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Planning for a Healthy Future

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PLANNING FOR A HEALTHY FUTURE

Bruce Ham [1]

ABSTRACT: The move from prescriptive to 'duty of care' style legislation will move the coal industry towards the world of litigation and soaring insurance premiums. Evidence from Queensland suggests that coal miners' injuries are a $4million Workers Compensation cost but the personal cost to miners, their families and community is well over $43 million per year. Under 'duty of care' there is a high risk that much of this cost plus legal expenses could be transferred back to the employers through litigation and increasing insurance premiums. The sustainability of the industry may come under threat.

While 'fitness for duty' assessments are a key part of all well managed health surveillance programs, 'duty of care' style legislation dictates that employers must implement safety management systems for hazardous exposures. This may include long-term assessment and management of the risks of hazardous exposures in the occupational environment. An analysis is undertaken to identify issues of trigger levels for health interventions. Parameters such as health condition, change in heath status and cumulative occupational exposure may be used as triggers that initiate health interventions prior to unacceptable or compensatable harm being suffered. It is argued this and nothing less will effectively meet the employer's obligation under legislation.

AIMS AND OBJECTIVES

While 'coal mine planning' is largely a geotechnical, engineering and economic evaluation activity, some consideration needs to be given to the human factors in production. One of the most important human factors and legislative issues is to have a workforce that is competent and confident in working without risk to their safety or health.

The objectives to be achieved in managing the risks to ensure a healthy workforce are:

1. Ensuring all the potential health hazards, work requirements and relevant medical conditions are identified.
2. Establishing a system to compile data on occupational health and exposures in the work place by implementing a health surveillance program that includes 'fitness for duty' assessment and on-going monitoring and management
3. Examining the evidence as to the likelihood, consequence and time frame of the impact of occupational health hazards,
4. Examining the controls or interventions that may be used in managing the risks,
5. Identifying trigger levels that initiate an occupational health intervention
6. Implementing occupational health interventions.
7. Ensuring an adequate system of documentation is established, and
8. Developing a review process.

DATA COLLECTION

There are several dimensions to the collection of data for the identification and management of occupational health risks. These include:

- Identify health hazards and potential controls,
- Collect and compile health surveillance data,
- Monitor exposures,

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- Examine injury data,
- Examine health outcome data and
- Examine mortality data

Through an understanding of the operation and occupational health practices, a process can be established to ensure all the potential health hazards are identified (Grantham 1992 and LaDou 1997). While injury data is a useful starting point, it is limited to identifying the effects of hazards with short term impacts. The diagnosis of injury also has some failings such as the strain and sprain injuries which incorporate a proportion of long term overuse and cumulative damage of soft tissue injuries.

Coal Services Limited and the Queensland Department of Natural Resources and Mines undertake comprehensive health assessment programs (Bofinger and Ham 2001, Coal Services 2004 [1], Ham 2004 [2]. The number of entry and periodic health assessments is shown in Table 1.

Table 1 – Health Data Collection in Queensland and New South Wales

State / District	• New South Wales				**Queensland**		
	North/North West		South & West				
• Medical Assessments	1999/00	2000/01	1999/00	2000/01	2000	2001	2002
Entrants	1010	1533	255	428	2221	5411	5512
Employees	1841	1373	726	556	2306	1419	1672

The number of employees in each Queensland and New South Wales has been about 10,000 persons. The greater number of assessments done in Queensland since 2001 is a reflection of the need to incorporate short-term contractors in the health scheme under the new 2001 legislation.

A program to gain reliable exposure estimates was reported by McFadden and Davies (2003). The study examined the issue of the amount of data to be collected to obtain a reliable estimate of exposure applying criteria developed by Grantham (2001). The study concluded that most face workers were exposed to high levels of inhalable dust and almost all underground mine workers were exposed to noise levels well beyond the statutory limits. The study identified a range of occupational health issues that warranted improved controls in a 12 month time frame. These included hazardous substances, microbial agents, organic vapours and various gaseous contaminants.

In the absence of a program of systematic exit medicals, some useful data has been obtained by examining the premature superannuation claims data from the Queensland Coal and Oil Shale (QCOS) Superannuation Fund in Queensland (Ham 2003). Claims are made for early payouts due to death or Total Permanent Disability (TPD). The numbers and proportions of persons who leave the industry with cancers, heart disease and traumatic injuries are shown in Table 2.

The work of Bofinger and Ham (2002 a), used the register of coal miners in New South Wales and Queensland to cross match and extract death data held by the Australian Institute of Health and Welfare. While this study focussed on the risk of heart disease in coal miners, it opened an opportunity to consider the coal miners' mortality data more widely

[1] Coal Services Limited 2004. Web Site – www.coalservices.com.au/health
[2] Ham B. W., 2004. Health Surveillance Web Site – www.members.optusnet.com.au

Table 2 – QCOS death and total permanent disability data

Cause	Deaths	TPD	Totals	Av. Age
Cancer	14	20	34	51
Circulatory disease	12	21	33	53
Ear disorders	0	3	3	
Endocrine disorders	0	3	3	
Infectious diseases	0	5	5	
Musculo-skeletal disorders	0	83	83	47
Nervous / mental disorders	9	43	52	48
Respiratory disease	0	4	4	
External causes	13	32	45	41
Other	3	2	5	
Total	51	216	267	48

ANALYSIS OF DATA

The Industry Commission report on Work, Health and Safety' (1995), accepted evidence being compiled for the Worksafe 'Report on Best Estimate of the Magnitude of Health Effects of Occupational Exposure to Hazardous Substances' (Kerr et. al., 1996) that identified widespread under-reporting of occupational related death through illness. The Commission concluded that systems needed to be put in place to monitor long-term exposures and provide a mechanism for collating long term health outcomes for persons working in environments of elevated risk. The analysis of the data collections discussed previously is a first step in addressing this need

An analysis of cross-sectional Queensland coal workers health data by Ham (2000) demonstrated the procedures for extracting and analyzing health data held in the Health Database maintained by the Health Surveillance Unit of Safety and Health Division (Mines) of the Department of Natural Resources and Mines. The study included stratifying the health data by mine, age group and gender. The health data was also cross matched with injury records held by the Department of Natural Resources and Mines.

This study also demonstrated how the health database data can be extracted and statistically analysed while maintaining confidentiality of personal medical records. Figure 1 shows the incidence of reduced respiratory function in 45 to 55 year old workers in underground Queensland coal mines. As electronic recording of medical data commenced in 1993, the longitudinal data should be available from 2003.

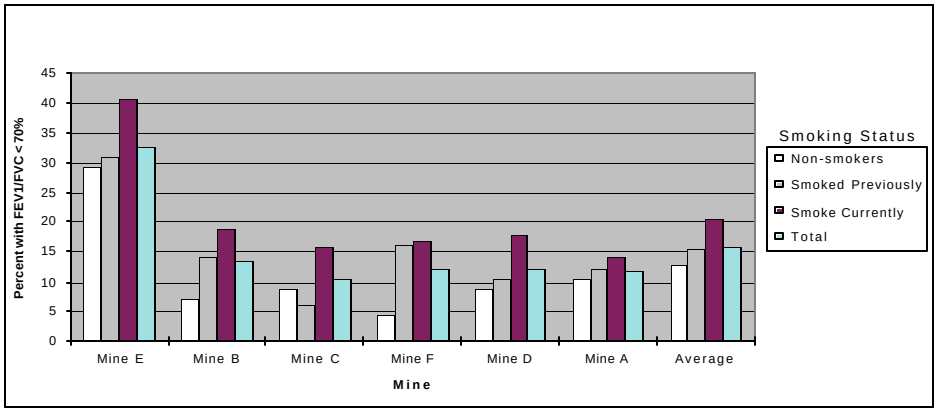

Fig 1 - Respiratory function loss in underground coal miners (after Ham 2000)

In order to give some perspective on the importance of health issues, the QCOS Superannuation early claim data was analysed by Ham (2003) so as to account for the cost of lost productive capacity. The results comparing published injury and lost time data are shown in Table 3.

Table 3 – Estimate of costs of poor health and injury from QCOS data

Data Source	Days lost	Man-Years lost	Total Cost $M
Reported Lost Time Injury Data	3627	18	1
Injury Lost Time from Production Returns	5475	27	2
Sickness Lost Time from Production Returns	31158	156	12
Workers Compensation Report			4
Lost Wage Estimate from QCOS data		660	43

In relation to the health outcomes, it is important to distinguish between fatal and non-fatal outcomes. For example, hearing loss is non-fatal, but in severe cases, it represents a diminished quality of life. One dimension of hearing loss is damage versus impairment. Practical tests may be applied to demonstrate that a worker with hearing loss is suitable for working in a specific function. Generally, the first indicator of noise induced hearing loss occurs at the frequency of 4000 hertz where a loss of 40 decibels is considered significant. Impairment (40 decibels or more) in the voice ranges of 500 hertz to 2000 hertz may limit the ability of a person to safely function at work and in daily life. This might be considered an unacceptable outcome.

The second dimension is what is the level of hearing loss at which a health intervention should be undertaken. Interventions may vary from education and insistence on the wearing of hearing protection to removal from high noise environment. A worker may clearly be fit to undertake the work required, but continued exposure will result in an unacceptable level of harm – (and how is this level defined). If the retirement age is taken as 60 years and damage is proportional to cumulative exposure, then a trigger level for high level interventions may be set differently for young verses old workers. The case for different risk profiles may have to be argued in an anti-discrimination context.

A second non-fatal outcome is the lower back damage due to cumulative exposure to whole body vibration. McPhee, Foster and Long (2001) identified several types of mobile plant where international whole body vibration standards are exceeded in less than 8 hours of exposure. As a community, our habits and life style choices are often not conducive to the long term health of our backs. A proportion of the community is prone to degenerative back disorders. Our current screening tools are not very effective in providing early warning of the onset of this condition. This provides an opportunity for future research.

With whole body vibration and several other hazards, some significant methodological issues need to be addressed just in relation to the reporting of health outcomes and measuring cumulative exposure. This must be done before the social debate on what represents an unacceptable risk of an adverse health outcome and what are reasonable intervention strategies. The debate will have to resolve commercial, anti-discrimination and personal rights conflicts.

In terms of long term fatal outcomes, the challenge in analysis of health outcome data is to develop a method to compare it with community and other sector data-sets. The general community data format reported by the Australian Institute of Health and Welfare examines health disorder rates per 100,000 head of population in various age groups. Other approaches are to examine the proportions of different causes of death between groups and to compare the median age at death for particular causes

The work of Bofinger and Ham (2002b), used the register of coal miners in New South Wales and Queensland to cross match and extract death data held by the Australian Institute of Health and Welfare. The data from the heart disease study examined the proportions of heart disease to other causes of death to draw the conclusion that heart disease was no more a risk to coal miners than the general population. Death rates – deaths per 100,000 population per year were also calculated to confirm this conclusion. There was some concern that the calculated death rate was an underestimate as it was based on a birth group (cohort) without a correction to provide death rates based in the surviving population

Subsequent reports on the general population by the Australian Institute of Health and Welfare (AIHW, 2002), revealed that different causes of death have different median ages at death. For example, death by traumatic injury is a characteristic of a younger group, while cancer and respiratory disorders are characteristic of an older age group.

The age profiles on the register of Queensland miners, the New South Wales coal miners are substantially different from the general population as shown in Figure 2. As the New South Wales miners' register is contains a profile that is older than the general population, a high degree of validity can be attributed to the mortality data in terms of death rates and median age at death for various causes as shown in Table 4.

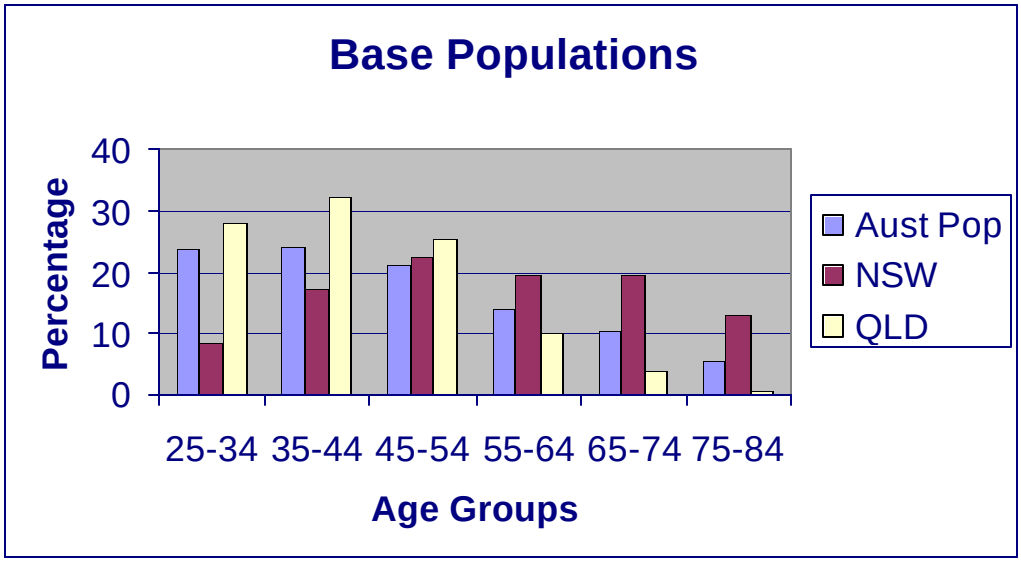

Fig 2 – Analysis of coal miners register data compared to general Australian population

The median age at death for various diseases indicates that the retired New South Wales miners generally have similar life expectancies to the general population. The same cannot be said for Queensland miners for whom median age at death is much lower that the general population. The comparison of median age at death is not valid in this case as older workers are under represented in the data set. In the case of Queensland, analysis of age specific death will be required to provide a reliable comparison. Changing technologies (eg. longwall mining) and work arrangements (eg 12 hour shifts) cause the use of historical data to be questioned. A better approach is to examine trends in age specific death rates particularly where death data can be linked to exposure data. This provides an opportunity for future research.

If the strategy applied by the UK coal miners dust disease case (Rudd, 1998 and Coggan and Taylor, 1998) is applied, then an unacceptable level of harm is defined when the occupational disease (or death) rate for a particular occupational group significantly exceeds that of the general population for the equivalent age group. The underlying dose-response studies for cases such as this, require long term and reliable estimates of exposures and health parameters and outcomes. In general terms, this is captured in the Queensland *Coal Mining Safety and Health Regulation 2001*, Section 53 *(Qld Gov. 2001)*, but there is need for some guidance as to appropriate standards in data collection.

Extended shift work is known to be associated with difficulties in making ideal lifestyle choices, and can be allied with poor diet, high blood pressure and the risk of fatigue related injury (particularly journey injuries). Inter-mine comparisons and benchmarking are needed to clearly identify risk levels and promote best practice risk management in this area.

LEGISLATIVE FRAMEWORK

The collection, analysis and interpretation of health data and performance measures, takes on a whole new meaning under the new style duty of care legislation as compared to the previous prescriptive legislation. This is reinforced in the Queensland Coal Mining Safety and Health Regulation 2001(Qld Gov. 2001), in which Section 49 requires employers to have a safety management system to periodically monitor the level of risk from workers exposures to hazards. This is contained under the health scheme regulations which provide for medical practitioners to maintain confidential medical records. Through section 49 (safety management system for occupational exposures) the medical practitioners should provide advice for the identification and management of 'at risk' employees – not just advice on employees who have a medical condition which restricts their work activities.

Table 4 – Analysis of Mortality Data

ICD Code Number	Cause of Death Category	Number of deaths		% of deaths			Median Age at Death		
		NSW Miners	Qld Miners	NSW Miners	Qld Miners	Australian Population	NSW Miners	Qld Miners	Australian Population (1)
II	Neoplasms (Cancer)	821	113	34	39	31.1	70	61	71
IV	Endocrine, nutritional & metabolic diseases	70	7	3	2	2.5	72	64	74
V and IV	Mental Disorders and diseases of the nervous system	64	6	3	2	2.9	71	na	42
IX	Diseases of the circulatory system	940	75	39	26	35.5	74	59	76
X	Diseases of the respiratory system	232	12	10	4	6.4	73	72	77
XI	Diseases of the digestive system	69	4	3	1	na	68	na	na
XIX and XX	Injury etc – external causes	149	66	6	23	2.1	48	33	39
	All Others	83	10	3	3	19.5	75	67	na
Total	All classes	2428	293	(1) AIHW, 2004					

Driven by the findings of the 1994 Moura Disaster, the need and application of safety management systems is both entrenched in legislation and well understood in the control of major high energy hazards such as methane and spontaneous combustion. The application of these principles to long term, chronic and possibly fatal conditions is more complex because of the extended time frames and the difficulty of collating and analysing long-term exposure data and confidential medical data.

This problem is made more complex by the variability of human reactions to various hazardous exposures, the need to protect sensitive individuals and an array of legislative, industrial relations and social issues. Among the social issues, are the awareness of mine workers and employers to the medium and long term consequences of deteriorating health as a result of hazardous occupational exposures.

The first step toward developing a culture of health in the mining industry is to provide adequate training in the understanding, collection, analysis and implications of health and injury data. It is only very recently that the National Mining Training Advisory Body has recognized that the mining industry needs to be trained to at least the same standard as general industry in terms of such disciplines as ergonomics, occupational health and occupational hygiene. Over several years this understanding of health issues will be integrated into the coal mining education processes through levels of the Australian Qualification Framework (AQF 2 to AQF 6).

The current programs for coal industry health assessments coordinated by Coal Services Limited in New South Wales and the Department of Natural Resources and Mines in Queensland are well placed in terms of international best practice. Changes in legislation in New South Wales and Queensland, require hazards to be controlled through structured safety management systems. The well developed causation and damaging energy models used in the control of dynamic safety risks fail to meet the more subtle factors required for safety management systems for occupational hazardous exposures. Current practice is to identify most hazards, control them within the limits of current technology and provide personal protective equipment for high exposures. When an occupational disorder becomes severe in the workplace, a health assessment is undertaken to certify the employee is unable to work safety. The employee is terminated and may claim an insurance payment. It is difficult to reconcile this practice with the legislated obligations of care to be managed through a safely management system

At least in theory, the assessment of risk of an occupational exposure is based on a data set derived in a dose-response study. These studies form the basis for the development of exposure limits and related regulations. These standards ensure that an unacceptable level of harm occurs to an acceptably small proportion of the population.

A core concept of good occupational health and safety practice developed by The International Labour Organization (ILO) is that workers should be entitled to a career in the workplace without adverse long term affects to health. While there is often uncertainty in compiling long term occupational health statistics, programs of data collection and analysis currently need to be developed to enable employers to demonstrate to government that workers are not being adversely affected by occupational hazards.

CONCLUSIONS

There is a significant difference between trigger levels for fitness for duty criteria and early health interventions. Under 'Duty of Care', safety management systems should provide for trigger levels for an early health interventions that effectively manage the risks that a worker subject to occupational hazards might eventually suffer an unacceptable health outcome.

There is a long term need to undertake dose-response studies that identify either cumulative doses or critical changes in body function that signify that some health risk is moving into the unacceptable range. This raises two questions that can be complex in relation to some specific hazards. These are: 'how is the dose measured?' and 'what is a health outcome that is unacceptable. Unfortunately, comprehensive data sets and, in some cases, even measurement tools are not available in relation to cumulative doses for a number of common occupational hazards.

The industry should be concerned that by failing to establish that best practice exposure based health surveillance, it cannot substantiate the safety management systems for occupational exposures that have been implemented. The consequence is that former workers (or their families) with any one of a number of medical conditions that may be associated with occupational exposures have a substantial claim for compensation on the grounds that a safety management system as required by legislation which may have prevented the adverse health outcome, had not been adopted.

While the solution is not clear, the first steps are obvious. Health surveillance needs to include exit medicals and follow-up mortality studies. Exposure monitoring needs to be upgraded to ensure all workers at risk, have the exposure data maintained in a database that is transportable across the industry (as with their medical data). Historical and prospective dose response studies need to be undertaken. These and equivalent overseas studies need to be examined in the context of defining an acceptable level of risk of harm. While this may define levels for removal of exposed workers, it opens a new generation of questions in relation to the obligations and rights of both employees and employers.

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