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Health Tracking Project -- The Development of a National Framework for Managing Occupational Illness and Disease in the Australian Minerals Industry

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ABSTRACT

The Health Tracking project is one of five projects being undertaken as part of the Minerals Industry Cooperation Initiative (MICI) – a national initiative sponsored by the Minerals Council of Australia. The aim of the Health Tracking project is to assess the practicality of ways to demonstrate the monitoring of hazardous exposures and the occurrence of related occupational illness and disease and development of management systems and strategies at a national level.

This second stage of the project will be completed in 2005 and will cover four areas:

1. pilot development of a comprehensive job exposure matrix (JEM) for the minerals industry;
2. development of both proactive and reactive occupational illness and disease metrics;
3. recommendations regarding appropriate health tracking models; and
4. provision of best practices guidelines for management of occupational health.

The synergies between these areas will establish the path towards an effective national occupational health surveillance system and the development of effective prevention strategies and policies.

INTRODUCTION

The Health Tracking project is one of the projects under the Minerals Industry Cooperation Initiative – MICI (Bofinger, 2004). MICI projects include the Health Project, Lessons Learned, Professional Pathways, MIRMgate and National Minerals Industry Risk Assessment Guidelines. The intent behind the projects is to address factors impacting on the occupational health and safety risks in the industry and to demonstrate, by 2006, that cooperation and the sharing of resources and information between mining companies is achievable and valued. This will form the basis of discussions with other industry stakeholders for a broader cooperative initiative.

The National Occupational Health and Safety Commission (2000) reported on broad issues of occupational health and safety data in Australia and concluded that the overall health burden of occupational disease was much greater than that caused by injury. Occupational disease was grossly under-reported because the current data systems were ineffective in capturing data on prevailing work environments and establishing relationships with health outcomes.

There is no comprehensive system of surveillance for occupational disease and illnesses. Surveillance is vital to the prevention of occupational diseases, injuries and fatalities. It provides information necessary to draw attention to the magnitude of workplace health and safety problems, to set research priorities and to target and evaluate interventions to improve worker safety and health. The current situation is fragmented with information relevant to the minerals industry held by:

- companies and sites,
- medical personnel, and
- workers compensation.

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Information to allow comparison of the health status of miners with other industries and the general population is held by the Australian Institute of Health and Welfare.

Analysis of the national compensation dataset compiled by the National Occupational Health and Safety Commission (NOHSC, 2002) shows hearing loss and musculoskeletal disease are the most common reported occupational illnesses. These are also relatively easy to identify and well known problems in the mining industry. However, information on other health issues is very limited.

Figure 1 shows the frequency rate for illness or disease for 2000 - 2001 for mining related industries (NOHSC, 2002). The frequency rate is the number of occurrences expressed as a rate per million hour worked by wage and salary earners. The total number of diseases or illnesses reported for mining is 545. The number of claims and the frequency rates reported for occupational illness and disease are generally low and care should be taken in interpretation of results.

The frequency rate for diseases of the nervous system and sense organs is highest for the coal mining industry. Diseases of the nervous system and sense organs are the highest frequency rate for the metalliferous industry but it is 0.7 compared to 4.5 for coal mining. The frequency rate for all industry is 0.6.

An examination of the published literature available revealed some analysis of occupational health or occupational disease issues for the Australian mining industry. There are limitations associated with the types of analysis reported in the published literature. The data is generally averaged, summarised, and de-identified. This type of analysis does allow trending of some diseases and illnesses for the mining industry or some sectors of the industry.

Coal industry

- Vibrating and jarring causing injury in the New South Wales coal industry (Cross and Walters, 1994) – This work examined the compensation data and found no evidence that whole body vibration was a significant factor in head, neck and back injuries.
- Emphysema and lung content (Leigh *et al*, 1994) – The results of this study showed strong evidence that emphysema in coal workers was causally related to lung coal content and therefore exposure to coal in life. The importance of age and smoking in severity of emphysema was also confirmed. A similar study was completed for chronic bronchitis (Leigh *et al*, 1986).
- Mortality in the New South Wales coal industry (Christie *et al*, 1995) – Generally the mortality was lower than the general population and a 'healthy worker' effect may explain the lower overall mortality.
- Cancer in a New South Wales coal miners (Brown *et al*, 1997) – This study considered the incidence of cancer in coal miners between 1973 and 1992 and concluded there did not appear to be a general risk of cancer in the NSW coal industry but that open cut miners have an increased risk of malignant melanoma.

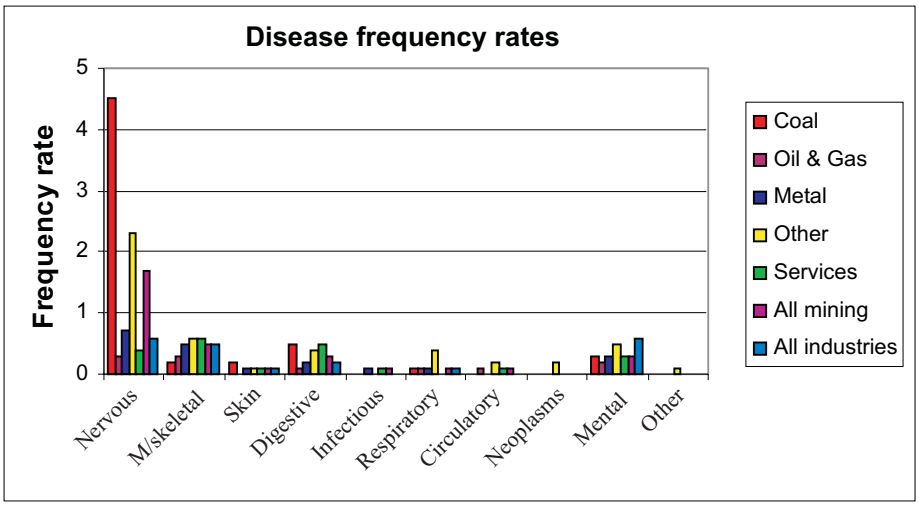

FIG 1 - Frequency rate for illness or disease for 2000 - 2001 for mining related industries (NOHSC, 2002).

- National Workplace Health Project and Queensland Health at Work Project – The national project compared lifestyle information affecting health between coal miners and other industry groups (Harris *et al*, 2000). The Queensland project gathered and analysed information from Queensland coal mines (Parker *et al*, 1996).
- Heart disease and coal mining (Bofinger and Ham, 2002) – There does not appear to be an increased risk of death from heart disease for the Australian coal industry. There are a number of factors that indicate an increased risk of heart disease for coal miners. This study included some industry summaries of occupational and lifestyle factors affecting heart disease.

Metalliferous and extractive industries

- Mortality in gold and coal miners and emphysema in Western Australia (Armstrong, 1979) – Overall, neither gold nor coal miners have a significantly higher mortality than expected from the experience of WA males in general. Lung cancer mortality was higher than expected in gold miners. Coal miners showed a lower than expected rate of lung cancer but an excess of deaths from other forms of cancer.
- Respiratory disease in goldminers in Western Australia (Musk, 1992) – Respiratory abnormalities were identified in non-smoking underground gold miners. These results were related to duration of employment, after adjusting for age and height, and were consistent with the presence of airway narrowing or emphysema.
- Asbestos and silica related diseases in Western Australian gold miners (Lee *et al*, 1999; de Klerk and Musk, 1998) – Asbestos-related pleural disease has been diagnosed in a small number of gold mine workers with no other significant known asbestos exposure. Gold miners were monitored to examine the relation between respiratory symptoms, smoking habits and employment history and the development of silicosis and lung cancer.
- Respiratory disease in bauxite miners (Beach *et al*, 2001) – This study determined that there was little evidence of a serious adverse effect on respiratory health associated with exposure to bauxite in open cut mines in present conditions.
- Mesothelioma in different occupational groups (Yeung *et al*, 1999) – Although Australia has one of the highest national incidences of mesothelioma in the world, the traditional primary asbestos industry cases from crocidolite mining and milling are now on the decline.
- Thorium and mineral sand workers (Hewson and Fardy, 1993) – This study was designed to complement estimates of radiation dose derived from air sampling measurements. It concluded that such doses must be interpreted with caution.

The image of the mining and minerals industry as hazardous to health persists in the community. In order to meet external community expectations of management of health issues, the industry needs to demonstrate proactive involvement in this management. This was the main driver for this project.

INITIAL PHASE OF PROJECT

The initial focus of the project was to identify and analyse the different approaches to occupational health monitoring and surveillance currently in place and identify the influence of the current situation on the potential for a national system (Bofinger, 2004).

Phase one

Mindful of the definition of health surveillance used within the project as being:

> *Health surveillance is the ongoing systematic collection, analysis and interpretation of data for purposes of improving health and safety*

we identified the limitations of the existing situation.

Recognition of need for health surveillance

The need for some form of *health monitoring* of individuals is well recognised and widely practised throughout the mining and minerals industry.

Recognition of the need and requirements for *health surveillance* is less well recognised but is growing.

Identification of outcomes required

The Government schemes in place were established as a result of the history of disease in the mining and minerals industry. The focus for these centralised schemes is occupational health information. There are differences in the philosophies behind the schemes and the data collected.

Current medicals completed under Government or company schemes are unlikely to identify the physiological changes that occur at the early stages of an occupational disease affecting other systems due to latency of onset and limited diagnostic criteria. There are exceptions, eg where biological monitoring is conducted in the lead industry.

The focus of company schemes was generally to prevent or rehabilitate injury, or to ensure fitness for duty.

Outcomes for both the company and government schemes, in terms of identifying occupational disease and illness, have not been clearly defined.

Identification of minimum data set

As the outcomes of the schemes have not been clearly defined, the type of data collected is often unsuitable or incomplete.

There is inconsistency in the identifying data used and this limits the cross-linking to other data sets. Privacy legislation impacts on the data collected.

There is limited exposure data held electronically and little or no correlation between health information and exposure data either at the Government or company level. The data currently held in electronic data sets limits both the following of individuals and the identification of trends.

Data capture mechanisms

Electronic data capture mechanisms are limited for company schemes. Government schemes hold electronic records.

There is a need for company schemes to be organised so that data can be analysed to establish trends and allow following of individuals. This includes the electronic storage of health and exposure data.

The limited exposure data that is collected in an electronic data set makes it difficult to establish a relationship between occupational exposure and disease particularly when there may be lifestyle factors that also affect the likelihood of disease.

If electronic data capture is to be more widely established, consideration needs to be given to privacy concerns, costs and resources and the potential for litigation for compensation.

Compatible data capture mechanisms using a consistent data set need to be developed.

Analysis and reporting requirements

There is limited analysis and reporting from the current schemes. This limits any ability by companies or others to manage the risks. Information currently collected from medicals and workers compensation, if available in a suitable form, could be used pro-actively to improve the health of workers in the mining industry.

Occupational health surveillance data in the Australian mining industry is fragmented, collected for different purposes and limited analysis has been undertaken to enable the industry to identify or respond to illness or disease. However, company systems and legislative schemes can provide a vital foundation for a national system.

Phase two

In phase two of the project, four areas have been identified as being appropriate to progress as part of the MICI health project. At the end of phase one, advice was sought from the Health Working Group of the Minerals Council of Australia on the direction forward to ensure appropriate and useable outcomes. Work in the following four areas is currently in progress.

1. scope out SWOT for tracking models that are available;
2. investigate the potential for developing a comprehensive job exposure matrix (JEM) for the minerals industry;
3. development of occupational disease and illness metrics; and
4. provision of best practices guidelines for management of occupational health.

Scope out SWOT for tracking models that are available

This outlines the models that are available within Australia and Internationally and identify the strengths, weaknesses, opportunities and threats (SWOT) of the current systems. It will provide information for decision making on the type of potential models.

The two Australian models that have been considered are Health Watch (for the petroleum industry) and Health Wise (for the aluminium industry). Detailed discussions have been held with the organisations managing the systems and the end-users about the benefits and limitations of the systems (Bofinger, 2004; Health Watch, 2000).

For phase two, the suitability of a tracking system for the occupational illnesses and disease that have been identified as being a priority for the industry based on industry input and consistent with the NOHSC priorities will be considered. These will include:

- noise induced hearing loss,
- respiratory illness,
- musculoskeletal, and
- cancers.

Investigate the potential for developing a comprehensive job exposure matrix (JEM) for the minerals industry

A JEM for the minerals industry (MINEJEM) was considered to be potentially beneficial for the industry. This is under further investigation and is initially focussing on the following areas:

- noise; and
- hazardous substance exposure leading to respiratory illness or disease:
  - respirable dust,
  - dust,
  - silica, and
  - heavy metal, eg lead.

The data collected as part of the state-based exposure systems will be considered. These areas and the data available were suggested as a ‘pilot’ study to determine the practically of the system and to allow working out of problems with the system. Information is available on the exposures of these hazards. The challenge is gathering the information and assessing the quality and value of the monitoring information.

JEMs cross-tabulate classified exposure information by chemical agent and occupational class. JEMs are also applied as a general exposure information systems for hazard control, risk quantification and hazard surveillance. The system includes, eg workforce data, and it provides information on the numbers of exposed workers by agent, occupation, and level of exposure. Exposure is described by the prevalence of exposure, eg per cent of workers exposed and the level of exposure among the exposed.

The detailed information that will be considered relating to the data to be used in MINEJEM will include:

- definition of jobs and tasks and what classification is used,
- type of data available,
- quality of data and how this would be assessed,
- methods used for gathering data,
- front-end format for MINEJEM, and
- Occupational Exposure Limits (OEL) that would be used.

The European Chemical Industries Council (CEFIC) has been developing an exposure database for the past four years (Cherrie and Kromhout, 2004). This is being provided to the Australian Minerals industry for evaluation in the first half of 2005. This database could form the base for the JEM.

Development of occupational disease and illness metrics

The aim of metrics or indicators is to provide different stakeholders with information on the effectiveness and efficiency of the management of occupational health and occupational illness and disease.

Occupational health has the potential to be defined by lead indicators. The applicability and appropriateness of lead indicators for occupational illness/disease is open for debate.

There are some general principles governing the choice of indicators that need to be considered:

- indicators should include more than one data source including integration of additional data sources in addition to mainstream outcome health factors, eg:
  - risk factors, and
  - behaviours.
- the focus should be on measuring change as the estimates of absolute levels will vary as information sources evolve and more detailed information becomes available; and
- regular reporting should be undertaken – similar to the current situation for safety statistics.

It is anticipated that the metrics will be based on three areas covering:

- OH policy and infrastructure,
- working conditions, and
- health outcomes.

This would lead to the development of metrics suitable for the Australian minerals industry. These metrics need to include both proactive and reactive measures and will focus on the acute and semi-acute measures – not the long-term measures. It would allow proactive tracking of the management of illness and disease.

Provision of best practices guidelines for management of occupational health

The fourth part of phase two involves interaction with another of the MICI projects. MIRMgate is a metadata system designed to provide high quality information on risk management in a searchable format for the minerals industry.

Information relating to health monitoring and health surveillance is present on the system and as new sources of information become available, these are added. Full details of the MIRMgate system are available on the MISHC website (MISHC, 2005).

A model for demonstrating the interaction of the different stage of the health project has been developed and is shown as Figure 2. Work is being completed in the different areas. This will be used to develop potential metrics to demonstrate management of occupational health from both proactive and reactive aspects.

SUMMARY

The synergies between these four areas will establish the path towards an effective national occupational health surveillance system and the development of effective prevention strategies and policies. The minerals industry will be able to proactively demonstrate management of both occupational health and occupational illness and disease.

The health project as part of MICI is a work in progress. The success of the project is dependent on the cooperation of the different sectors of the industry.

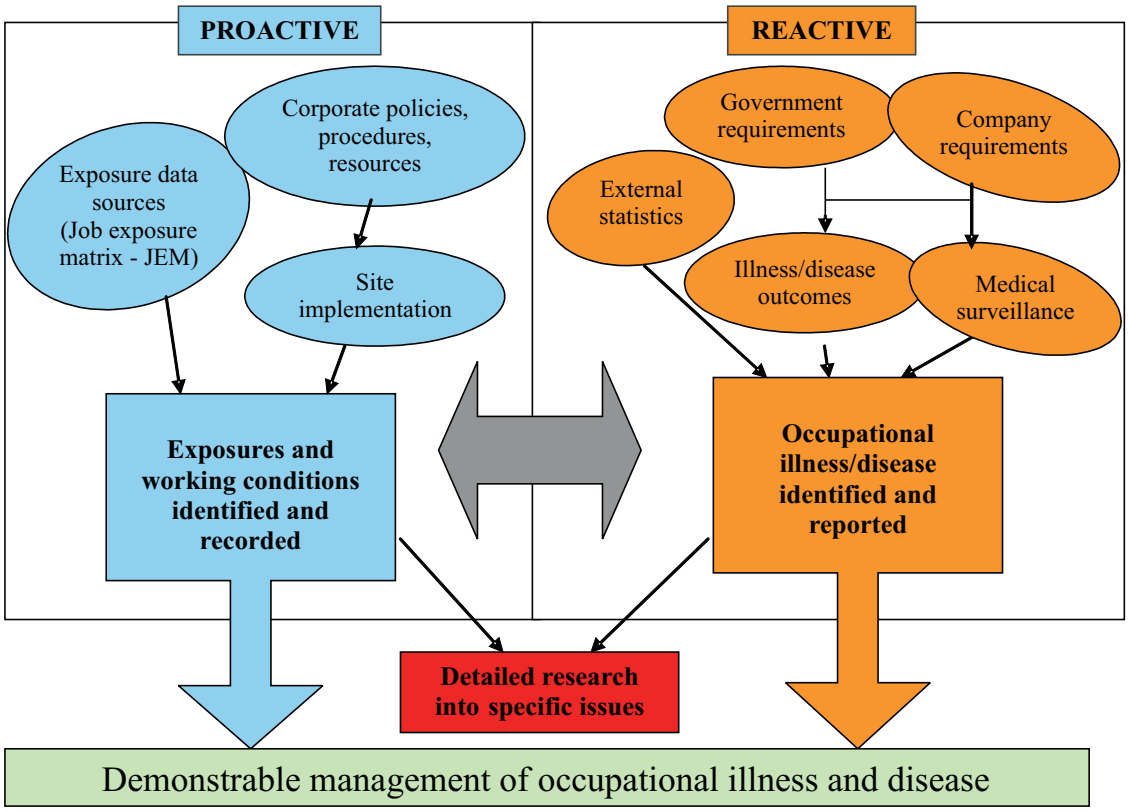

FIG 2 - Model for health tracking project.

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