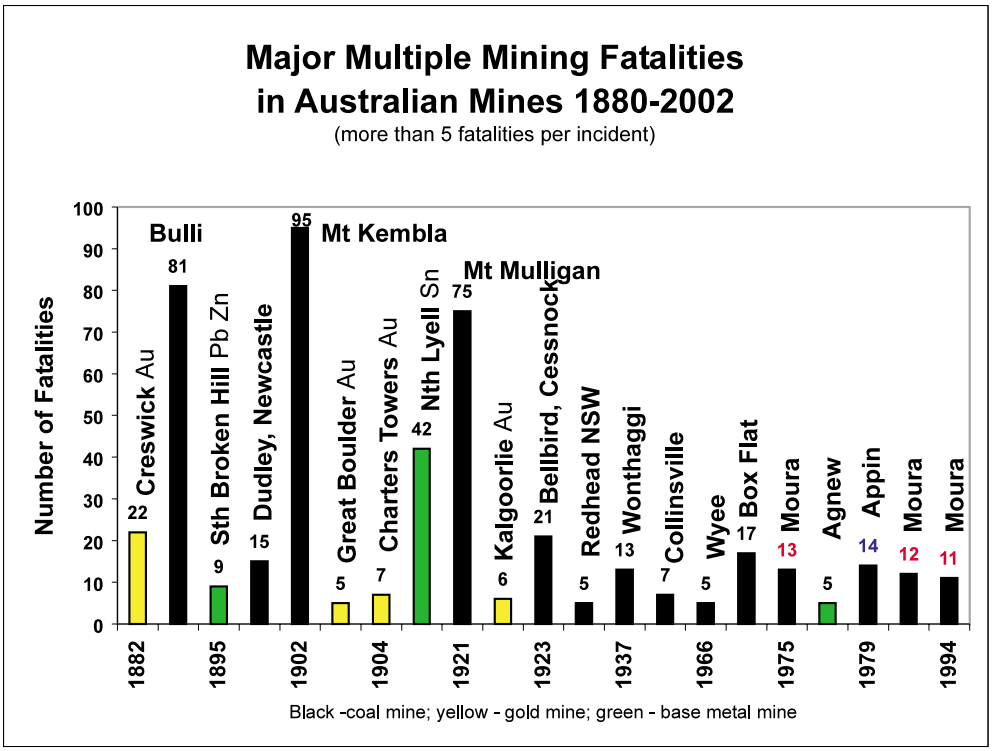

FIG 2 - Selected Multiple Fatality Incidents (greater than five fatalities per incident) in the Australian mining industry 1880 to 2002.

The actual number of fatalities annually in Australia is relatively small, making it impossible to easily identify trends or common factors in fatalities. Another complication in assessing trends is that a single incident may produce multiple fatalities, especially in gas explosion or gas asphyxiation incidents, such as the Braden Copper Mine disaster at El Teniente, Chile, in which 355 men died from gases produced in a small oil fire near a ventilation intake (Reed, 1989). These skew any trends or incident analysis by number or rate of fatalities rather than the number or type of incidents. There is therefore a strong case to measure fatal incidents rather than the number of fatalities in determining frequency rates, a Fatal Incident Frequency Rate, which eliminates the skew from multiple fatalities in a single incident.

While senior management of companies in recent years have increased efforts to eliminate fatalities, the mining industry in part still stands accused of placing production and profits ahead of safety. In a recent multiple-fatality incident in New South Wales in 1999, the Coroner stated in his findings: 'I find that…It is quite clear that the production rate took precedence over factors which concerned the safety of those within the mine.' (Bailey, 2003). Management was also criticised in selecting an inappropriate mining method in a fatality in Queensland where the Mining Warden found, 'We are satisfied that the deceased was using the wrong mining method….We consider this accident was caused by a failure to work the job by an appropriate mining method resulting from inadequate direction by supervision.' (Windridge, 1991). The investigators considered the incidents to be failures of management, and such findings are independent of the concept that individual workers are responsible for their own safety. A mine worker operating under a supervisor's instruction has no input into the decisions on which mining methods are used, and little control over management priorities such as budgets and production schedules. The accountability for mining-method selection decisions, and production versus safety priorities, rests with senior mine management and ultimately with the Chief Executive Officer and the Board of Directors.

CURRENT FATALITY RATES AND TRENDS

This section examines the statistics in the Australian mining industry and compares these to other rates of unnatural death in other Australian industries and the community. Between 1990 - 1991 and 1999 - 2000 there were a total of 229 fatalities and 202 fatal incidents in the Australian minerals industry (Minerals Council of Australia, 2002). The data shows the annual FIFR for mining for the ten years from 1990 to 2000 to be relatively unchanged at around 0.2 fatalities per thousand employees (Minerals Council of Australia, 2002). The rate dropped to 0.09 in 1998 - 1999, which was about the same as for the construction industry but twice the rate for homicides. The rates for total suicides were higher, and the rates for male suicides and male motor vehicle deaths are nearly three times higher (Figure 3). The fatality rate for young male suicides now exceeds the fatality rate for motor vehicle deaths in the same age group of 15 to 25 years.

The generalisation from this is that fatality frequency rates for the mining industry are at the low end of the unnatural death rates for Australia, and better than for the agricultural forestry, fishing and transport industries but nearly twice the homicide rate. The mining industry fatality rate is about the same as the overall motor vehicle fatality rate in the wider community.

It is important to note that homicides, suicides and motor vehicle incidents are significant causes of unnatural deaths in the wider community. It is therefore inevitable that some mine-site fatalities will be suicides and, to a lesser degree, some may be homicides. This is particularly true in sub-Saharan Africa where the infection rate for HIV/AIDS approach 40 per cent of the working-age group. The family of an HIV/AIDS infected worker benefit financially if the worker dies in a work-related incident, but get nothing if he dies at home from AIDS. This opens up the possibility of suicide at work in order to obtain a financial benefit to the family. In Australia, the suicide rates are highest among young males aged 15 - 30 living in remote rural areas – the exact description of many mine workers. The duty-of-care requirements for managers in Australia require that this risk be assessed and managed appropriately.

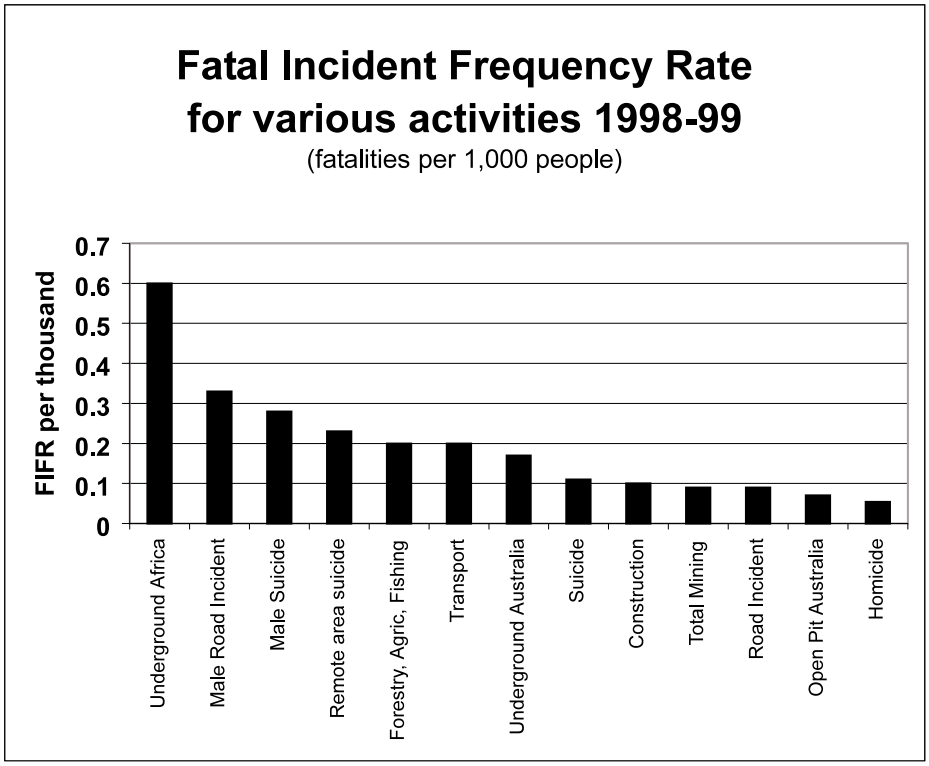

FIG 3 - Fatal injury frequency rates for selected unnatural deaths and various industries compared to the FIFR for underground mines in Africa. (Data from the Australian Bureau of Statistics, Australian Transport Safety Bureau and the Australian Mining Council.)

COMPARISON OF CAUSES OF FATALITIES

Most companies analyse their incident statistics to determine causes and reduce the frequency of incidents. Various industry and government bodies such as the State departments of mines, the State mining councils and the Minerals Council of Australia analyse fatalities and serious injuries to determine common factors.

Figure 4 shows the mechanisms of 142 Australian mining fatalities from 1994 to 2000 analysed by the Minerals Council of Australia. While the single largest factor is vehicle and mobile plant incidents, accounting for one-third of fatalities, this is equalled by gravity-related incidents, such as slips, trips and personnel falls, falling objects and rock falls and slides.

The analysis is also disturbing in that 14 per cent of the fatalities are classed as an 'unknown' mechanism, implying that the analysis has failed to extract vital information from tragic events, either through inadequate or incomplete investigations, or legal, social or industrial factors that inhibit publishing of the mechanism. These people will have died in vain if the industry cannot extract sufficient information to prevent recurrence.

The same analysis was conducted on 354 fatalities in the United States in the same period (Figure 5) and revealed similar proportions, although mobile plant incidents were slightly higher and machinery incidents were significantly higher. Rock fall incidents were lower, with gravity-related incidents accounting for 26 per cent, slightly lower than Australia. Less than two per cent of the incidents had an 'unknown' mechanism.

The analysis does not reveal how many of the machinery related incidents in the US were related to gravity, where someone fell into or onto machinery. It could also be argued that the drowning incidents are gravity-related. The mobile plant incidents do not discriminate between on-site vehicle incidents related to mine site activities and those related to traffic incidents travelling to and from work on public roads or mine-site roads. Industry-specific aircraft fatalities, such as exploration teams killed in helicopter crashes, are either not discriminated or collected under 'Other'. Management of travel risks are part of the corporate duty of care, especially where employees commute for several hours each shift.

A second analysis of fatalities and serious injuries by the Queensland Mining Warden looked at selected incidents between 1974 and 2001, covering 107 fatalities and ten serious injuries in 51 events. This reveals a significant difference between looking at fatal incident numbers and looking at the actual number of fatalities, where one incident may have multiple fatalities.

From Figure 6, it would be concluded that the major cause of fatalities in Queensland in the period studied was gas explosions and related events such as toxic fumes generated by the explosion, followed by gravity-related incidents. However, from Figure 7, which examines only the number of incidents regardless of the fatalities per incident, it would be concluded that the major cause of fatalities is gravity-related incidents with gas explosions only making up ten per cent of fatal incidents, equal to incidents where the deceased were caught between objects.

An emphasis on the number of fatalities only would lead to misleading conclusions about the most common causes of fatal incidents. It is clear that fatal incident investigations need to be explicit in separating fatal incident mechanisms and statistics from total numbers of fatalities and reporting both data sets.

MANAGEMENT FOCUS AND ACCOUNTABILITY

The accountability for fatality prevention rests with the Board of Directors and the very senior management levels such as Chief Executive Officers and General Managers. These people set the priorities within the company and they largely influence the corporate culture and the type of people employed. They authorise feasibility studies and implement recommendations on mining methods and downstream treatment and processing. They control budgets and authorise capital expenditure on prevention mechanisms.

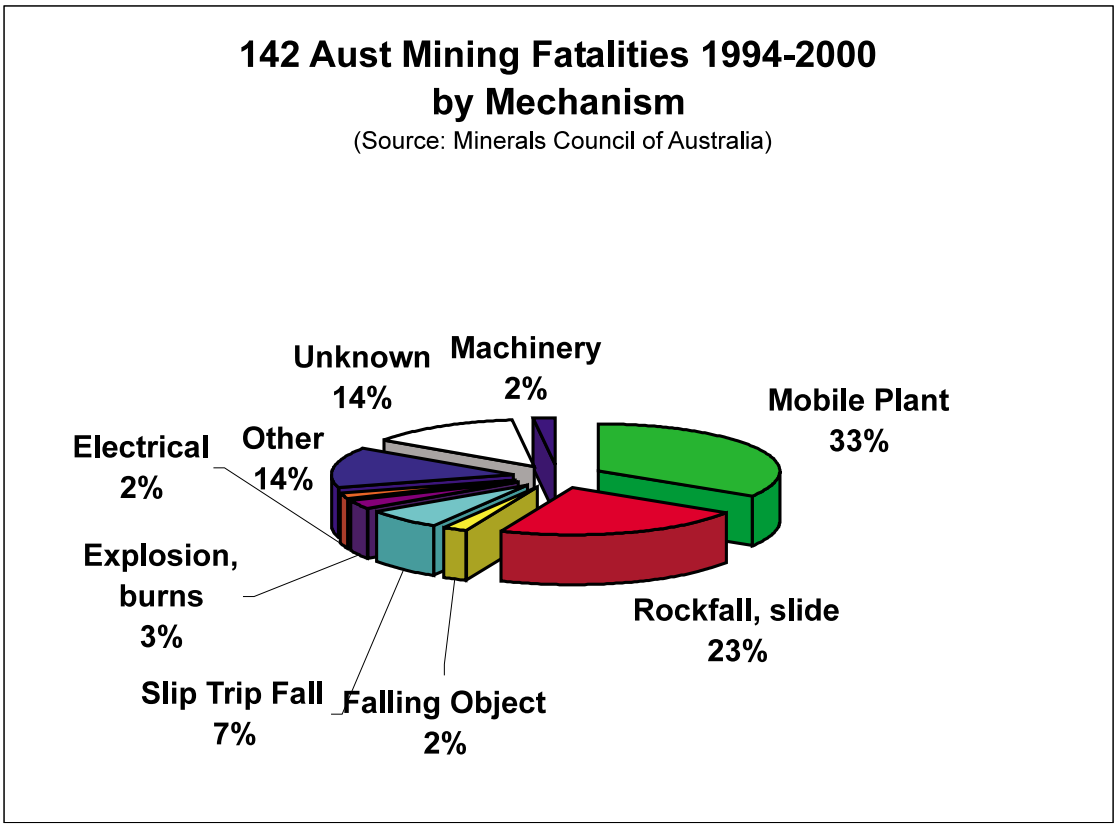

FIG 4 - Australian mining fatalities from 1994 to 2000 by mechanism of injury, showing that one-third are related to mobile plant and one-third to gravity-related incidents (slips, trips, falls, falling objects and rock falls and slides) (source: Minerals Council of Australia 2002).

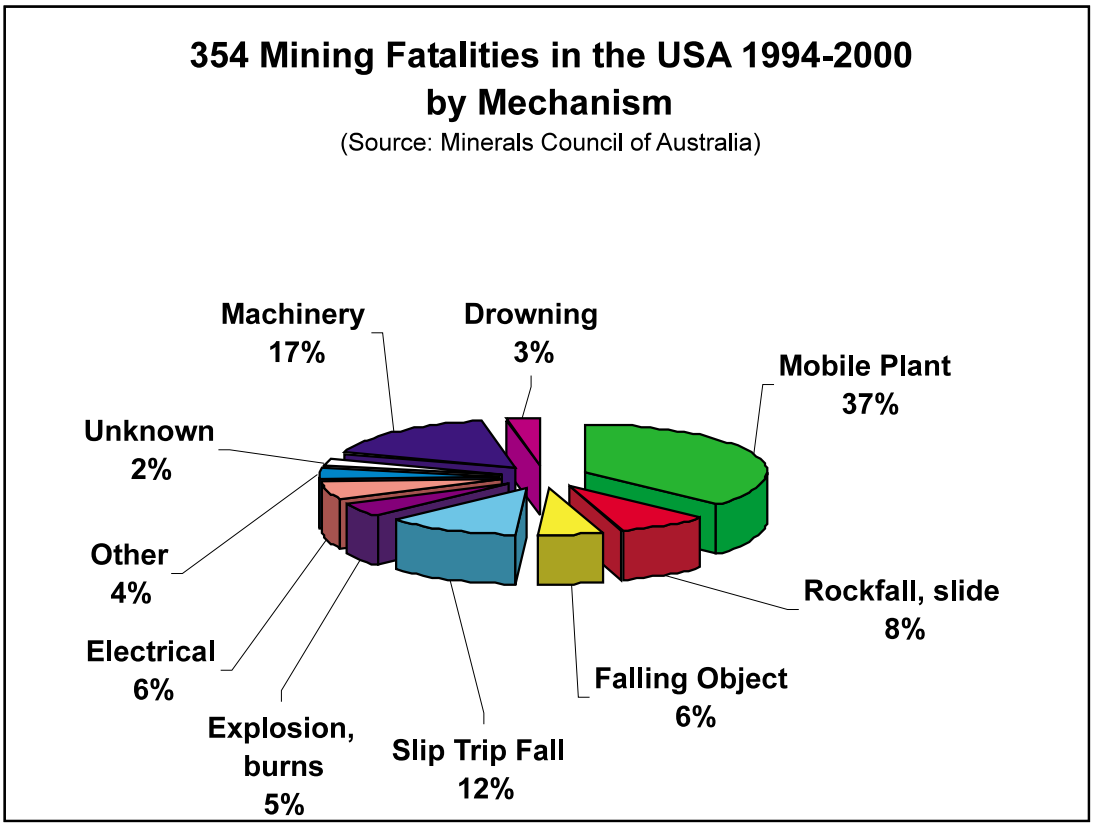

FIG 5 - Analysis of 354 US mining fatalities from 1994 to 2000 by mechanism of injury, showing that 37 per cent are related to mobile plant, 26 per cent to gravity-related incidents (slips, trips, falls, falling objects and rock falls and slides) and 17 per cent to machinery (source: Minerals Council of Australia 2002).

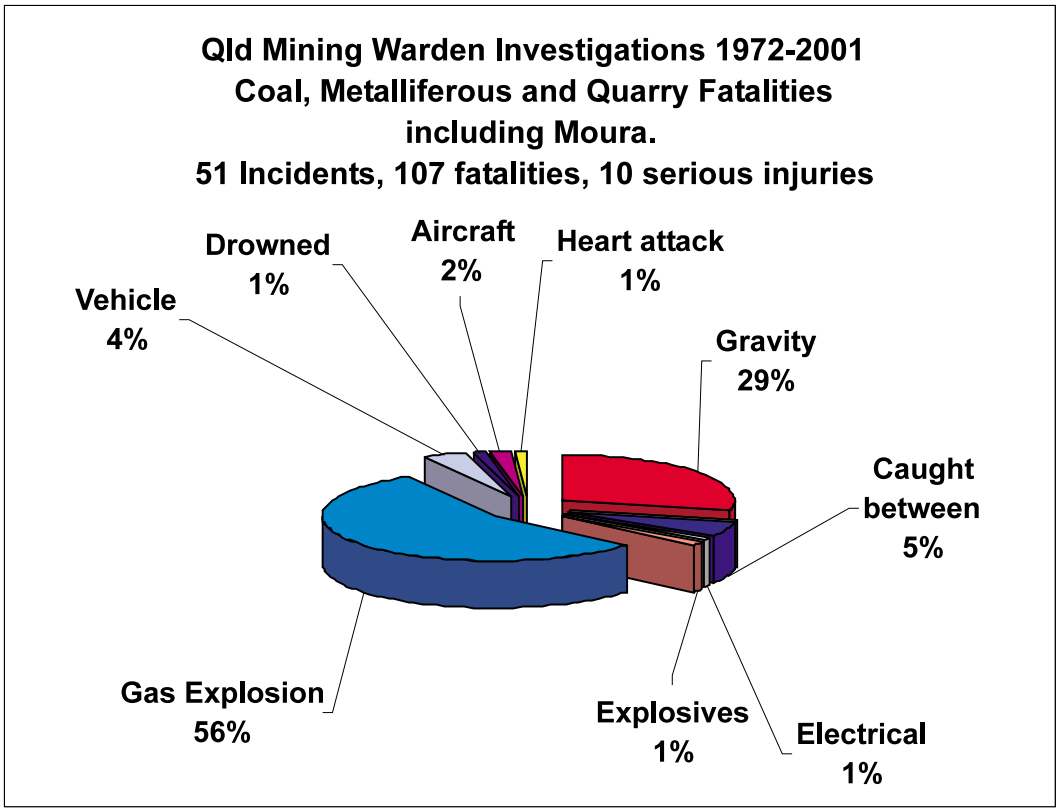

FIG 6 - Analysis of mechanisms of fatalities from 1972 to 2001 investigated by the Queensland Mining Warden, ranked by number of fatalities (source: Queensland Department of Natural Resources and Mines).

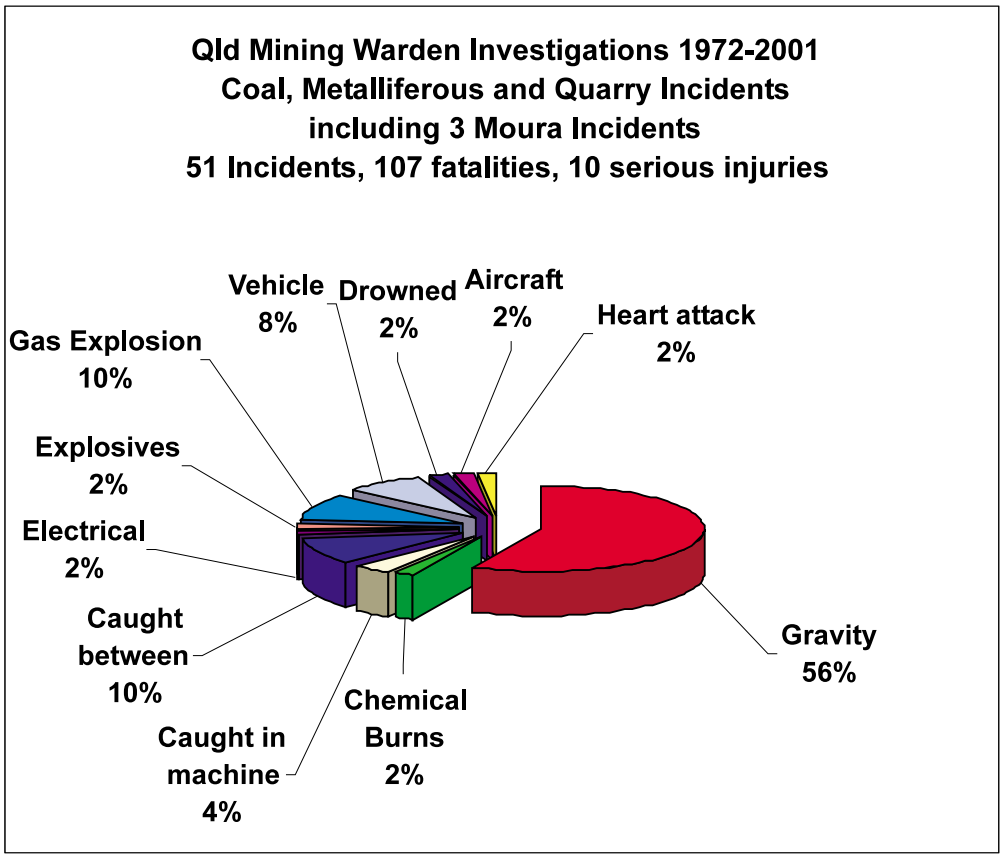

FIG 7 - Analysis of mechanisms of fatalities from 1972 to 2001 investigated by the Queensland Mining Warden, ranked by number of incidents where one incident may have multiple fatalities (source: Queensland Department of Natural Resources and Mines).

Management focus is determined by the Board and senior management's perception of priorities. Examining company Annual Reports and Quarterly Activity Reports to the Stock Exchange show that the highest priority is given to profit and productivity, with environmental performance a long way behind but often ahead of occupational health and safety. Fatalities are often given minimum mention, if at all, by less responsible Boards.

Failure by some senior management to accept this accountability has resulted in some Australian State governments attempting to introduce industrial or corporate manslaughter legislation in response to pressure from community and industry lobby groups. The legislation is aimed at criminal offences rather than offences under the occupational health and safety acts or mining acts. This legislation attempts to make companies accountable for fatalities and individual managers liable for penalties. Existing legislation is based on proving gross negligence on the part of company officers, and having to prove that the officer was negligent. As CEO's and Boards are often many management levels away from direct management control of the fatal incident, it has been almost impossible to convict high level officers on the grounds of gross negligence. Current legislation allows a corporation to be prosecuted for manslaughter under criminal legislation, but it has proved almost impossible to establish that the corporation had the necessary criminal intent or state of mind of gross negligence. It is usually only in very small companies where the owner/Director is personally responsible for the circumstances surrounding a fatality that a corporation can be convicted (Hopkins, 2002).

Safe, socially responsible and sustainable profit is a valid goal.

Four examples of fatality rates

To illustrate the point of management focus, this paper examines four multinational mining companies with tens of thousands of employees and double-digit fatality numbers. The companies have operations in Australia, Europe, Africa and the Americas. As the purpose is to illustrate a point and not an attempt to assign blame or pass judgement, the companies are not identified, just designated A, B, C and D.

Company A

Company A has 64 900 employees and had 43 fatalities in 2001 and 39 in 2002, giving it a Fatal Injury Frequency Rate (FIFR) of 0.66 per 1000 employees in 2001 and an FIFR of 0.60 in 2002. It produced 4.7 million ounces of gold with approximately one fatality for every 120 000 ounces produced. It has operations in Africa, the Americas and Australia.

A perusal of its 2002 Annual Report and recent Quarterly and a special Social Investment Report revealed statements such as:

- 2002 Annual Report first-page summary: 'A very good year', 'solid set of results'.
- Chairman's and CEO Letter: 'sound operating performance', 'profit and production…remain impressive', 'results for the year 2002 are impressive'. There is no mention of the 39 fatalities or even safety in general.
- No total fatality figure was available for the Quarter, but 14 fatalities were mentioned at one mine and 11 at another plus a reference to 'fatal accidents'.
- Social Investment Report 2001/2002 under Safety and Health – two pages are devoted to eliminating noise and reducing hearing loss in employees, but no mention of fatal statistics or any clearly annunciated fatality elimination plan.

Company B

Company B has 34 000 employees and in 2001 incurred 22 fatalities, giving it a FIFR of 0.65 per 1000 employees. In 2002, it recorded 26 fatalities, an increase of 18 per cent despite a decrease of 54 per cent in the LTIFR. In 2001, it produced 2.1 M oz of precious metals, and had one death per 95 000 oz of precious metals. Its operations are primarily in southern Africa.

The Executive Chairman's statement of March 2003 makes no reference to fatalities or injuries. The only comment on safety was, '…we maximise the economic and social benefits of our operations for all stakeholders, while minimising the negative impacts, particularly those related to safety, health and the environment.'

The Chief Operating Officer's review stated: 'Under the guidance of the Group's Safety, Health and Environment ('SHE') committee, a committee of the Board, the Group embarked this past year on the most intense and focused safety programmes in its history. The success of these programmes is evident in a marked reduction in the reported lost-time injury frequency rate per 200 000 hours worked ('LTIFR'), which now stands at 1,2; an improvement of 54 per cent on 2001. Notwithstanding the improvement, the Board regrets to report the death of 26 employees at managed operations during the year. Management will continue to implement and apply all safety programmes in a determined manner. The ultimate goal of a fatality-free working environment will only be achieved through a mind-shift change in behaviour.'

The same report shows a full-page photograph of underground employees seated on a conveyor belt as their transport to the workface, and the photograph is repeated elsewhere in the document. The employees are unrestrained and are not wearing eye protection. The return belt is supported overhead by angle-iron girder uprights, and there is nothing to prevent the employee coming in contact with these uprights. Company B's Board and management are sufficiently proud of this arrangement that they have published it twice in their annual report. The practice of employees riding on conveyor belts is banned on most Australian mine sites as exposing employees to an unacceptable risk. The decision to implement it as normal practice in Company B is made by management, not employees. A mind-shift in the behaviour of employees will not eliminate this risk until they are empowered to refuse to ride the conveyor.

Other photographs in the same report show underground employees barring down with other employees between them and the face, and a barring-down training session with trainees and the instructor not wearing eye protection or gloves.

The inability of the Board and senior management to perceive or understand the risk involved in these practices, to the point of allowing substandard practices to be published in their promotional material, raises questions about their understanding of risk in relation to safety, and about the perceptions raised in readers outside the company.

Company C

Company C has 38 000 employees and had 13 fatalities in 2002 and 15 fatalities in the previous year. It has an FIFR of 0.34 fatalities per 1000 employees. It has operations in southern Africa, Australia, Asia, Europe and the Americas. It mines precious and base metals and coal.

The CEO's report for 2002 states: 'All our safety performance indicators have improved and we are pleased to report a nine per cent reduction in our injury frequency rate. It is however with great regret that we report the deaths of 13 employees or contractors. We will relentlessly pursue any opportunity to achieve our goal of zero fatalities.'

Company D

In 2002, Company D employed 29 000 people (30 000 in 2001) and together with its proportionate share of those employed by joint ventures and associates, the total was 36 000. Australia and New Zealand (10 000), North America (10 000) and Africa (6000) remained the principal locations. It mines precious and base metals and coal. Company D had 6 fatalities in 2002, giving it an FIFR of 0.21 based on 29 000 employees or 0.17 based on 36 000.

In the 2002 annual report, the CEO reported: 'Despite these strenuous efforts, I am very sad to have to report the deaths of six employees at operations we manage during 2002. Many of these fatalities were related to vehicles and driving. We are reinforcing the need for our businesses to achieve full implementation of the (Company D) safety standards to prevent any fatality.

There were 487 lost time incidents during the year, a 33 per cent decrease from 2001. For the last few years, we have set an annual target of a 50 per cent reduction in the lost time injuries frequency rate. In 2002, the frequency rate was 0.85 (per million hours worked) compared with 1.26 in 2001. While not 50 per cent, this result represents significant improvement.

Our goal, nevertheless, remains to eliminate all injuries.'

Discussion

Several important observations can be made. In the companies with the highest FIFRs, the focus of the Board and Chairman is not on the fatalities. The focus is on their product, productivity, performance, price and profit. For whatever reason, the fatality rates are ignored or get minimal reference.

No personal accountability is taken. In Company A, the senior management reports ignore all fatalities. In Company B the Board anonymously reports the deaths. In Company C, the CEO records 'with great regret that we report the deaths….', making it more personal but sharing the accountability with others. In Company D, the CEO records 'I am very sad to have to report the deaths of six employees at operations we manage….', taking personal accountability for the reporting and sharing the management accountability with others.

In the ideal company, the CEO and Chairman would report: 'It is with great regret that I report the deaths of employees in operations I manage…', report the fact that management and Board representatives attended the funerals and extend a message of sympathy and regret to the families. The mining industry still has some long way to go.

CHANGING THE CORPORATE CULTURE

What can mining company managers do to eliminate fatalities from their sites? The following suggestions are offered, based on the author's 30 years in the industry, several years as a health and safety auditor and general manager of underground gold mining, contract drilling and OHS consulting companies.

Focus on fatalities with the same intensity and reporting as profit – Responsible profit remains a valid goal

Some Boards of Directors are focused on profit at the expense of fatality prevention. Some senior managers are focused on Lost Time In jury prevention rather than fatality prevention, but are still required to produce profits. Budgets are often constrained so that equipment or tasks required for a fatality-free workplace cannot be acquired or continued. Senior management are accountable for budgets and the fundamental decisions on mining methods and schedules. Safety statistics should be the first set of numbers in Board papers and internal management reports, and publicly reported in Quarterly and Annual Reports, with the CEO accepting accountability for safety and health performance. Managers only report upwards the information they have been specifically requested to supply, or that they think their up-line supervisors need to know. If the Board does not request detailed, proactive, fatality prevention data, then the data will not be supplied.

Senior management (CEO, MD, GM) and preferably directors attend funerals of all fatalities, subject to privacy and family permission

If the CEO of Company A with 43 fatalities in 2001 attended every funeral, he would have averaged one funeral a week. This would quickly drive home the point that improvement is needed. Failure to attend the funerals sends a message to employees that management was doing something they regarded as a higher priority. What would take a higher priority? Meetings with financiers, shareholders or brokers? Production meetings? Look at the message this sends.

Focus on catastrophic risk, not LTIFR

Knowing that an airline has a low LTIFR may be comforting for employees who work there, but tells prospective passengers nothing about the flight safety of the aircraft, the level of preventative maintenance or the mental state, political beliefs, flying skill and suicidal tendencies of the pilots. Having a low LTIFR doesn't make an airline safe to fly with. Similarly, a mine having a low LTIFR may not necessarily be a safe place to work.

The LTIFR for the Australian mining industry has dropped markedly in the last ten years (Figure 1), as has the Lost Time Injury Severity Rate (LTISR), partly due to a genuine improvement in safety levels and partly due to the way such injuries are reported and managed. If a person with a broken leg can have the leg set in plaster without requiring an overnight stay in hospital and return to his next shift or work from home on light duties, it may not be recorded as a Lost Time Injury, even though it is a serious injury. The use of light duties to enable rapid return to work has reduced the apparent severity rate of injuries despite the fact that the broken leg will still take six to eight weeks to heal.

To focus on reducing the LTIFR has shifted the focus away from catastrophic risk, and a constantly improvement in LTIFR and LTISR due to management and return-to-work practices or under-reporting of lost time injuries deludes senior management into believing safety has improved. These issues are addressed extensively by Hopkins (2000) in an analysis of the Esso gas plant explosion at Longford in Victoria.

Communication

Communication of critical information in mining companies can always be improved. Managers only provide information to their up-line supervisors that they are specifically asked for, or that they believe their up-line supervisor needs to know. This information is often filtered, especially if the reporter feels the information may reflect on his performance or status. While the reporter may not actually lie or falsify the information, it is common practice to be selective in what facts are reported. Adverse information that may reflect badly on the reporter may be left out. Consequently, senior management, even with the best of intentions, only will only get the information that their subordinates permit to go through. Senior managers need mechanisms to cross-check data and sources, and to find out information directly themselves. This may involve by-passing the normal chain of reporting to seek information directly from two or three levels below their immediate subordinate. This can alienate the subordinate and lead to lack of trust but good

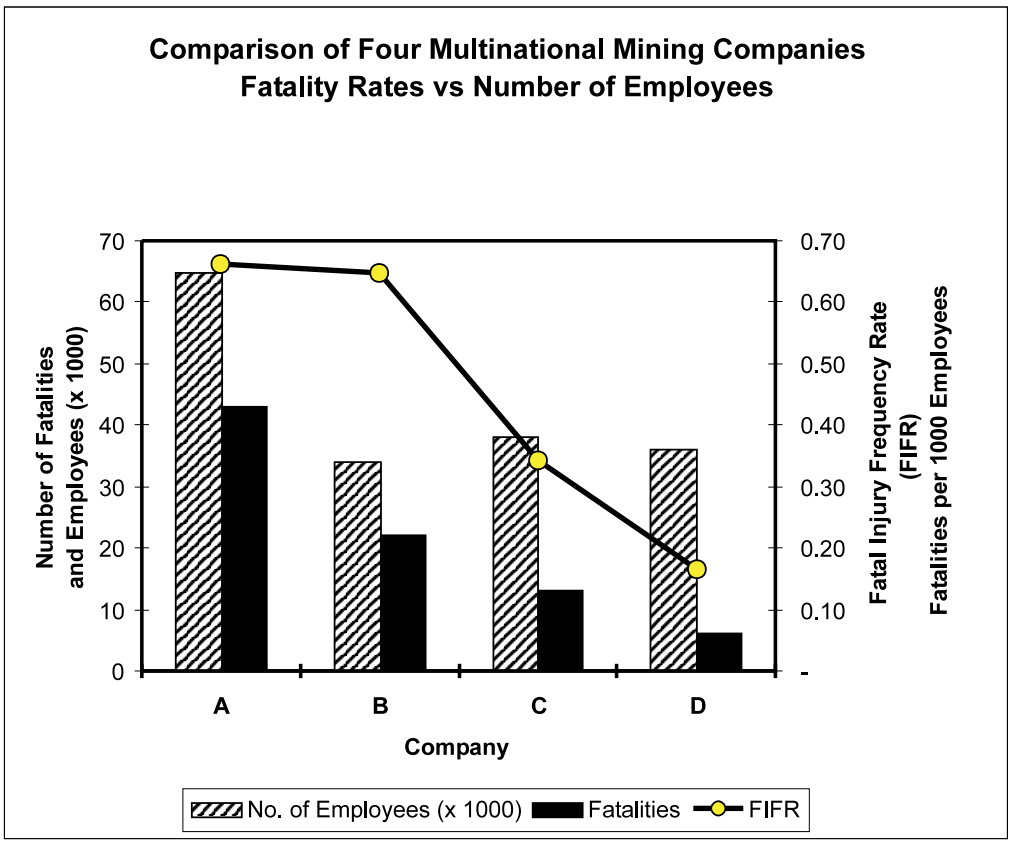

FIG 8 - Comparison of number of employees, number of fatalities and fatal injury frequency rate (FIFR) for four large multinational mining companies.

corporate governance requires that Boards and CEOs take all necessary steps to keep themselves fully informed of all their corporation's activities. External audits are one mechanism to achieve an independent assessment of compliance with corporate systems.

Identify the indicators that something is starting to go wrong

Fatal incidents, because they are rare events, do not figure highly in the normal monthly statistics routinely reported. Companies need to be reporting on the indicators that something is amiss or things are starting to drift outside safe parameters. Hopkins (2000) raises the issues of an alarm overload, where plants routinely operate at or exceeding design specifications, so that alarms sounding during the shift are a frequent event. events. These de-sensitise personnel to alarms to the point where alarms are so commonplace they are ignored.

Management needs to ensure that the alarm overload culture does not develop. If equipment is operating beyond design specifications and management is satisfied that the risk is controlled, consider re-adjusting the limits at which alarms are triggered. Excessive or repeated alarms should be reported as hazard incident reports and followed up. Hazard reports and the subsequent action plans to address the identified hazards are a proactive weapon in the fight to eliminate fatalities.

Replace the word 'accident' with 'incident' at all times

'Accident' implies that it was inevitable and not preventable, some sort of 'bad luck' or 'Act of God'. Accept that all incidents and fatalities are preventable. However, they may not be readily predictable.

Focus on risk prediction and proactive measures

All incidents are preventable if they are predictable. Focus on predicting incidents. Where applicable, use project planning charts (Gantt, PERT, flow charts) to predict when circumstances will exist that pose a hazard, where the hazard is located, who will be exposed to it, how long they will be exposed and then develop an action plan to intervene. The intervention can be as simple as a supervisor being present, or a five-minute site inspection before work commences to heighten awareness of the hazard.

Take personalities into account

Mining employees are mainly male risk-takers. Risk-averse personalities do not seek employment in hazardous industries. Be aware that males under 30 in remote areas are a significant suicide risk, and be alert for negative attitudes and depression as forerunners to suicidal tendencies. Technical and financial managers are assertive, decisive, goal-focussed, results-oriented technicians. They are usually not warm and sensitive. Strong personalities frequently dislike criticism and blame, and are often aggressive in conflict situations or under stress. This leads to a reluctance in subordinates to pass on bad news, yet the bad news is essential. Bad news requires action. Good news is simply a bonus. Senior managers need a mechanism to ensure they have access to unfiltered information.

Pre-employment psychological and personality assessment is a proactive measure. Psychological and personality assessment of existing employees should be undertaken as soon as practicable. Feedback of the personality assessment to employees in an educational role and a no-blame culture provides them with tools to manage their performance and their relationships with others.

Pre-employment and ongoing random testing for substance abuse is also a proactive tool. The company should provide opportunities for employees to raise personal problems with supervisors, and referral to professional counselling where appropriate.

Measure frequently against key performance indicators (KPIs)

Managers cannot control if events are not measured against a benchmark or previous performance. KPIs do not have to be complex, but ideally should be numerical and time-based so that a percentage variance can be calculated and results graphed to provide quick visual assessment. Performance indicators work best when subordinates are involved in setting the KPIs and agree to them as being reasonable. The number of Hazard and Near Miss reports received, and the percentage fixed within 24 hours are simple proactive KPIs. Information from the repairs and maintenance section is critical, as this section is the first to handle failures of equipment or notice operator errors in operating the equipment. Repeated repairs will highlight these failures, so reporting of common or repeated repairs can be used proactively to identify poor equipment specifications or re-training of poor operators.

Follow-up to ensure actions are completed

Many companies initiate action plans, but fail to follow up to ensure actions are completed. Action plans need to be signed off by senior supervisors.

Strategic intervention

Management is about strategic intervention. Take steps to ensure the systems are working. Safety and health audits should be conducted annually but unexpectedly. The external auditor should outrank the mine manager or Site Senior Executive (SSE) and report to the CEO. This ensures that the external auditor is not intimidated by the SSE who signs the auditor's cheque. There is less benefit in an external audit if the site is given several months warning to prepare for it.

Automate where feasible – remove the person

People cannot be injured or killed if they are not present when an incident occurs.

CONCLUSION

The accountability for fatality prevention rests with the Board of Directors and the very senior management levels such as Chief Executive Officers and General Managers. Until the senior management accept personal accountability for fatality prevention, including attending the funeral of workers killed in their corporations, and safety and health statistics are given equal priority with profits and productivity, fatalities will continue to occur. Senior management sets the corporate culture and makes the fundamental decisions on mining methods, budgets, schedules and other priorities that put employees at risk. Unless senior management accepts personal accountability for fatality prevention, governments will legislate to enforce it.

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