Queensland Government
Natural Resources and Mines

Health Surveillance

Past History and Future Potential

Townsville Conference
3-6 August 2003

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EXECUTIVE SUMMARY

Mine safety is about eliminating or applying appropriate controls on occupational health hazards that have the potential to cause disabling injury or illness.

A recent tripartite review of mine health surveillance in Queensland found a number of interesting opportunities to introduce a new health surveillance process suitable for use in the broad mining and quarrying industries throughout Queensland. The paper identifies these opportunities in a clear way and provides an integrated three stage model to provide a practical direction for the future.

By working in partnership with industry stakeholders, it is anticipated that the a revised Health Surveillance Unit will assist industry in either eliminating or better controlling occupational health hazards found in mine and quarry work places.

Improved management of mine worker occupational health practices and assessments should pave the way for a quantum improvement in the future safety statistics.

Many of the large mining companies as well as the Minerals Council of Australia have recognised the importance of occupational health management and have initiated strategies and programs to achieve improved performance.

Several large mining companies have already commenced development of improved health management practices and this paper provides a possible framework to harness their collective learning and in doing so minimise wasteful duplication of effort across the industry.

By adopting this course of action it is anticipated that significant progress can been made to achieving a mining and quarrying industry that, in the future, is free from disabling occupational injury or illness.

Background

Occupational illness and disease in mineworkers has been identified as a serious problem for many centuries. Agricola (1484–1555) wrote extensively about many of the occupational health problems he had identified in the local population of mineworkers in Germany. In particular, he identified several health hazards including those caused by various respirable dusts found in mines.

Knowledge of health hazards increased slowly over the succeeding centuries and it was not until the mid 1900's that medical science could measure respirable dust levels and modern medical management systems implemented.

Health surveillance of mineworkers in Queensland was initiated in 1982 when the Queensland Coal Board issued two Health Orders under the *Coal Industry (Control) Act 1948*. In 1993 it was again upgraded and following the abolition of the Board in 1997, the health surveillance requirements for the coal industry were transferred into the coal mining legislation. With the introduction of the new *Coal Mining Safety and Health Act 1999* and the *Coal Mining Safety and Health Regulation 2001* the regulation included further changes to the *Coal Mining (Industry Employees Health Scheme) Regulation 1993* health scheme and it became the *Coal Mine Workers' Health Scheme.*

The current health surveillance program only applies in the coal industry and utilises an approved health assessment form for medical practitioners to follow which is similar to a document developed and used by the medical division of the Coal Services Pty Ltd (ex Joint Coal Board). The prime focus of the medical examinations to date has been to monitor black lung disease (pneumoconiosis), hearing loss, eyesight and fitness of mines rescue trainees.

At the same time as the new coal mining legislation was introduced in 1999, the *Mining and Quarrying Safety and Health Act 1999* was enacted and included legislative requirements for health surveillance and medical assessments. The mines and quarries were not required to report the results of medical assessments to the regulator and nor were they required to conduct medical examinations in accordance with an approved form (as is the case for the coal industry).

In 2002, a report into an operational review of the Mines Inspectorate for the period 1996/97 to 2001/02, determined that the inspectorate's role in safety was well established but its role in health was less defined. The report received ministerial endorsement in April 2002 and included a recommendation to review the future role of the regulator in relation to health surveillance during 2002/03.

A steering committee and a tripartite working group were given the task to investigate and make recommendations on future directions for the regulator. The Working Group consisted of representatives from unions, employers and inspectorate involved in the metalliferous mining and coal mining industries. The agreed common objective for the review was:

> *"To recommend a business model for health surveillance in Queensland in partnership with the mining industry, that will assist in the systematic identification, assessment and elimination / control of adverse occupational health risks to mine workers."*

The review included investigation into current health surveillance practices in Western Australia and New South Wales. It was found that the regulator in Western Australia conducts health surveillance on all mine and quarry workers, the industry consisting of primarily metalliferous mining activities. New South Wales were found to conduct their health surveillance of coal mine workers through a private company, Coal Services Pty Ltd (previously Joint Coal Board), however no similar service was found to exist for the metalliferous and quarrying industries.

In general, the study found that the prime focus of mineworker health surveillance programs in New South Wales, Western Australia and Queensland concentrated on respiratory disease and noise-induced hearing loss.

The Working Group then sought information to confirm or indicate possible occupational illness or diseases that were currently affecting the workers in mines and quarries.
In order to achieve this objective, information from a wide range of sources was reviewed. In addition to the coal industry medical data already collected by the health surveillance unit other sources such as Workers' Compensation, the coal industry superannuation fund and records kept by an industrial organisation were reviewed. As a result of this wide review, it was apparent that the current health surveillance was not focused on current occupational health hazards affecting mine workers.

Figure 1 provides a profile of occupational injury and illness data that clearly demonstrates the current emphasis on respiratory and hearing conservation matters are relatively well controlled and other health issues have a higher incidence rate.

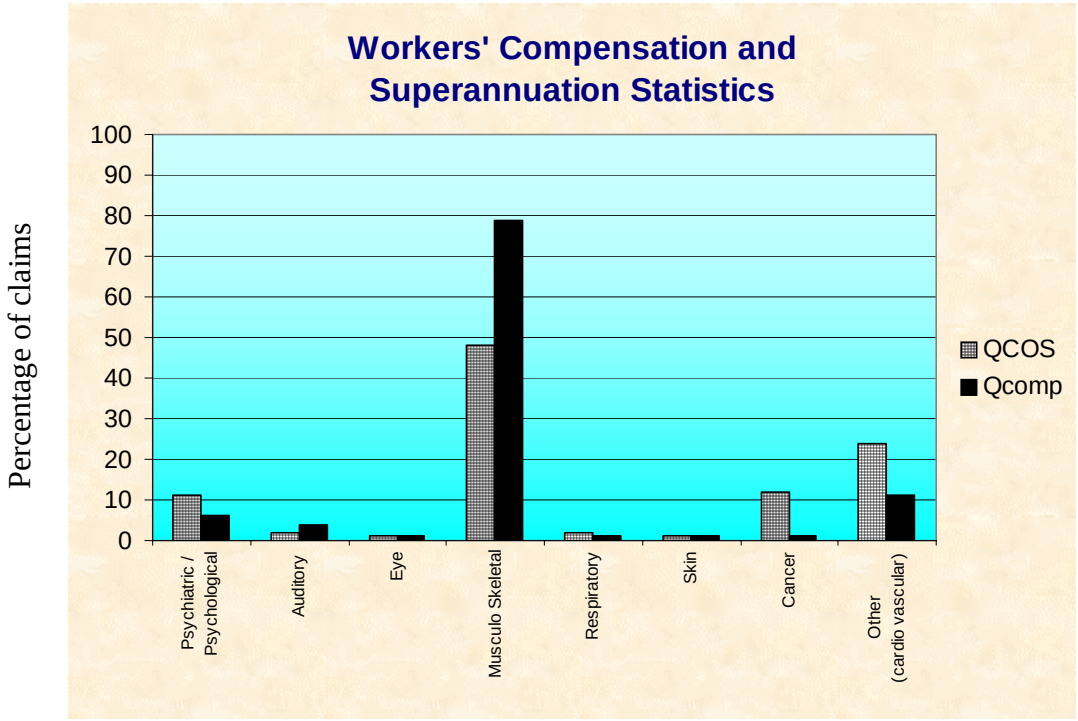


Figure 1: Comparison of workers' compensation data (percentage of total payments) against Q-COS claim numbers for specific disease groups

Workers' Compensation data covering the entire metalliferous mining, coal mining and quarrying industries and the coal industry superannuation data were examined. The analysis indicated that the major occupational injury and disease problems in the mining industry were found to be heavily oriented towards musculoskeletal injury and psychological impairment with a relatively minor amount related to respiratory and auditory injury or illness.

In addition to these findings, a number of other important and related findings were made.

It was estimated that almost 100 percent of employees in the coal mining industry undergo the required medical examination, however less than 10 percent of the workforce suffered a compensatable injury. Anecdotal evidence was provided from two separate sources, which indicated upwards of 30 mineworkers, had their employment terminated each year due to occupational illness or injury. The current health surveillance system does not capture this type of important data. No similar data was found which would allow an estimate of the occupational injury / illness experience in the metalliferous mining and quarrying industries to be made.

Other shortcomings of the current system included that there are no records available on persons who have either "retired" from the mining industry early, had their employment terminated or changed work tasks as a result of occupational injury or illness. This was found to be a particular omission where persons had suffered from an injury or illness caused by a long-term exposure to an occupational health hazard such as whole body vibration or high blood lead levels.

A total of 21 recommendations were made in the report and include:

- Replacement of the existing Coal Mine Workers' Health Scheme with a new Health Surveillance Unit (HSU) that meets the needs of the coal mining, metalliferous mining and quarrying industries in Queensland
- The HSU to be based in Brisbane.
- The principal role of the HSU to be the collection, analysis and reporting of adverse health assessment data
- The HSU to be part of the Mining Inspectorate and communicate its findings to industry for preventive action and to facilitate epidemiological and other research where appropriate.
- Provisions to be included in both mining acts and subordinate legislation to permit the proper functioning of the health surveillance process.
- Identification of duties of key personnel including "Site Senior Executives" and "Employers", to ensure appropriate health surveillance of workers and the ongoing control of risk of disabling injury or disease.
- Appointment of medical practitioners to be known as "Appointed Medical Officers" whose duties will be defined by regulation.
- Industry operators to develop a protocol for large operators to share information on occupational health risks with small miners and contractors.
- Establishment of medical practitioner support for the new HSU, initially by a part-time occupational physician and, on a permanent part-time basis, a panel of medical practitioners with experience in the mining and quarrying industries.

In order to meet the needs of the broad mining and quarrying industries, a new model for the development of health assessments, application of the model and finally the implementation of a

new health surveillance unit were developed. The entire process is generally compatible with the current legislation related to both the mining and quarrying industry and the coal industry.

Proposed Model for Health Assessment Development

In order to implement a holistic program, it was determined that each mine and quarry develop and implement an occupational health management process as part of the mine safety management system. This would be done by a process identified in Figure 2. The health hazards associated with each work task would need to be identified, subjected to a risk assessment and effective controls put in place.

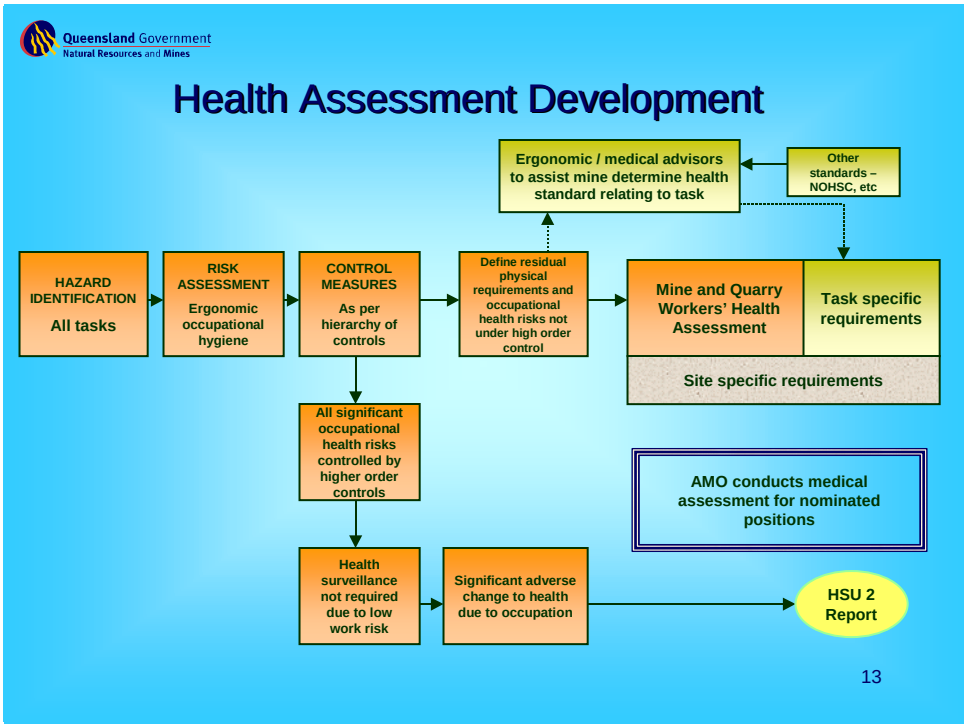


Figure 2: Steps in development of a Health Assessment Program

Where all significant health hazards associated with the work task were able to be placed under high order controls the task could be identified as not requiring workers to undertake a health assessment.

For work tasks that have a residual occupational health risk that is unable to be placed under a high order control, the worker would be required to undergo the baseline "Mine and Quarry Workers' Health Assessment"' plus any task or site specific assessments.

Mine and Quarry Workers' Health Assessment Form

The Working Group determined that the information contained in the current reports from the Coal Mine Workers' Health Scheme should be kept as a resource for future analysis. The existing approved form used for the Coal Mine Workers' Health Scheme was found to need modification to meet the needs of the new mining and quarrying industry health surveillance process. The

modified form includes best practice procedures from similar forms used in New South Wales and Western Australia.

The Working Group supported the adoption of a similar process to that used in Western Australia for determining if a chest x-ray should be included as part of the assessment. This system identifies those who are likely to have had significant exposure to pneumoconiosis-producing dusts in the past, or are entering a job with a risk for such exposure in the future, so that a chest x-ray can be included in their assessment. Otherwise, the chest x-ray will not be a mandatory requirement for health surveillance. This requirement for chest x-rays is also similar to the current requirement in the Queensland coal industry.

An interesting addition to the previous health assessment process is the proposed inclusion of the graphical representation of trends in specific health risks. It is anticipated that this information be provided to both the employer and the employee with the aim of encouraging proactive efforts from both parties to maintain good health. A typical trend graph is found in the HSU 2 report (Appendix 2)

Additional Task and Site Specific Health Requirements

There are tasks at mines and quarries that will have specific health requirements identified in order for the task to be completed safely. These may require additional assessments to the baseline medical assessment to be made.

Task Specific Requirements

Task specific issues occur where there is exposure to a specific hazard while carrying out a task that is not common across the whole workforce. Exposure of a dozer driver to significant whole body vibration, or exposure of a smelter worker to lead, are two examples of task specific exposures that could indicate a need for additional components to the health surveillance process. This might mean, in the first example, that the doctor would need to make a more thorough assessment of areas likely to be affected by whole body vibration, such as the lumbar spine. Where there is additional risk from exposure to a designated hazardous substance, as in the second example, the requirements of the National Occupational Health and Safety Commission's Health Surveillance Guidelines, including biological monitoring where appropriate, would become part of the health surveillance process.

The frequency of task specific assessments might vary from the normal health assessment, usually being more frequent, especially where biological monitoring is required.

Underground mining carries with it additional risks from catastrophic events such as fires, explosions and the development of dangerous gas levels. In the event of such an occurrence, the worker is required to escape as rapidly as possible, often on foot via ladders and steep passageways. As a result, a task-specific assessment may need to ascertain that the worker's level of physical fitness is sufficient to allow the mineworker to escape from the mine or to a place of safety. These specific requirements may be included under this section.

Other risks, such as those from exposure to physical hazards such as heat, noise or various forms of radiation, or biomechanical, biological or psychological hazards may, once identified as significant, also be the subject of additional components to the health surveillance for individuals or work groups. Where possible, the use of standardised health surveillance procedures from competent authorities should be endorsed by a panel of recognised specialists.

Site Specific Requirements

The Working Group accepted that it remains the prerogative of the SSE / employer to set certain health standards for their workforce over and above those required by the mandatory health surveillance process. The additional health assessment requirements must relate to the management of hazards at the mine. This may result from the geographic location of the mine, other conditions specific to that mine site, or from a procedure on an issue such as drug and alcohol testing.

These site-specific health requirements will be additional to the normal health surveillance assessment required for that particular mine or quarry site, though results will not generally be reportable to the regulator.

Application of the Health Assessment Process

All mine and quarry workers, who are to undertake tasks where there is an occupational health risk present that is not under a high-order control and which could reasonably be expected to cause a disabling injury or disease, will need to undergo a medical assessment. As a minimum, this will be in accordance with the Mine and Quarry Workers' Health Assessment Form. Task and site specific occupational health assessments will be conducted at a frequency determined by the risk level or the medical condition of the worker.

The critical link between the operations at a mine and the Health Surveillance Unit is shown in Figure 3 and provides a schematic flow chart of how the health assessment process would be implemented into the mining industry. The flow chart also indicates the areas where reports will be required by the regulator (Health Surveillance Unit).

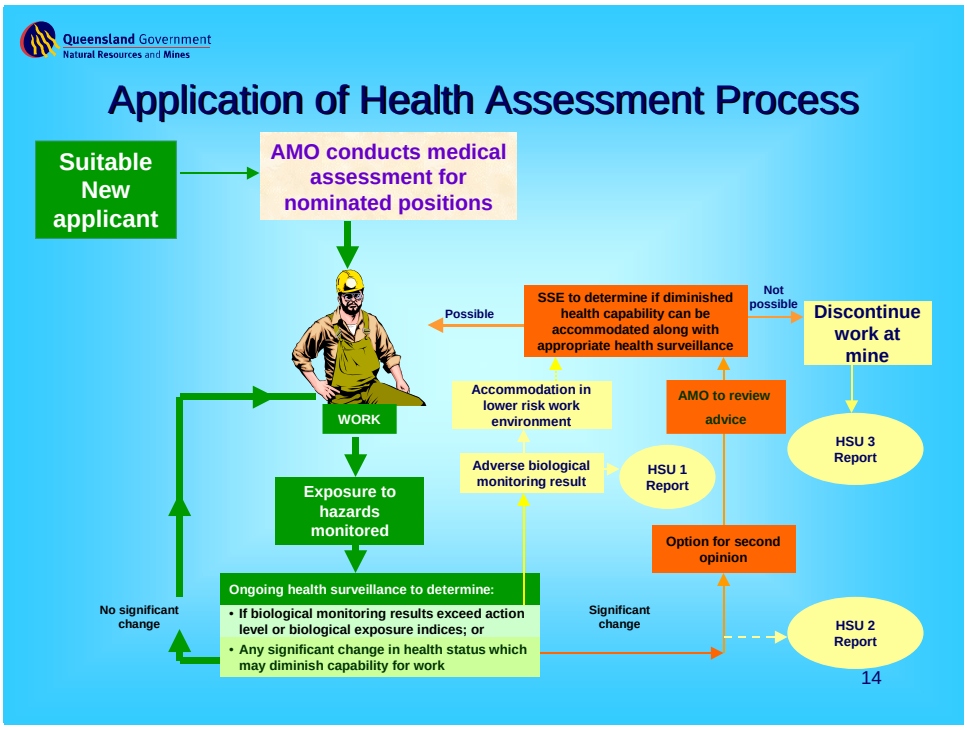


Figure 3: The medical assessment path for all mine and quarry workers from the time of application to cessation of duties at a mine or quarry

Having developed a relevant health assessment standard suitable for the work tasks at a mine, the SSE would be required to ensure that all medical assessments for either new applicants or existing workers are conducted in accordance with the mine standard.

Medical Assessments

It will be mandatory that, for the system to be effective, mine and quarry workers must make themselves available to undergo a medical assessment and also agree for the data to be analysed by the regulator (Health Surveillance Unit).

In the event that the assessment reveals a level of diminished health or physical capability, the medical summary report will be brought to the attention of the SSE who will determine if the person's diminished capability can be accommodated at the mine. The accommodation may include changes to the workplace, equipment or work design, appropriate health surveillance programs or limitations of the worker's activities being put in place.

Workplace Hazard Exposure Monitoring

It is the responsibility of the SSE to ensure that the mine or quarry regularly monitors the level of occupational health hazards workers are exposed to in the workplace.

Ongoing Medical Assessments

Ongoing medical assessments must be made at a frequency related to the potential health risk to the worker. The frequency should be such that the medical assessments are able to indicate any adverse trends in a person's health before a significant adverse change is found that requires their removal from the task.

The ongoing medical assessments have two separate elements, each of which may have different assessment cycle times:

1. The first type of assessment is to monitor exposure to hazardous agents through the use of biological monitoring or biological effect monitoring. In the event that a significant adverse result is found a HSU 1 report (appendix 1) must be prepared and submitted.

2. The second is for other significant changes to occupational health. In the event of a significant adverse change in health being confirmed, a HSU 2 report (appendix 2) would need to be prepared and submitted. Should the adverse change be of a level such that the worker may need to change duties at the mine, the worker must be given the opportunity to seek and obtain a second medical opinion. The second opinion must then be given to the mine AMO who must consider the second medical opinion before making a final report to the worker and the SSE.

Accommodation of Diminished Work Capability

Where an adverse biological monitoring result or a significant change in health has been identified and causes a diminished capability to work, the SSE will need to determine if and how other workplace arrangements can be made to accommodate the changed health status of the mine or quarry worker.

Where the SSE determines that accommodation is possible by changing duties on either a temporary or permanent arrangement, the worker must be assessed and confirmed as physically and psychologically able to undertake the new task with an acceptable level of risk.

Similarly, the SSE must ensure that duties given to accommodate injured workers during their rehabilitation program do not pose an unacceptable risk to the workers' health.

Should the SSE determine that accommodation of the person's diminished health capability is not possible, the SSE must ensure that appropriate action is taken and a HSU 3 report is prepared and submitted.

Medical Reports to the Health Surveillance Unit

Instead of the current system where all mineworker medical assessment reports are sent to the current HSU, only three types of report will be required from operating mines and Appointed Medical Officers.

The proposed three circumstances requiring reporting to the HSU are:

HSU 1 – Where there has been an adverse biological monitoring or biological effect monitoring result (that is, one that exceeds the action / alert level).

HSU 2 – Where the health surveillance assessment detects significant deterioration in an existing worker's occupational health, requiring the SSE to accommodate the change in the work capabilities of the worker.

HSU 3 – Where the health surveillance process detects significant deterioration in an existing worker's health or biological monitoring result and the SSE determines that the worker's diminished capability cannot be accommodated at the mine. The worker is to be removed from those activities.

Proposed Health Surveillance Model

The Health Surveillance Unit

Research conducted as part of this review indicated that the majority of coal mineworkers were able to complete their working careers without suffering a permanently disabling injury. It is anticipated that the mining and quarrying industries would have a similar injury profile.

By focussing only on the adverse health monitoring results, the current resource allocation of two staff members in the Health Surveillance Unit is expected to be adequate to capture, analyse and report on behalf of the full Queensland mining and quarrying industry.

Due to the large financial resources potentially required to address many of the health hazards in the workplace, some of which were identified as needing research, the Working Group supported the proposal that, in the first instance, the major effort should focus on the larger organisations, with the lessons learnt then made available to smaller operators.

Should the need arise for the HSU to participate in epidemiological research into the health of mineworkers this could take place after the major health risks have been brought under control.

The objective, in the case of mineworkers, would be to build up a picture of the ongoing health of the workers over the longer term, to identify disease trends that point to risks that lead to gradual deterioration in health or to disease with longer latency, such as various cancers, respiratory, cardiovascular or neurological disorders. One example would be to determine the risk of cardiac disease in miners exposed to diesel particulates. The focus of this type of study is prevention. Once a particular work exposure is identified as a risk for a particular disease, risk-reduction strategies can be developed that can be adopted across the industry as a whole. It is anticipated that studies of this nature will often link to other studies in other states and countries such as the USA.

The Working Group accepted that to address this objective, the current surveillance process that provides data from coal mineworkers would need to be extended to cover the total mining industry.

Role, Structure and Function

The role, structure and functions of the HSU were refined during the extensive consultation program conducted. There are three basic elements to the activities required of the HSU as indicated in Figure 4.

1. Data Collection
2. Data Analysis; and
3. Report Findings

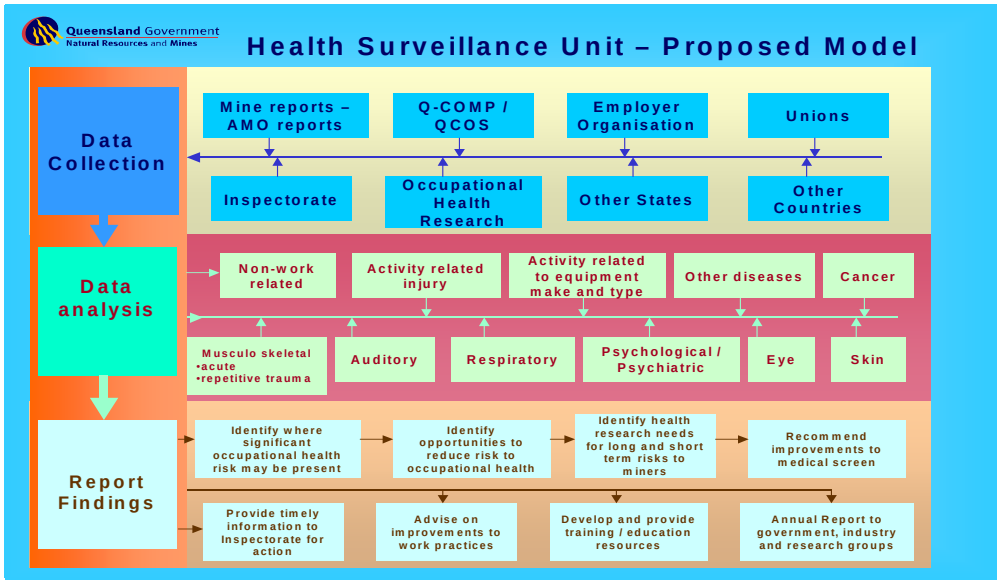


Figure 4: Proposed Model of the Health Surveillance Unit

Role

The role of the HSU is to champion the issue of occupational health for all mine and quarry workers in Queensland. Its role is not to interfere with employers who act responsibly in ensuring their employees do not suffer any disabling occupational injury or disease.

Its role is, however, to identify activities or occupations at mine and quarry sites where there is firm evidence that occupational health hazards exist and are not adequately controlled. It is the role of the HSU to advise the inspectorate who in turn will ensure that the SSEs respond appropriately to minimise the risk to the health of workers at the mine or quarry.

It is the role of the HSU to establish and maintain contact with other professional bodies and benchmark best practice against HSU standards and practices.

The HSU will need to collect all available information in compliance with the Privacy Principles on mineworker health and conduct statistical analysis on the data and report on its findings.

As a minimum, the data analysis will categorise the data into the following classifications:

- Non work-related injury
- Activity-related injury
- Injury related to equipment type or manufacturer
- Cancer
- Musculoskeletal disorders caused by both acute and repetitive trauma
- Auditory disorders
- Respiratory disorders
- Psychological / psychiatric impairment
- Eye disorders
- Skin disorders
- Other diseases

The HSU will be responsible for identifying where improvements can be made to the health assessment form and also where research into health matters may be required.

Structure

A very simple organisational structure is proposed. The HSU should be a stand-alone unit within Safety and Health, be separate from the inspectorate and have its own budget. The Unit should have a manager, one data supervisor and part-time support from a statistician and an advisory panel of occupational physicians.

In general terms, the HSU manager will liaise with industry stakeholders and AMOs, ensure that privacy protocols are maintained, implement training as required, develop and provide training resources and provide reports as required.

The Data Supervisor will ensure that data is collected and analysed in accordance with Australian standards, maintain regular contact with suppliers of data, conduct regular checks on the integrity of the data and ensure data entry is up to date. The Data Supervisor will also ensure that the strict privacy protocols are maintained.

Part-time assistance from the Safety and Health Statistician will also be required, who will conduct or oversee the analysis of the data and ensure it is done in compliance with Australian Standard 1885.1 (1990).

Functions

In fulfilling its role to the mining industry, the HSU will have the following functions:

- be a centre of excellence where high ethical standards are maintained with special emphasis on privacy matters
- collect medical data relevant to the occupational health of mine and quarry workers and comply with privacy policy requirements. The data sources are detailed elsewhere in this report

- analyse information received in a manner which is relevant to the health needs of mine and quarry workers
- report results of data analysis
- advise the inspectorate on activities or other matters where significant health risks have been identified
- develop training resources and facilitate training in occupational health
- provide statistical data to support research
- participate in epidemiological and occupational health benchmarking studies with other research groups, states and/or countries

It is anticipated that the proposed new health surveillance model should be able to be implemented with two staff members and only a moderate increase in the budget allocation that exists for the current Coal Mine Workers' Health Scheme. The significant change from the current system being that under the new process, only persons whose occupational health has been adversely affected will be reported to the new HSU. All other medical records will be kept by the Appointed Medical Officers and be available to the HSU, possibly by electronic transfer/interogation methods.

Opportunities for the Future

The Working Group members were unanimous in their desire to see mine operators and the regulator work in partnership to achieve a well-focused health surveillance program for all mine and quarry workers. By sharing information small and large operators should be able to improve current practices with a minimum of disruption and cost to the business. It is confidently anticipated that such a partnership will result in worker health and safety being enhanced.

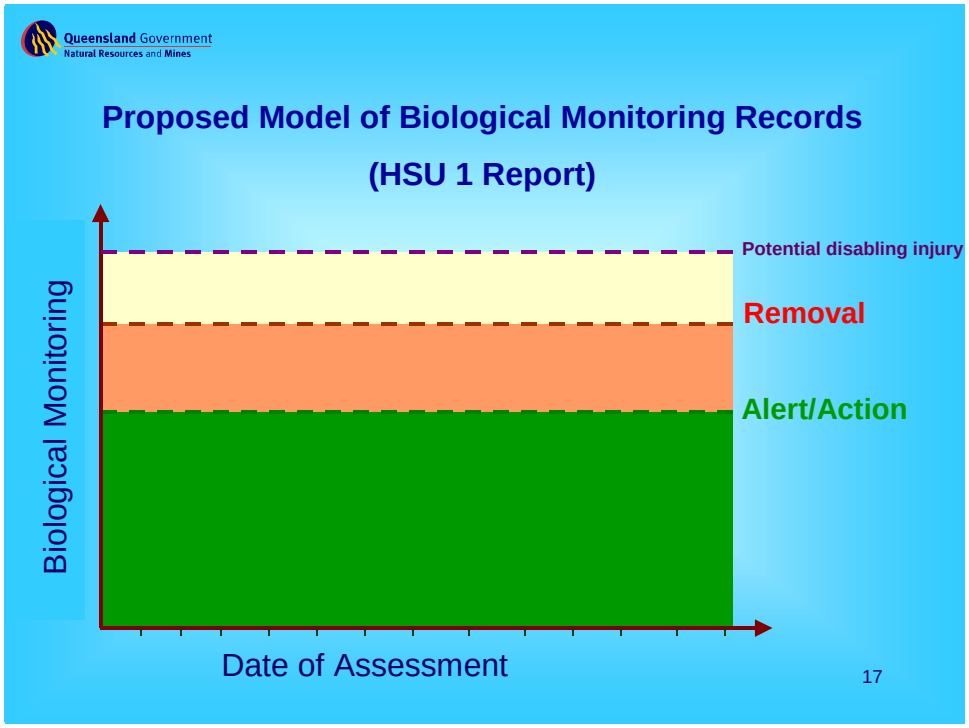
In addition, opportunities for further research have been identified such as developing electronic data management systems and access a wider range of health data from sources not currently utilised in either Queensland or other states. This will require detailed attention with respect to the setting up of robust systems to ensure the Privacy Policy is implemented and complied with at all times.

Conclusion

The proposed health surveillance model is consistent with the direction that several large mining houses have now embarked upon. The Minerals Council of Australia have indicated that they are actively developing an Australia-wide health surveillance model for the mining industry and have received two presentations on the proposed Queensland model as set down in the report. The NSW Mine Safety Council and Coal Services Pty Ltd (Previously Joint Coal Board) have also developed a strong interest in the proposed health surveillance system for Queensland after having received separate presentations on two occasions.

The opportunities are there to identify, control or eliminate the currently known occupational health risks. It now needs the commitment of all stakeholders to ensure that the mining and quarrying industry workers benefit from well focused health surveillance programs.

APPENDIX 1



APPENDIX 2