Health Management Plan

A guide to the development and implementation of a health management plan in the NSW mining and extractives industry

Acknowledgements

This plan was prepared by the NSW Mining Industry Health Working Party, with assistance from consultant Dr Tim Driscoll of ELMATOM Pty Ltd. It draws on information from a variety of sources, and in particular a recent unpublished report prepared in 2007 by Associate Professor David Cliff and Ms Kristy Farrelly of the Minerals Industry Safety and Health Centre, Sustainable Minerals Institute, University of Queensland titled "Review of health monitoring and surveillance requirements and practice in Australian mining OHS jurisdictions and a description of best practice conducted for the NSW Mining Industry Health Working Party", and the WorkCover New South Wales publication "Risk management at work – guide 2001". Organisations represented on the NSW Mining Industry Health Working Party are Coal Services Pty Limited; the WorkCover Authority of New South Wales; the New South Wales Minerals Council; the Construction, Forestry, Mining and Energy Union (Mining and Energy Division); and Industry & Investment NSW. The Working Party also has an independent expert as a member (Professor Geoffrey Berry).

NSW Mine Safety Advisory Council

The NSW Mine Safety Advisory Council has the strategic objective of achieving world-leading occupational health and safety through the development of changes in health and safety culture throughout the mining industry in NSW.

The Council was established in 1998 following recommendations made in the 1997 Mine Safety Review and Gretley Inquiry. The Council was strengthened in 2006 through: the setting up of a secretariat within the existing structure of Industry & Investment NSW; the appointment of two independent experts in OHS; and making resources available, when appropriate through Industry & Investment NSW, on the Council's recommendation to explore issues and commission research.

The Council includes senior officials from some of the most respected bodies in the mining industry including the CFMEU (Mining and Energy Division), Australian Workers Union, NSW Minerals Council and Cement Concrete and Aggregates Australia and Industry & Investment NSW. Two independent experts in occupational health and safety are also part of the Council. Mr Norman Jennings was appointed Chairman of the Council in 2006. The Council was established to provide the Minister for Mineral Resources with advice on critical OHS issues to the NSW Government.

Research into key OHS issues in the mining industry was commissioned by the Council and released as the Digging Deeper Report in 2007. The Council hosted a CEO OHS Culture Change Summit in November 2008 which issued a communiqué outlining a joint vision for the industry and an agreement on a set of guiding principles that will help ensure the industry has a dynamic culture to address key health and safety issues. The Council is focused on addressing the areas of: culture change; fatigue; safety incentive schemes and production bonuses; the disconnect between OHS systems and practice; contemporary health issues, including musculoskeletal disorders; and OHS issues affecting contractors and inexperienced workers.

Disclaimer

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Guide to the development and implementation of a health management plan in the NSW mining and extractives industry

September 2009, version 1.0

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Contents

Glossary

MSAC	NSW Mine Safety Advisory Council
NOHSC	National Occupational Health and Safety Commission
OHS	Occupational health and safety
TWA	Time-weighted average
☛	Additional information

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1. Introduction

Background

Key aspects to providing a healthy working environment

All mining operators are subject to an Occupational Health and Safety (OHS) legislative framework[*]. Amongst other things, this legislation requires all employers, including mining operators, to provide a safe and healthy working environment for their employees and others who might be affected by their mining activity. A key aspect of providing this safe and healthy working environment is the development and operation of a system to ensure the working environment is as safe as it can reasonably be. One aspect of such a system is a risk management plan. In addition, under both coal mining and non-coal mining legislation, a health and safety management system or plan is required[♤]. Risk management plans have commonly been developed to address physical risks, but they rarely address hazards that might lead to ill health. This document is designed to help operators fulfill their obligations by providing guidance on how to develop the required health management plan. The Australian Standards covering occupational health and safety management systems[‡] provide general guidance on the development of such systems and should also be used in developing the final health management plan.

Legislation requires a health and safety management system to be in place

The Wran Mine Safety Review identified, among other things, the relative lack of information on, and prevention activity in relation to, work-related disease affecting NSW miners. A project conducted in 2007 identified the key contemporary health issues affecting mining in New South Wales and proposed a priority for these conditions[§].

[*]See the Regulations at http://www.legislation.nsw.gov.au

[♤] The Coal Mining legislation stipulates that the system must be consistent with the Australian/New Zealand Standard AS/NZS 4804:2001 *Occupational health and safety management systems - General guidelines on principles, systems and supporting techniques*, whereas the non-coal legislation doesn't specifically refer to the standard.

[‡] See Standards Australia (2001). AS/NZS 4804:2001. *Occupational health and safety management systems: General guidelines on principles, systems and supporting techniques*. Standards Australia/Standards New Zealand, Sydney/ Wellington; and Standards Australia (2001). AS/NZS 4801:2001. *Occupational health and safety management systems: Specifications with guidance for use*. Standards Australia/Standards New Zealand, Sydney/ Wellington.

[§] Driscoll T (2007). Summary literature review of health issues related to NSW mining. Report for the Mines Safety Performance Branch. Industry and Investment. ELMATOM Pty Ltd, Sydney.

High priority contemporary health issues

The high priority contemporary exposures and related health conditions are:

- Noise causing noise-induced hearing loss;
- Vibration causing musculoskeletal conditions;
- Diesel exhaust fumes leading to respiratory disease;
- Hazardous substance exposure causing dermatitis;
- Ergonomic stressors causing musculoskeletal conditions;
- Ergonomic stressors causing back conditions;
- Ergonomic stressors causing fatigue and related conditions;
- Psychosocial hazards causing psychological conditions; and
- Ultraviolet radiation and skin disease.

Defining high medium and low priority hazards

Other exposures and conditions (such as silicosis and pneumoconiosis) are still important but have been given a lower priority because they are probably now well controlled. A full list of high, medium and low priority contemporary hazards is provided in Appendix 1. High priority contemporary hazards can be expected to be relevant to most mine workers and mine operations and need to be explicitly addressed in any health management plan. Medium and low risk hazards may also be relevant in specific situations and must be addressed in those situations. In addition, specific legislation may require particular controls, reporting or other activity for even the low priority hazards in certain mine operations.

Purpose

Providing guidance to manage health risks and comply with legislative framework

The purpose of this document is to provide guidance to mining operators on how to systematically manage health risks in the workplace so that the operators comply with the legislative framework and ensure there are no negative impacts on the health of workers or visitors potentially affected by workplace exposures. The guidance is provided in the form of suggested approaches to the development of the required health management plan. The plan is not prescriptive, which means that individual operators can develop a plan that is specific to their needs. However, it is expected that all plans will address each of the main areas identified in this document. Users of this document must keep in mind that the plan also requires a strategy to implement the components of the plan, and that the plan and strategy must also be incorporated in the overall health and safety plan and strategy of the operator.

Coverage and structure of the plan

Chapter summary

This plan has 15 chapters. Apart from the Introduction and a chapter on General Principles, each chapter considers a specific aspect of the management plan. For each aspect, there is general information, information on the actions required under appropriate regulations, and, where appropriate, information on other desirable actions and a list of resources that might be useful in the development or operation of specific aspects of the health management plan.

2. General principles

Introduction

Why have a health management plan

A health management plan is designed to provide the overall strategy and specific procedures to prevent workers and visitors to the workplace sustaining injury and ill health as a result of occupational exposures. This chapter describes some of the general principles underlying the development of a health management plan in the New South Wales mining industry.

Responsibilities

Meeting legislative responsibilities

All mining operators are subject to the New South Wales Occupational Health and Safety legislation. This legislation requires all employers, including mining operators, to act in certain ways and to achieve certain outcomes. Amongst other things, this means that all mining operators are required to provide a safe and healthy working environment for their employees and others who may visit the workplace. A key aspect of providing this safe and healthy working environment is the development and operation of a system to ensure the working environment is as safe and healthy as it can reasonably be (this is commonly described as the ALARP principle – keeping risks As Low As Reasonably Practicable). This requires a systematic approach to risk management, one aspect of which is a risk management plan. Risk management plans have commonly been developed to address physical risks in the mining industry, but they less commonly address hazards that might lead to ill health.

Who has OHS responsibilities and obligations

A range of parties involved in mining operations have specific responsibilities and obligations under the OHS legislation. These include operators, employers, controllers, designers, suppliers and workers.

Resources needed for an effective health management plan

Establishing needed resources

Many enterprises or mine sites will not have the resources that are required to develop, implement, maintain and review an effective health management plan. Instead, employers and operators will often need to identify qualified specialists in various areas to help with certain aspects of the plan. Input from occupational hygienists, ergonomists and occupational physicians will often be required or desirable. It would usually be wise to establish an on-going relationship with a practitioner from each of these specialty areas, and in certain circumstances practitioners from other areas will also be helpful. The web sites of some of the organisations likely to be of most use are listed in the Resources section below.

Resources

OHS organisations

Industry & Investment NSW
WorkCover NSW
Coal Services

Occupational Physicians

Australasian Faculty of Occupational and Environmental Medicine
Coal Services

Occupational Hygienists

Australian Institute of Occupational Hygienists
Coal Services

Ergonomists

Ergonomics and Human Factors Society of Australia

Other sources

Authorised medical practitioners (WorkCover site)
Dust Diseases Board
New South Wales Minerals Council
Minerals Industry Safety & Health Centre
Construction Forestry Mining and Energy Union
Industry and Investment NSW (1997). *The Mine Design Guideline MDG 1010-Risk management handbook for the mining industry.*

This publication provides guidance on risk assessment and the development of a risk management plan, but it focuses on injury risks. Two good resources for the development of a risk management approach and plan are provided by WorkCover New South Wales:
WorkCover NSW (2001). *Risk assessment. Code of practice 2001.* WorkCover NSW, Sydney
WorkCover NSW (2001). *Risk management at work – guide 2001* WorkCover NSW, Sydney

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The relevant Australian Standards should also be consulted:
Standards Australia (2001). AS/NZS 4804:2001. Occupational health and safety management systems: General guidelines on principles, systems and supporting techniques. Standards Australia/Standards New Zealand, Sydney/ Wellington.

Standards Australia (2001). AS/NZS 4801:2001. Occupational health and safety management systems: Specifications with guidance for use. Standards Australia/Standards New Zealand, Sydney/ Wellington.

3. Development and implementation strategy

Introduction

Suggested approach

This chapter considers the approach that should be used to develop and implement the health management plan in the workplace, and integrate it with the overall operational health and safety management plan.

Approach

Consultation, commitment and good communication

The development and implementation of a health management plan begins with establishing a consultation procedure and a policy commitment to the effective management of health risks in the workplace. Consultation and good communication are central to the development and implementation of an effective plan. The process of development and implementation is described in detail in the various sections of this document and is outlined in the figure below.

Identifying roles and responsibilities

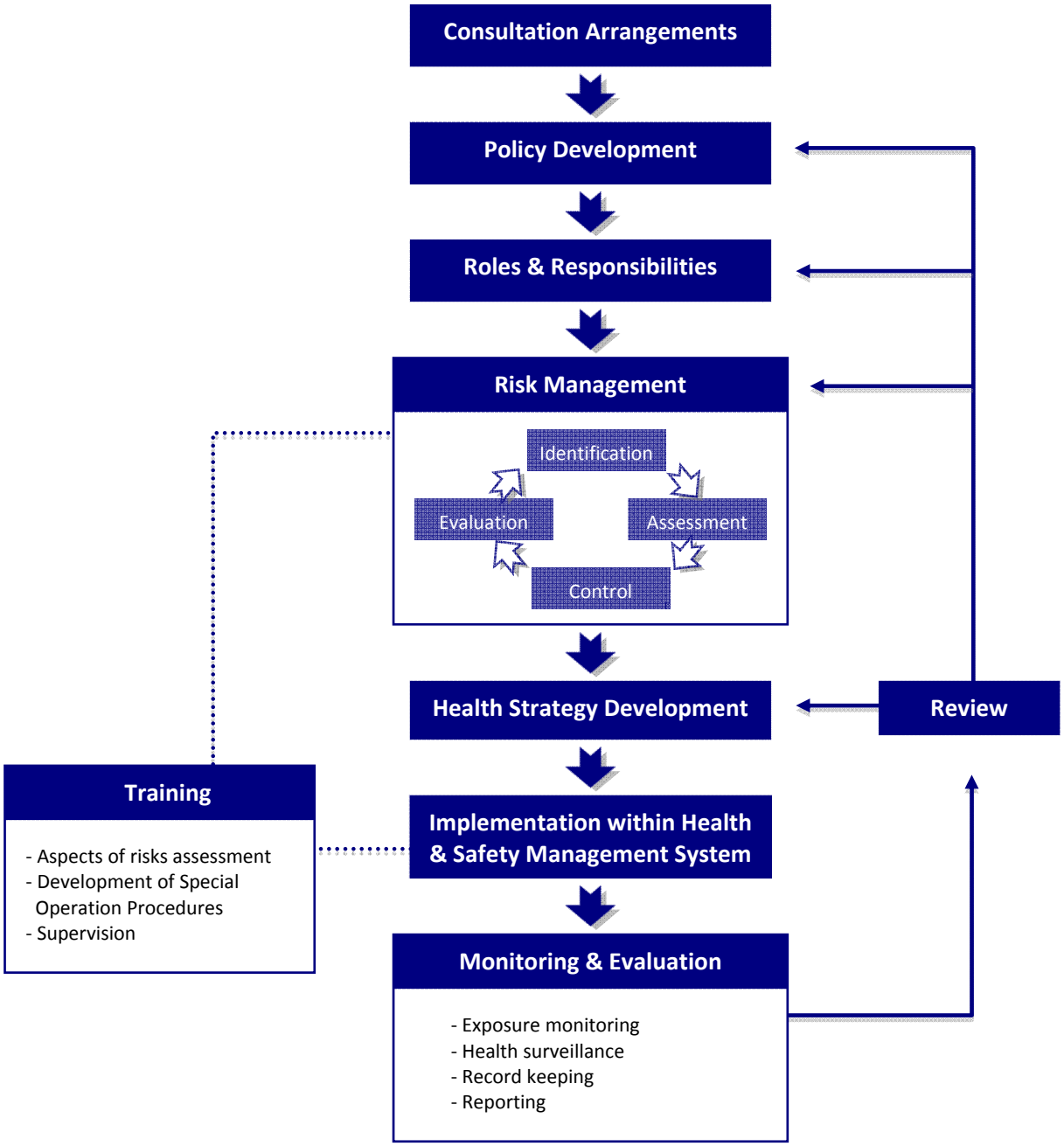
Having established the consultation procedures and developed the policy, it is important to identify the roles and responsibilities of persons within the organisation who will have responsibility for developing and implementing the plan. The risk management approach of identification, assessment, control and evaluation must then be developed and implemented. This will involve training before development and as part of the implementation. A strategy will then be needed to implement the plan. The effectiveness of the various control measures should be monitored and evaluated on an on-going basis, and the results used to review the plan on a regular basis. The aim of this process is to produce a health management plan and a strategy to implement the plan, and to integrate this process with the overall operational health and safety management plan. This is illustrated in the figure on page 6.

Summary of development and implementation stages

In summary, the development and implementation of an effective health management plan requires:

- Early and on-going consultation;
- Making a firm policy commitment to effective health risk management;
- Establishment of roles and responsibilities;
- Risk identification, assessment and control;
- Development of assessment and monitoring procedures;
- Training and supervision;
- Development of a strategy to implement the plan;
- Implementation of the plan;
- On-going performance monitoring and evaluation of the risk management process;
- Regular review and resultant modification of the plan; and
- Integration of the plan with the overall Health and Safety Management Plan.

Overall approach to the development and implementation of a health management plan



4. Consultation

Introduction

Developing policies and procedures in consultation with workers

As with any important aspect of health and safety connected to work, appropriate policies and procedures must be developed in consultation with workers, as workers are likely to have the best practical understanding of work processes and the potential for exposure to various hazards as a result of the work processes. Such consultation is also legally required. In addition, workers are the persons most likely to be at risk of developing ill health as a result of the work-related exposures.

Requirements

Fulfilling legal requirements

A health management plan is likely to be most appropriate and effective if it is developed in consultation with workers. In addition, there is a legal requirement to consult workers regarding any major decisions likely to affect the health of workers. This consultation is commonly undertaken with workers' occupational health and safety representatives and with the workplace occupational health and safety committee.

Key aspects to development of health management plan

Key aspects of the required consultation relevant to the development of a health management plan include:

- The employer must consult with its employees to enable them to contribute to the making of decisions affecting their health, safety and welfare at work.
- Information that must be shared includes matters that affect or may affect the health, safety or welfare at work of employees covered by particular consultative arrangements.
- Consultation must be undertaken when:
  - assessments are made of risks to health and safety;
  - decisions are made on measures to control or eliminate those risks;
  - changes are made to premises, systems or methods of work, or to plant or substances used for work, that may affect health, safety or welfare at work; and
  - decisions are made about the consultation arrangements.
- Consultation is to be undertaken by means of an OHS committee, an OHS representative or other agreed arrangements, or a combination of these approaches**.

** Based on Cliff D, Farrelly K (2007). *Review of health monitoring and surveillance requirements and practice in Australian mining OHS jurisdictions and a description of best practice conducted for the NSW Mining Industry Health Working Party*. Unpublished.

5. Policy

Introduction

Policy commitment

All safety management plans should reflect the mine operator's health and safety policy. It is important to ensure the health component is strongly reflected in the policy. Policy must be developed by management in consultation with workers. This policy should make it clear to management, employees, contractors and visitors that the operator is committed to ensuring the health and safety of all involved in the mining work or those affected by the mining work. This commitment should be explicitly made at senior management level and demonstrated by the actions of those at senior management level. The roles and responsibilities of persons at all levels of the operation should also be documented in general terms. There are many examples of health management policy statements available on the internet. Some representative examples that might prove useful when developing a new plan are shown in Appendix 3.

Resources

Guidance on the content of an appropriate health and safety policy is provided in AS/NZS 4801:2001 and AS/NZS 4804:2001.

6. Risk management

Introduction

Risk identification assessment control and evaluation

This chapter considers risk management. Risk management encompasses the identification, assessment, control and evaluation of hazards that pose a meaningful risk to the health of workers and visitors to the workplace.

Hazard **identification** involves identifying the activities that may pose a risk.

Risk **assessment** describes the process of evaluating the extent of the risk arising from the exposure.

Risk **control** describes the process of addressing the risk by eliminating or minimising its effect.

Evaluation is the process of checking the extent to which the control measures have been successful. Evaluation is also addressed in a later chapter of this report.

Risk assessment is a dynamic process, with risks being assessed and prioritised, all priority risks being addressed, and the new work environment evaluated regularly. This provides information to be used in the next risk assessment which will probably have a different set of risks and different high priority risks that require control.

Balancing worker knowledge and risk assessment

Risk assessment must involve appropriate consultation between all relevant parties. In particular, it is important that the workers potentially affected by the hazards have an opportunity to provide input to the risk assessment process. The workers' practical knowledge of the tasks and associated hazards and risks provides an extremely valuable input into the risk assessment process. However, formal and comprehensive risk assessment can be a demanding undertaking and it is essential that those undertaking the risk assessment be adequately trained and assessed as competent to undertake such an assessment. In some situations this will involve bringing in expertise in risk assessment from outside the organisation.

Practical guides to risk assessment[††] and to risk management[‡‡] are provided by WorkCover NSW and can be used to guide the development of the health management plan.

[††] See WorkCover NSW (2001). Risk assessment. Code of practice 2001. WorkCover NSW, Sydney.

[‡‡] See WorkCover NSW (2001). Risk management at work – guide 2001. WorkCover NSW, Sydney

Requirements

Legal obligation under OHS legislation

Risk management is both an essential aspect of providing a safe and healthy workplace and a legal requirement under the OHS legislation.

Desirable approaches

Hazards identification

Identification

Hazards can be identified in a variety of ways. Typically these would include:

- Examining records to look at incidents and health concerns that have occurred previously;
- Considering events and exposures that could realistically occur, even if they haven't yet;
- Discussing with workers their safety concerns;
- Walking through and observing the workplace; and
- Examining available information on hazardous substances and equipment used on site (the best source of information on a hazardous substance is usually the material safety data sheet for the substance).

Assessment

Assessing likelihood of exposure and the severity of outcome

One of the keys to effective risk management is to properly assess the risks arising from a given hazard. This assessment has two aspects – assessing how likely it is that the exposure will occur, and assessing the severity of the outcome that can be expected as a result of the exposure. Often a workplace cannot institute all the necessary control measures at the same time, or cannot monitor all exposures all the time. The dual assessment allows control activities and monitoring to be prioritised. Common exposures should be well controlled and monitored unless the expected adverse health outcome is likely to be trivial. Exposures with a potentially severe outcome must be well controlled and closely monitored even if the exposure is rare.

This reasoning has resulted in many organisations developing a risk matrix, with the likelihood of an event or exposure on one axis and the severity of the injury or illness resulting from the event or exposure on the other axis. This allows probability and severity to be assessed together for each hazard, providing an indication of the importance of the hazard and thus the priority its control should be given. An example of a risk matrix, including the approach to its development and the way it was used to develop a complete risk management approach, is shown in Appendix 5.

Assessing the risk adequately requires the use of all relevant data sources (such as WorkCover guidance material, industry codes of practice, Australian Standards, manufacturers' information, material safety data sheets)[§§], input from workers and often advice from experts in the field.

[§§]Based on WorkCover NSW (2001). Risk management at work – guide 2001. WorkCover NSW, Sydney.

The risk register provides a record of prioritised tasks and actions

Risk register

Once the risk matrix has been used to allocate a risk rating, the identified risks can be recorded in a risk register. This register provides a documented record of the prioritised risks that is accessible to all people who might come into contact with the hazards and associated risks. The risks on the prioritised list may then be eliminated or controlled to as low as is reasonably practical (using the hierarchy of control). The register also records the priority which needs to be given to their elimination or control. As risks are dealt with, the register should be appropriately updated (see Tables 5, 6 and 7 in Appendix 5 for an example of a risk register).

Control

Hierarchy of control and principles to control hazards

The key aim of a health management plan is to ensure that hazards that pose an important risk to the health of the worker or to others who may come into contact with occupational hazards are properly controlled. An important concept in developing this control is the so-called "hierarchy of control". This hierarchy provides a set of approaches and principles that must be used to control hazards, with approaches at the top of the hierarchy to be considered before those further down the list. There are many forms of the hierarchy, but essentially the controls measures, in descending order of preference, are as follows:

- Elimination;
- Substitution;
- Isolation;
- Engineering;
- Systems of work;
- Administrative approaches; and
- Personal protection.

This shows, for example, that reliance on personal protective equipment as the main means of controlling risk arising from a particular hazard should be avoided wherever possible. Personal protective equipment might be used as one control method but, wherever possible, approaches higher up the hierarchy should also be incorporated. More detail about the hierarchy is provided in Appendix 4.

Safe operating procedures

When hazards cannot be eliminated, an essential part of the approach to control the risk is the development of safe operating procedures or methods of safe work. These must be developed in consultation with the relevant workers and supervisors, who also need to be appropriately trained to contribute to the development of these methods of safe work.

There must be clear guidelines for developing agreed operating procedures and systems in place to demonstrate that the proper process takes place. Once these have been developed the implementation of the control system should be incorporated into the strategy that guides how the plan is implemented.

Evaluation

Assess the success of control measures

As mentioned, evaluation is the process of checking the extent to which the control measures have been successful. This is important because control measures which are working should be maintained and those that are not working need to be replaced or augmented with other control measures. Various approaches to evaluation are considered in a later chapter.

Approaches to specific high priority and other hazards

Noise causing noise-induced hearing loss

Outcomes relating to excessive noise

Loud noise is an inherent aspect of all sectors of the mining industry. This noise arises from various sources, including large machinery, power tools, high-energy impacts and the movement of large amounts of earth. The main adverse health outcome related to noise is noise-induced hearing loss, although hypertension has also been associated with exposure to excessive noise. Prolonged exposure at levels above 85db(A) is expected to result in significant hearing loss. This hearing loss typically does not become evident for many years after first exposure.

Assess excessive noise

Assessment of the risk posed by noise in specific mining tasks is easily assessed by conducting a noise survey. Tasks associated with excessive noise can then be addressed using the hierarchy of control, but a typical control and monitoring approach would include purchasing less noisy equipment, isolating people from noise as much as possible, having rigorous use of effective protective equipment, conducting noise surveys and conducting regular hearing assessment surveillance programs.

The OHS Regulation specifies that adequate control measures are required if noise levels "exceed an 8-hour noise level equivalent of 85 dB(A)…or peak at more than 140 dB(C)". In those circumstances, measurements must be made in accordance with the relevant Australian Standard[***]. When shift lengths exceed 8 hours the noise level equivalent needs to be adjusted to take into account the longer hours.

Vibration causing musculoskeletal conditions

Known risk factors of vibration

Vibration is a very common exposure for miners. Exposure occurs via vehicles and power tools. The repetitive vibration and associated recurrent small movements are a known risk factor for various musculoskeletal conditions, with vehicle vibration particularly associated with injuries of the lower back and neck, and power tools associated with conditions of the upper limb.

[***]Standards Australia (1998). AS/NZS 1269.1:1998 Occupational noise management Part 1: Measurement and assessment of noise emission and exposure. Standards Australia, Sydney.

Vibration assessment should only be carried out by competent people

Assessment of vibration is difficult and should only be conducted by occupational hygienists (or sometimes other OHS professionals) with considerable experience in vibration measurement. Control of risks arising from vibration is usually best achieved by selecting equipment designed to minimise vibration and by decreasing external sources of vibration, such as rough road surfaces, where possible.[†††]

Diesel exhaust fumes leading to respiratory disease

Risk of diesel exhaust fumes

Miners have potentially significant exposure to diesel exhaust fumes, primarily from vehicles. This is the case for both open cut and underground miners, particularly the latter, and for both coal miners and non-coal miners. Diesel exhaust consists of small particulate matter, carbon monoxide, carbon dioxide and oxides of nitrogen, plus other substances. Organic compound molecules, including polyaromatic hydrocarbons, are absorbed onto the particulate. Diesel engine exhaust is classified as being probably carcinogenic to humans. Lung cancer and bladder cancer are the two cancers most strongly associated with exposure to diesel engine exhaust.

Control of diesel exhaust fumes is usually achieved by selecting equipment which minimises exhaust output, optimising the use of diesel-powered equipment and having adequate ventilation.

Hazardous substance exposure causing dermatitis

Understanding Dermatitis

Occupational contact dermatitis is a condition of the skin resulting from exposure to substances that come into contact with the skin. It may be primarily irritant or inflammatory in nature. The hands are usually the most commonly affected area of the body, but the condition can occur on the skin of any part of the body that comes into contact with the causative substance. It can be particularly a problem on the feet of miners because they spend so long wearing boots, often in moist conditions. Occupational dermatitis is often persistent and difficult to treat.

Exposures leading to occupational dermatitis are usually controlled by limiting skin contact with hazardous substances (such as through wearing gloves at appropriate times), providing adequate shower facilities and prompt treatment of dermatitis that does develop.

Ergonomic stressors causing musculoskeletal conditions

Factors that contribute to musculoskeletal conditions

Mining workers are commonly exposed to a wide range of body stressors in much of their work. Underground miners in particular are often called upon to work in awkward positions and to work with their hands above their heads, postures known to be associated with increased risk of developing musculoskeletal conditions. Much of this exposure is unavoidable without appropriate mechanisation, emphasising the need for proper control measures to be in place in order to minimise the likelihood and extent of any musculoskeletal conditions that might result.

[†††]See Australian Standard (AS) 2670.1-2001 Evaluation of human exposure to whole-body vibration. Part 1: general requirements.

Vibration and jarring can also result in musculoskeletal conditions. Recurrent kneeling and squatting, possibly associated with lifting, in miners has also been associated with osteoarthritis of the knee.

Eliminating ergonomic stressors

Control of ergonomic stressors leading to musculoskeletal conditions usually requires careful assessment and modification of the ergonomic aspects of work tasks, and adoption of mechanised processes where possible and appropriate. Where possible, the workplace and equipment should be designed in such a way as to eliminate ergonomic stressors. Where this is not possible, systems of work are required which minimise the risk to health. Approaches that can help to achieve this include modifying the design of the workplace, the equipment or the task; using mechanical aids; and training workers adequately.

Ergonomic stressors causing back conditions

Assessment and modification of ergonomic aspects may reduce exposure

Mining workers are commonly exposed to a wide range of body stressors in much of their work. Much of this work involves moving heavy loads and, particularly in underground mines, this may involve using awkward movements or postures. These circumstances predispose to the occurrence of back conditions such as lumbar disc protrusion, lumbar (and cervical) nerve root irritation, and non-specific back pain. Vibration and jarring can also result in back conditions.

Control of ergonomic stressors causing back conditions usually requires careful assessment and modification of the ergonomic aspects of work tasks, and adoption of mechanised processes where possible and appropriate.

Ergonomic stressors causing fatigue and related conditions

Minimising occurrence of work related fatigue

Fatigue is a condition in itself and also predisposes to the occurrence of physical and psychological conditions, as well as increasing the risk of injury related to work. The transition to long shifts and prolonged periods of continuous work in some areas of the mining industry is likely to have increased the incidence of fatigue and associated physical and mental conditions in the mining industry in recent years. This problem remains an area of concern in Australian mining.

Operators are required to have a plan that minimises the occurrence of work-related fatigue, that addresses the risks associated with fatigue, and that addresses the risks associated with shift work. There are no strict guidelines available to use when controlling fatigue in miners. However, the general principle to follow is try to avoid multiple, successive, long shifts; to provide an adequate break between shifts and between sets of shifts; and to avoid as much as possible long periods of driving before and after prolonged shifts. In particular, it is important to ensure there is enough recovery time between shifts to allow appropriate sleep and rest.

Psychosocial hazards causing psychological conditions

Unwanted outcomes of psychosocial hazards to be controlled

Psychosocial hazards and associated psychological conditions can arise in the mining industry due to work organisation factors, exposure to serious injury of the worker or a colleague, long working hours, shift work, and prolonged stretches working away from family and friends in remote places. One specific unwanted outcome of these psychosocial hazards can be alcohol and drug-related conditions. The extent of alcohol and drug use in association with mining is not known and it is not clear if alcohol use within the mining industry is an important problem or not. However, it is reasonable to assume that a considerable proportion of miners in remote places could be at risk of having an excessive alcohol intake.

There are no strict guidelines available to use when controlling psychosocial hazards related to mining work. Psychological testing has not been proven to be of benefit. It is reasonable to assume that psychosocial hazards are likely to be more of a problem in remote mining areas and in work circumstances that require miners to spend a lot of time away from their home. Voluntary, confidential employee assistance programs are often considered to be of benefit in this area. The role of critical stress debriefing programs is less clear.

Ultraviolet and ionising radiation

Sunlight and welding are UV risks

Ultraviolet radiation from the sun is known to increase the risk of developing skin cancer and is potentially an important skin cancer risk factor for above ground mining workers, particularly for melanoma. Miners can also be exposed to ultraviolet radiation from other sources such as welding equipment. Ultraviolet radiation can also result in eye disease such as cataracts.

The main forms of control of exposure to ultraviolet radiation from the sun are to limit work at times of peak exposure and for outdoor workers to wear a hat, long-sleeve shirt and sun-glasses, and to use sunscreen. For welding, appropriate goggles or face shield and appropriate clothing are the main control measures.

There are also sources of ionising radiation in some mining procedures. The sources include radioactive materials used to measure flows, and x-ray devices. Shielding and limiting personnel from areas where exposure is possible are the main forms of control measure and usually work effectively. Formal exposure monitoring, either personal or environmental, may also be required in certain circumstances.

Other hazardous substances

Hazardous substances have specific control approaches

Hazardous substances must be adequately controlled. Most information relevant to the definition and control of hazardous substances is contained in various National Occupational Health and Safety (NOHSC) documents (see the documents listed in the Resources section below under the heading “Hazardous substances”). The risk management plan approach to hazardous substances must include consideration of Material Safety Data Sheets; labeling of containers; prohibition of certain hazardous substances in specific circumstances; and aspects such as health surveillance, record keeping and

reporting that are relevant to other sections of this Health Management document. Some work processes involving hazardous substances and that may be undertaken on mine sites (such as welding, spray painting and lead work) have specific control approaches that must be used.

NOHSC (1995) Code of Practice

Assessment and control measures for asbestos and asbestos-containing substances must be consistent with the document NOHSC (1995). Code of Practice for the Management and Control of Asbestos in the Workplace NOHSC (1995). *Code of Practice for the Management and Control of Asbestos in the Workplace [NOHSC: 2018 (2005)]*. AGPS, Canberra.

Atmospheric contaminants

Contaminant to be controlled

An atmospheric contaminant is:

- Hazardous substances that occurs in the form of a fume, mist, gas, dust or vapour; or
- An asphyxiant; or
- Other dust (which may be respirable or inspirable).

In particular, in the New South Wales mining setting, respirable silica and coal dust are important hazards that must always be well controlled.

For many atmospheric contaminants, ventilation will be one of the control measures employed. When designing and operating ventilation, it is important to locate the ventilation as close to the source as possible; operate the ventilation whenever the contaminant is likely to be present; and clean the ventilation equipment regularly.

Most atmospheric contaminants will have an exposure standard – a concentration level which must not be exceeded. Control measures must be in place to ensure that these concentration levels are not exceeded. These standards are set at national level (currently by Australian Safety and Compensation Council) and can be accessed in a hard copy publication or via the internet. Publications listing the standards and their interpretation are listed in the Resources section below under the heading “Airborne contaminants”. These are the publications specifically referred to in the Regulations. In addition, the Regulations specify separate additional standards for inspirable synthetic mineral fibre dust (currently 2 mg/m 3 (TWA) (as long as the respirable dust standard is not exceeded)) and of dusts not otherwise classified (currently 10mg/m 3 (TWA)).

Resources

Risk assessment and risk management

WorkCover NSW (2001). *Risk assessment. Code of practice 2001.* WorkCover NSW, Sydney.

WorkCover NSW (2001). *Risk management at work – guide 2001.* WorkCover NSW, Sydney.

Joy J, Griffiths D (2007). *National minerals industry safety and health risk assessment guideline.* Minerals Council of Australia, Canberra.

NSW Department of Primary Industries (1997). MDG 1010. Risk Management Handbook for the Mining Industry, Industry & Investment, Orange

Industry & Investment (1997). MDG 1014. Guide to Reviewing a Risk Assessment of Mine Equipment

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Hazardous substances

WorkCover NSW (2006). *Control of workplace hazardous substances. Code of practice 2006.* WorkCover NSW, Sydney.

NOHSC (1999). *List of designated hazardous substances* [NOHSC:10005(1999)]. AGPS, Canberra.

NOHSC (2004). *Approved criteria for classifying hazardous substances* [NOHSC: 1008 (2004)]. AGPS, Canberra.

ASCC (2007). *National code of practice for the control of workplace hazardous substances* [NOHSC:2007(1994)]. AGPS, Canberra.

NOHSC (1994). *Guidance note for the assessment of health risks arising from the use of hazardous substances in the workplace* [NOHSC:3017(1994)]. AGPS, Canberra.

NOHSC (2005). *Code of practice for the management and control of asbestos in workplaces* [NOHSC: 2018 (2005)]. AGPS, Canberra.

NOHSC (1994). *National code of practice for the labeling of workplace substances* [NOHSC:2012(1994)]. AGPS, Canberra.

NOHSC (2003). *National Code of Practice for the Preparation of Material Safety Data Sheets 2nd Edition* [NOHSC:2011(2003)]. AGPS, Canberra.

Airborne contaminants

NOHSC (1995). *Adopted national exposure standards for atmospheric contaminants in the occupational environment* [NOHSC:1003(1995)]. AGPS, Canberra.

NOHSC (1995). *Guidance Note on the Interpretation of Exposure Standards for Atmospheric Contaminants in the Occupational Environment* [NOHSC:3008(1995)] 3rd Edition. AGPS, Canberra.

Ergonomic hazards

ASCC (2007). National standard for manual tasks [ASCC: 2007]. AGPS, Canberra.

ASCC (2007). *National code of practice for the prevention of musculoskeletal disorders from performing manual tasks at work* [ASCC: 2007]. AGPS, Canberra.

Australian Standard (AS) 2670.1-2001 Evaluation of human exposure to whole-body vibration.

Fatigue

WorkCover NSW (2008). Fatigue Prevention in the Workplace. WorkCover NSW, 2008.

Shaw A (2003). *Guideline on fatigue management*. Shaw Idea Pty Ltd, Victoria.

Baker A, Ferguson S (2004). *Work, design, fatigue and sleep*. A resource document for the minerals industry. Centre for Sleep Research, Adelaide.

Noise

NOHSC (2000). *National Standard for Occupational Noise* [NOHSC:1007(2000)]. AGPS, Canberra.

NOHSC (2004). *National Code of Practice for Noise Management and Protection of Hearing at Work* [NOHSC: 2009(2004)], 3rd Edition. AGPS, Canberra.

NOHSC (1991). *Control guide management of noise at work* [NOHSC: 1991]. AGPS, Canberra.

Other

ASCC (2006). Guidance on the principles of safe design for work [ASCC: 2006]. AGPS, Canberra.

ASCC (2006). *National Standard for Synthetic Mineral Fibres* [NOHSC:1004(1990)] and *National Code of Practice for the Safe Use of Synthetic Mineral Fibres* [NOHSC:2006(1990)]. AGPS, Canberra.

Coal services health and safety trust research reports, and specifically:

Davies B, Glover D, Manuell R (2004). *Keeping coal miners healthy at work: an occupational hygiene manual for the coal mining industry.* Coal Services Health and Safety Trust, Sydney.

7. Exposure monitoring

Introduction

Exposure monitoring program monitors risk

Mining work involves potential exposure to many health hazards. If these hazards are not well controlled, workers may be at considerable risk of developing ill health related to the hazards. It is therefore necessary for mine management to ensure that hazards are well controlled. This is usually best achieved by applying the control hierarchy, as previously described. Where the hazard cannot be eliminated, it is important that management be confident that the exposure control mechanisms in place are functioning properly and to have systems in place that will identify when the exposure control mechanisms are not sufficient and thus require modification. The OHS Regulations define monitoring as *"to survey regularly all measures used to control atmospheric contaminants in a place of work".* Other types of monitoring (e.g. noise, blood lead) are also required in certain circumstances. The operation, through its risk assessment, should identify what should be monitored and establish a monitoring program as part of its health management strategy. This involves understanding what needs to be monitored, establishing an appropriate monitoring system, and comparing the results of the monitoring program to appropriate standards. When extended shifts are worked the exposure standard needs to be adjusted to take into account the longer shift.

High priority contemporary exposures

The recent report on priority contemporary exposures and conditions in NSW mining identified a range of exposures that should be the focus for exposure monitoring. For some of these the monitoring should be straightforward. For others, there are no simple monitoring systems. The high priority contemporary exposures are:

- Noise causing noise-induced hearing loss;
- Vibration causing musculoskeletal conditions;
- Diesel exhaust fumes leading to respiratory disease;
- Hazardous substance exposure causing dermatitis;
- Ergonomic stressors causing musculoskeletal conditions;
- Ergonomic stressors causing back conditions;
- Ergonomic stressors causing fatigue and related conditions
- Psychosocial hazards causing psychological conditions; and
- Ultraviolet radiation and skin disease.

Control of silica dust to be maintained

In addition to these exposures, there are a number of other exposures which have a lower overall priority because they are less of a contemporary issue (many of these are already likely to be well controlled) but which must, or should be, the subject of regular monitoring (see Appendix 1). In New South Wales, respirable levels of silica and coal dust are now well controlled, but only because significant resources continue to be allocated to ensure that this is the case. The frequency of monitoring depends on the manner in which exposure occurs, the degree to which work processes can be expected to result in consistent exposure levels or variable exposure levels, the likelihood that exposure levels near the standard might occur, and the severity of the health

effect that might occur as a result of excessive exposure. Relevant standards are regulated and gazetted and the results of the monitoring program must be compared to these.

Requirements

Mines required to monitor significant hazard exposure

The specific hazards that require formal monitoring will depend on the mining operation. In simple terms, mines are required to monitor any significant hazard to which workers are, or are likely to be, exposed in the course of their mining work. The more common and important of these hazards are shown in Box 1, but note that this list is not exhaustive.

Box 1: Hazards likely to be involved in at least some mining operations

Noise
Heat and cold (particularly heat in open cut and some underground mines)
Ionizing radiation
Vibration
Coal dust
Silica
Asbestos
Diesel exhaust, including diesel particulate matter
Lead
Other airborne particles
Other carcinogenic substances
Other hazardous chemicals
Atmosphere in confined spaces
Manual handling

Record and provide results

Where atmospheric monitoring does occur, it is important that the:

- measurement be done appropriately;
- results are recorded;
- results are provided to exposed workers; and
- results are easily accessible to persons who are exposed or potentially exposed.

Valid and reliable monitoring approaches are available for only some of these hazards. Those hazards important to a health risk assessment (as opposed to a safety risk assessment) are considered here.

Noise

As mentioned, monitoring of noise exposure is straightforward, with portable noise meters available to allow noise levels in specific mining tasks to be measured, either individually or through conducting a noise survey. Measurements must be made in accordance with the relevant Australian Standard (*AS/NZS 1269.1:1998 Occupational noise management Part 1: Measurement and assessment of noise emission and exposure*).

Vibration

Measuring vibration

Monitoring of vibration is difficult and should only be conducted by occupational hygienists (or sometimes other OHS professionals) with considerable experience in vibration measurement. Vibration would not normally be monitored through regular routine measurements. Formal measurements that are undertaken would usually be targeted measurements of tasks or situations that were suspected of being high risk, or to assess the success of control measures that have been implemented.

Diesel exhaust fumes leading to respiratory disease

Monitoring diesel exhaust in enclosed workspaces

Monitoring of diesel exhaust should be undertaken when diesel equipment is used in enclosed workplaces (such as underground) or in other circumstances where excessive levels might be expected to develop. There is no formal exposure standard for diesel particulate but the Australian Institute of Occupational Hygiene recommends a standard of 0.1 mg/m^3 for diesel particulate (measured as elemental carbon less than one micron).

Other hazardous substances

Standards for monitoring airborne substances

Dusts such as coal, silica, asbestos and other airborne dusts can be easily monitored using standard methods.

Under the NSW *Coal Mine Health and Safety Act 2002* (CMHSA) and the NSW *Coal Mine Health and Safety Regulations* 2006 (CMHSR), dust monitoring is explicitly required (the standard for respirable coal dust is 2.5 mg/m^3 (depending on the silica content)). This includes having arrangements in place for *"regular collection and analysis of samples, by a licensed person independent of the operation, of airborne dust from the breathing zone of people whose health may be affected by the dust"*. Regulations also specify that monitoring of methane, carbon monoxide, carbon dioxide and oxygen must take place at least every 35 days.

Asbestos must be measured as specified in the relevant Code of Practice (NOHSC (2005). *Code of Practice for the Management and Control of Asbestos in the Workplace* [NOHSC: 2018 (2005)]. AGPS, Canberra). Other hazardous substances that can be present in the atmosphere and which have an exposure standard must be monitored as appropriate.

Monitoring exposure by a licenced person

Regulations require certain monitoring to be undertaken only by a licenced person. This licence is given by the Chief Inspector. Activities requiring a licence include sampling and analysis of airborne dust (Coal Services Pty Ltd is recognised as licensed to sample and analyse airborne dust), and sampling and analysis of diesel engine exhaust.

Other hazards

There is no recommended on-going monitoring approach for hazardous substance exposure causing dermatitis; ergonomic stressors causing musculoskeletal conditions; back conditions or fatigue; psychosocial hazards causing psychological conditions; or ultraviolet radiation from sunlight.

Resources

Coal services environmental monitoring group.

NOHSC (1995). *Adopted national exposure standards for atmospheric contaminants in the occupational environment [NOHSC:1003(1995)].* AGPS, Canberra.

NOHSC (1995). *Guidance Note on the Interpretation of Exposure Standards for Atmospheric Contaminants in the Occupational Environment [NOHSC:3008(1995)]* 3rd Edition. AGPS, Canberra.

ASCC (2007). *National code of practice for the control of workplace hazardous substances [NOHSC:2007(1994)].* AGPS, Canberra.

NOHSC (1994). *Guidance note for the assessment of health risks arising from the use of hazardous substances in the workplace [NOHSC:3017(1994)].* AGPS, Canberra.

NOHSC (2005). *Code of practice for the management and control of asbestos in workplaces [NOHSC: 2018 (2005)].* AGPS, Canberra.

NOHSC (1994). *National code of practice for the labeling of workplace substances [NOHSC:2012(1994)].* AGPS, Canberra.

NOHSC (2000). *National Standard for Occupational Noise [NOHSC:1007(2000)].* AGPS, Canberra.

NOHSC (2004). *National Code of Practice for Noise Management and Protection of Hearing at Work [NOHSC: 2009(2004)], 3rd Edition.* AGPS, Canberra.

NOHSC (1991). *Control guide management of noise at work [NOHSC: 1991].* AGPS, Canberra.

NOHSC (1990). *National Standard for Synthetic Mineral Fibres [NOHSC:1004(1990)] and National Code of Practice for the Safe Use of Synthetic Mineral Fibres [NOHSC:2006(1990)].* AGPS, Canberra.

WorkCover NSW (2006). *Control of workplace hazardous substances. Code of practice.* WorkCover NSW, Sydney.

8. Training and information

Introduction

Adequate training to be provided

A key aspect of any good health management plan and associated strategy is the provision of adequate information and training for workers in relation to all aspects of work activities that might affect their health. Some training is specified under legislation and there is an obligation on the employer that workers be informed of hazards and associated risks that exist and properly trained in methods to control those risks.

Requirements

Adequate risk assessment

An employer is required to provide adequate induction training to all new employees and adequate training on an on-going basis in relation to the risks to which the workers may be exposed and the control measures in place to control those risks. This means that an adequate risk assessment must have been undertaken to allow the workers to be appropriately informed.

Workers and management appropriately trained

The training plan and strategy should ensure that:

- new employees receive induction training;
- affected employees receive training when there are changes in the workplace such as engineering changes or new hazardous substances are introduced;
- workers and management are trained on how to properly include health issues in all OHS management plans;
- persons with responsibilities are appropriately trained on how to carry out their roles and responsibilities;
- all persons are provided with the information necessary to be able to safely and effectively carry out their work; and
- workers are trained in safe operating procedures.

Workers must be involved in the development of safe operating procedures or safe methods of work and must be trained appropriately to allow them to have input into this development.

9. Supervision

Introduction

The provision of appropriate supervision is an essential part of any adequate health management plan.

Requirements

Supervisors must be trained appropriately

Legislation requires proper supervision of employees and contractors.

The level and type of supervision that is required needs to be determined, developed and implemented as part of the health management plan.

Supervisors must be trained in their responsibilities and how to carry them out.

10. Health surveillance

Introduction

Health surveillance whenever a worker is at risk

Health surveillance involves monitoring the health of workers to identify health issues at an early stage so that further health problems can be prevented or minimised, and to provide evidence that the control systems in place are properly protecting the health of workers[‡‡‡]. Common examples are audiometry to monitor the effects of noise and monitoring blood lead levels in persons potentially exposed to significant levels of lead. Health surveillance is only of use when it is possible for medical examination or investigation to identify health issues of concern. In general, some form of health surveillance should take place whenever a worker is exposed to a hazard at a level that can be reasonably expected to result in ill health. The purpose of this aspect of the health management plan is for the operation to determine and schedule the surveillance requirements, taking into account legislative requirements and those additional requirements of the operation. This must then be incorporated into the health management strategy and the overall health and safety management plan.

Requirements

Legislation requires health surveillance where there is risk exposure

In certain circumstances, legislation requires health surveillance to take place when there is a risk to the health of workers from exposures. The legislation also specifies the minimum surveillance approaches that must be undertaken. In addition, there are more general requirements for health surveillance - according to the OHS Regulations (section 165), *"…an employer must provide health surveillance for each employee who is exposed to a hazardous substance if there is a risk to the health of the employee as a result of that exposure…"*. Typical hazards in mining that require health surveillance are shown in Box 1 in the section on exposure monitoring.

The NOHSC guidelines for health surveillance provide specific information for health surveillance of workers exposed to asbestos and crystalline silica, and regulations provide information on the minimum requirements for health surveillance for each of the hazardous substances specified in legislation[§§§].

Identify appropriate testing

As examples, in brief, for asbestos, the minimum requirements are occupational and demographic data, medical interview and records of personal exposure; for silica, the minimum requirements are completion of a standardised respiratory questionnaire, standard respiratory function tests and chest x-ray; and for lead the minimum requirements are a medical and occupational history and a physical examination.

[‡‡‡] Health surveillance is formally defined as "the monitoring of persons to identify changes (if any) in their health due to exposure to a hazardous substance, and includes biological monitoring, but does not include the monitoring of atmospheric contaminants." in the OHS Regulations 2001 (section 145).

[§§§] See the Regulations at http://www.legislation.nsw.gov.au/maintop/scanact/inforce/NONE/0.

Legislation may require a medical practitioner to assess and or supervise

The approach to health surveillance should be risk-based, so a particular operation might also have identified other health conditions that require health surveillance and this should guide the health surveillance approach that is incorporated into the health management plan and that is implemented via the health management strategy. The plan should identify appropriate intervals for the testing and, where health surveillance takes place, legislation requires it to be conducted by, or under the supervision of, an authorised medical practitioner[****]. All records relating to health surveillance are subject to the requirements of the Privacy Act.

Biological monitoring may be appropriate in certain circumstances

Biological monitoring

Biological monitoring is not likely to be required, or of use, in most areas of mining. However, in certain circumstances (such as workers likely to be exposed to lead) monitoring will either be required or desirable.

Biological monitoring is *"…the measurement and evaluation of hazardous substances or their metabolites in the body tissues, fluids, or exhaled air of a person."* (OHS Regulations 2001 (section 145). The regulations require that *"an employer must provide biological monitoring for an employee if there is a reasonable likelihood that the employee could be exposed to levels of a hazardous substance that could be a risk to health and an effective procedure for the biological monitoring of those levels is available."* (OHS Regulations 2001 (section 165).

Advice regarding the role, scope, conduct and interpretation of a biological monitoring program would normally be provided by an Authorised Medical Practitioner.

Desirable approaches

In addition to the surveillance required by legislation, it would be usual to have an audiometry program to monitor for early signs of noise-induced hearing loss.

Resources

NOHSC (1005). *Guidelines for Health Surveillance* - NOHSC:7039(1995). AGPS, Canberra.

Coal Services Health Group

[****]The OHSR 2001 defines an authorised medical practitioner as a "…medical practitioner authorised by WorkCover, or authorised by another body or under a scheme approved by WorkCover, to perform health surveillance for the purpose of this Regulation."

11. Illness management and rehabilitation

Introduction

This chapter considers the management and rehabilitation of workers who develop ill health as a result of work-related exposures.

Requirements

Obligation to provide rehabilitation

Under the Workers' Compensation legislation, the employer has an obligation to provide appropriate rehabilitation and suitable duties for persons returning to work after a work-related injury and illness.

Desirable approaches

Early intervention and early return to work

It is in the interests of the worker and the employer that a person who has developed a health injury and illness due to a work-related exposure be provided medical and ancillary services to enable them to return to their previous level of functioning (or as close to it as possible) as soon as possible. Workers who have been off work for a considerable period of time will often need alternate duties when they first return to work and the employer should endeavor as much as possible to provide suitable duties that can be undertaken. Key aspects of an effective rehabilitation program are early intervention and early return to work. The rehabilitation and return to work process is often best managed by a formal rehabilitation provider in consultation with a physician. The injured worker may choose a support person to be involved in the return to work process that may be a fellow worker, friend, family member or union representative.

Guidance on approaches to rehabilitation and return to work is available from WorkCover New South Wales, Coal Services and from other sources.

Resources

NOHSC (1995). *Guidance note for best practice rehabilitation management of occupational injuries and disease* [NOHSC:3021(1995)]. AGPS, Canberra.

WorkCover New South Wales accredited rehabilitation providers

Coal Services

12. Health and wellbeing

Introduction

This chapter considers other aspects of a health management plan related to the health of workers.

Requirements

Encourage good health and wellbeing in the workplace

The health management plan should focus on ensuring the health of workers and visitors by minimising the risks resulting from workplace exposures. A key principle of this requirement is to recognise the importance of being healthy for the wellbeing and productivity of workers. This outcome may be further enhanced by the integration of workplace health management plans and safety management systems to achieve a workplace that encourages good health and wellbeing and is as safe as reasonably possible for all workers.

To support the health and wellbeing of workers and visitors provision of appropriate amenities, such as sanitation and access to potable water are be provided[♀♀♀♀].

Desirable approaches

Access for workers to employee assistance programs encouraged

In any health management plan, consideration should be given to education and assistance in other areas such as health, fitness, wellbeing, nutrition, etc. Many organisations in a range of industries provide access for workers to employee assistance programs. Often the workers' immediate family is also given access to such programs. The programs are designed to provide confidential counseling and related services for health problems not related directly to work, with the intention that workers will be happier, healthier and more settled. Issues such as smoking, alcohol and drug use, and relationship difficulties are commonly addressed by such programs. An additional benefit of participation in the programs is thought to be that participation in the program will better equip workers to perform their job, thereby improving productivity, and result in the workers being more committed to remaining in their job. However, not all workers will want to participate in employee assistance programs and a key aspect of all such programs is that they be voluntary.

[♀♀♀♀]WorkCover NSW has a workplace amenities code of practice that may be referred to for further information.

13. Records management

Introduction

Records required to meet legal obligations

The keeping of appropriate records is an important part of health risk management. Certain records are also required to meet legal obligations. These records may include the health management program; results of exposure monitoring and health surveillance; significant exposure events; adverse health events thought to be related to work; and other appropriate records.

Requirements

Personal records kept confidential

All records need to be kept in a secure place and in accordance with the Privacy Act. This means that all records relating to risk assessment should be available for inspection by employees who may be exposed to the hazards considered in the risk assessment. Health surveillance records must be kept confidential, but employees may request a copy of their own health surveillance record and any environmental monitoring record that is relevant to them.

Records kept for the appropriate time frame

Certain types of records must be kept for a minimum number of years. For example, under relevant legislation, records relating to training in relation to hazardous substances must be retained for at least five years, whereas records relating to health risk assessments that indicate atmospheric monitoring or health surveillance are needed must be retained for at least 30 years. If the operation ceases, the health and safety records must be offered to the relevant regulator for storage.

Information on work-related disease and injury should be recorded using the relevant Australian Standard (AS 1885.1 – listed in the Resources section below).

Record analysis and improvement

Records should be stored in a database that allows analysis and there should be a system in place to allow on-going analysis and improvement of records management. Systems should be in place to allow on-going auditing to verify that adequate and effective security systems are in place to manage records.

Resources

Standards Australia (1990). Australian Standard AS 1885.1—1990, Measurement of occupational health and safety performance—Describing and reporting occupational injuries and disease. Standards Australia, Sydney.

14. Reporting

Introduction

Reporting to the appropriate authority

Certain aspects of health risk management and outcomes should be reported to the relevant OHS authority and insurance scheme as appropriate, and certain aspects are required to be reported. Internal reporting systems must also be in place to support the management of health risks to workers.

Requirements

Reporting any incident with a reasonable risk of serious injury or illness

Occupational health and safety and mine-specific safety regulations stipulate a number of occurrences that must be reported to the relevant OHS authority (which for mining would usually be Industry & Investment NSW, but would sometimes be the WorkCover Authority). Essentially, any incident that carries a reasonable risk of resulting in a serious injury or illness of a worker must be reported to the OHS authority.

Incidents that result in lost time injuries or illness of greater than seven days must be reported to the relevant authority. There are also requirements for the notification of high-risk work, including those that may involve lead or the risk of exposure to carcinogenic substances or asbestos. Notwithstanding these requirements, all compensable matters must be reported to the relevant insurer. Other requirements for reporting may also exist. Exceedances of limits as specified in legislation must also be reported to the relevant OHS authority. Systems must be in place to ensure this reporting occurs.

Effective systems for internal reporting

In addition to reporting to regulatory authorities, mines should have effective systems in place for internal reporting. The results of the monitoring of health surveillance and high-risk exposures should be reported to both management and employee representatives. The effectiveness or failure of control systems (for example personal protective equipment) identified through reporting should prompt remedial action.

Reporting will help support supervision of people and systems and provide indicators for the evaluation and review of risk management systems.

Resources

Industry and Investments – Mine Safety website

15. Evaluation and performance monitoring

Introduction

Ongoing performance monitoring

An essential part of a health management plan is the on-going performance monitoring and evaluation of the success of the plan in controlling risks associated with work and in minimising adverse health effects arising from work. This monitoring and evaluation can have several forms. Exposure monitoring and health surveillance (considered in other chapters) are both forms of monitoring relevant to evaluating the performance of the plan. These are special aspects of two important monitoring approaches that use lag indicators and lead indicators.

Lag indicators

Lag indicators are indicators of the ultimate success or failure of the plan by monitoring illnesses that the plan was designed to minimise or prevent. Typical lag indicators are measures of the number or rate of identified work-related illnesses reported by workers or identified in workers. They are useful because they give a clear and direct measure of the success or failure of the control mechanisms in place. Examples include the number of workers' compensation claims (overall or for a particular illness) or the number of workers with documented noise-induced hearing loss. However, lag indicators have shortcomings because they only provide information about the performance of the control systems once a worker's health has been adversely affected. This is particularly a problem for conditions which take time to develop. In some conditions (e.g. silicosis) there may be many years between first exposure and the development of symptoms or signs of ill health. This means that there is no quick feedback on the success of the control measures and so no prompt activity to correct any shortcomings with the control measures. In addition, the health outcomes being monitored can be expected to occur infrequently, so the measure is not very sensitive to change.

Lead indicators

For these reasons, it is useful to include so-called lead indicators in the measures used to monitor the operation of the plan. Lead indicators (sometimes called 'positive performance measures') are measures of aspects of the risk control approach, rather than measures of the level of health of the workers. They can be measured at any time and so do not require worker ill health to provide useful information, which is their main advantage over lag indicators. They provide information on the operation of aspects of the plan and are likely to be more responsive to changes in the work environment and to the way work is undertaken. Examples include the number or rate of exposure measures that exceed the relevant standard (or exceed, say, 50% of the relevant standard); the proportion of workers attending an induction session before commencing work; the number of hazardous substances for which an up-to-date Material Safety Data Sheet is available; and so on.
Lead indicators therefore focus on processes and activities related to risk management, whereas lag indicators focus on the outcomes which the risk management program is designed to prevent – work-related illnesses in the workers. Lead indicators have the disadvantage that they are not direct measures of the success or failure of the risk management process because

they are not measures of worker health. If there is a direct link between the measure and the relevant health outcome, as is the case with exposure monitoring, this is usually not a problem. However, if the connection is more indirect, as is the case for many lead indicators, they can become measures of activity and "busy-ness" rather than being measures of useful activity.

Requirements

Plan to be auditable

All appreciable risks are required to be adequately controlled and monitored, so some form of on-going monitoring and evaluation of the health management plan is required. Plans must be able to be audited and assessed by appropriate authorities. Therefore, the plans must be structured in a way that allows the plans to be evaluated and monitored.

Desirable approaches

Lag indicators provide only a broad indication of success

The most typical lag indicator would be the number or rate of accepted compensated claims for illnesses, and the type of illnesses involved. This indicator is easy to measure but provides only a broad indication of the success or shortcomings of any risk management program. Other lag indicators that might be used include the number or rate of workers presenting for treatment of apparently work-related illnesses.

Consider and identify lead indicators where appropriate

There are no standard lead indicators recommended for use in the mining industry. Some lead indicators are likely to be useful across much of the mining industry. Other useful indicators might only be relevant to particular enterprises or particular sites. It is appropriate that lead indicators be identified and considered as part of the process of developing a health management plan. However, in developing these indicators, it is important that the reliability, validity and usefulness of these indicators be considered. This is because the use of invalid indicators could result in wrong conclusions being reached about the success or shortcomings of the health management plan.

Lead indicators should be developed for specific work sites

The key characteristics of a good lead indicator are along the following lines. A lead indicator should:

- accurately measure the parameter being monitored;
- be easily understood by users;
- be simple to collect;
- be able to allow a response to influence the outcome;
- be reproducible; and
- readily relate to the aspect that is the focus of the control and/or goals in place. ‡‡‡‡

It is important that lead indicators are developed for specific work sites because an indicator that is useful for one site may be meaningless for another. Two useful publications that describe the approach to use to develop lead indicators in the mining industry are listed in the Resources section below.

‡‡‡‡ Based on: Minerals Council of Australia (2001). *Positive performance measures – a practical guide.* Minerals Council of Australia, Canberra

Resources

The Chamber of Minerals & Energy Western Australia (2004). *Guide to positive performance measures in the Western Australian minerals and resources industry.* CMEAWA, Perth.

Minerals Council of Australia (2001). *Positive performance measures – a practical guide.* Minerals Council of Australia, Canberra.

Appendix 1

Priority exposures and conditions

Table 1 Intensity, frequency, latency, severity, priority and key sector for main exposures and conditions[1].

Exposure	Condition	Intensity[1]	Frequency[2]	Latency[3]	Severity[4]	Priority[5]	Key sector[6]
Noise	Noise-induced hearing loss	High	Common	Long	Medium	High	All
Vibration	Musculoskeletal conditions	High	Common	Medium	Medium	High	All
Diesel exhaust fumes	Bronchitis/emphysema, lung cancer	Medium	Common	Medium	Medium	High	Underground
Hazardous substance exposure	Dermatitis	High	Moderate	Short / Medium	Low	High	All
Ergonomic stressors	Musculoskeletal conditions (including back pain)	High	Common	Medium	Medium	High	All
Ergonomic stressors (shift work)	Fatigue and related conditions	Medium	Common	Short & medium	Medium	High	All
Psychosocial hazards	Psychological conditions	Medium	Moderate	Short	Medium	High	All (particularly remote)
Ultraviolet radiation	Skin cancer, cataracts	Medium	Common	Long	Medium	High	Above ground
Asbestos-related respiratory disease	Asbestosis, lung cancer, mesothelioma	Low	Common	Long	High	Medium	All
Silica-related respiratory disease	Silicosis, lung cancer, bronchitis / emphysema	Low	Common	Long	High	Medium	All
Coal dust-related respiratory disease	Coal workers' pneumoconiosis, bronchitis / emphysema	Low	Common	Long	High	Medium	Coal

[1] From: Driscoll T (2007). Summary literature review of health issues related to NSW mining. Report for the Mines Safety Performance Branch. Industry and Investment. ELMATOM Pty Ltd, Sydney.

Exposure	Condition	Intensity[1]	Frequency[2]	Latency[3]	Severity[4]	Priority[5]	Key sector[6]
Hazardous substance exposure and asthma	Asthma	Medium	Moderate	Medium	Medium	Medium	All
Welding fumes and respiratory disease	Bronchitis / emphysema, fibrotic lung disease, ?lung cancer	Low	Occasional	Medium	Medium	Medium	All
Psychosocial hazards	Alcohol and drug-related conditions	Low	Occasional	Medium	Low	Medium	Remote
Thermal stress	Heat-related illness	Low	Uncommon	Short	Medium	Low	Remote western and underground
Synthetic mineral fibres-related respiratory disease	?Fibrotic lung disease	Low	Uncommon	Long	Medium	Low	All
Other hazardous substance exposure and other respiratory disease	Bronchitis / emphysema	Low	Occasional	Long	Medium	Low	All
Hazardous substance exposure and other conditions	Various	Low	Occasional	Various	Medium	Low	All
Biological hazards	Various infections	Low	Uncommon	Short	Low	Low	All
Ionising radiation	Malignancies	Very low	Occasional	Long	High	Low	Minerals sand mining

1: Intensity: the intensity of the exposure
2: Frequency: the frequency of exposure of miners
3: Latency: the period of time between first exposure and development of symptoms
4: Severity: the severity of the disease resulting from the exposure
5: Priority: the assigned priority of the exposure / issue
6: Key sector: the sector(s) for which the exposure / issue is particularly relevant and for which the priority is primarily proposed.

Appendix 2

Relevant acts and regulations

The key legislation relevant to occupational health and safety in mining is listed below, along with web addresses where the legislation can be found. The Acts and Regulations are also available from the I&I NSW website:

Occupational Health and Safety Act and Regulations

The *Occupational Health and Safety Act 2000* (NSW)

The *Occupational Health and Safety Regulation 2001*

Coal Mine Act and Regulation

The *Coal Mine Health and Safety Act 2002* (NSW)

The *Coal Mine Health and Safety Regulation 2006*

Coal Industry Act 2001

Mining Act and Regulation

The *Mine Health and Safety Act 2004* (NSW)

The *Mine Health and Safety Regulation 2007*

Appendix 3

Examples of policy statements

Two examples of policy statements used by mining operators are shown below[◊].

Health & Safety Risk Management Policy of Centennial Coal[‡]

Objective

- The Company's Objectives are:
- To create a workplace environment free of work related fatalities, injuries, and diseases.
- To support, encourage and promote efforts to achieve world class occupational health and safety performance.
- To eliminate or control circumstances which lead to injury, property damage and business interruption.

Health and safety beliefs

- Everyone has a responsibility for the health and safety of themselves and others
- Identifiable hazards should have their risks eliminated or controlled
- Every task, however urgent or important, should be done safely
- Health and safety performance can be improved
- Work related fatalities, injuries and diseases are preventable

Strategy

These objectives will be achieved by:

- Implementing adequate induction and on-going training of, instructions to and supervision for employees and contractors to assist them to carry out their tasks safely and efficiently.
- Planning, designing, installing, commissioning and operating fit for purpose equipment.
- Providing and maintaining a Safety Management System in accordance with AS4801 & AS4804 as an important part of the day to day business operations.
- Utilising systematic auditing procedures to measure and review the effectiveness of Safety Management Plans.
- Examining the Health and Safety Hazards in current and future operations, by adopting a defined risk assessment and elimination or control process to operations.

◊Note: These are examples only and other approaches may be taken. The New South Wales Government does not guarantee that the information is complete, current or correct and accepts no responsibility for unsuitable or inaccurate material that may be encountered. Users should always verify historical material by making and relying upon their own separate inquiries prior to making any important decisions or taking any action on the basis of this information.

‡See http://www.centennialcoal.com.au/ssl/axs/1/2.asp?recID=31.

The NSW Mining Industry Health Working Party thanks Centennial Coal for allowing their policy to be reproduced here.

DRAFT

Health & Safety Policy Of Xstrata Coal[§]

We aim to operate a safe workplace that is injury and fatality-free, and to enhance the well-being of employees, contractors and communities. To achieve this:

- we provide visible safety leadership, and appropriate leadership development and training at every level;
- we foster and maintain a positive safety culture, behaviour, and awareness;
- we identify and eliminate or mitigate safety, occupational and community health and hygiene hazards;
- we maintain operational integrity;
- we apply safe work systems and occupational and community health and hygiene programmes;
- we actively engage with and monitor contractors, suppliers and business partners so that they understand and respect our occupational and community health and safety standards;
- we encourage and support our people and the communities associated with our operations to participate in programmes which enhance their health and well-being;
- we report, manage and learn from injuries, illnesses and high potential incidents; and
- we prepare for and effectively respond to emergencies and crises.

[§]See http://www.xstrata.com/sustainability/policies/sd-framework/. The NSW Mining Industry Health Working Party thanks Xstrata Coal for allowing their policy to be reproduced here.

EXAMPLE

Appendix 4

The hierarchy of control

The hierarchy of control provides a set of approaches and principles that can be used to control hazards, with approaches at the top of the hierarchy to be considered before those further down the list. There are many forms of the hierarchy, but essentially the controls measures are similar. In descending order of preference, the control measures are as follows:

- elimination;
- substitution;
- isolation;
- engineering;
- systems of work;
- administrative approaches; and
- personal protection.

An example of the application of the hierarchy of control to the control of noise is shown below. This example is adapted from one presented by Safework SA*.

Eliminate the hazard

- If possible, remove the cause or source of the noise, by eliminating the machine, task or work process.

If this is not practical, then:

Substitute the hazard with a lesser risk

- Use a less-noisy machine for the task, or introduce a less-noisy work process.

If this is not practical, or in addition, then:

Isolate the hazard

- Separate the noisy process or equipment from the workers. This might be done by moving the equipment away from the workers by relocation, or by operating the equipment when few workers are nearby.

*See description at Safework web site

EXAMPLE ONLY

If this is not practical, or in addition, then:

Use engineering controls

- The source of the noise could be enclosed, or sound barriers put between the source and the workers.
- Sound damping and muffling equipment could be improved or maintained so it is as effective as possible.

If this is not practical, or in addition, then:

Use systems of work

- Work systems could be developed to ensure the equipment is used in ways that minimise the levels of noise and the number of workers nearby likely to be exposed to excessive levels of noise.

If this is not practical, or in addition, then:

Use administrative controls

- Develop and implement approaches to minimise the level of noise exposure. These could include job rotation and limitations on the length of time the noisy equipment is operated in a shift.
- Implement hearing protection zones and use appropriate signs to warn workers of noise risks.

If this is not practical, or in addition, then:

Use personal protective equipment

- Train workers in the appropriate use of hearing protection.
- Provide appropriate hearing protection equipment, making sure it is properly fitted and maintained.
- Supervise workers to encourage the use of hearing protection equipment where appropriate.

EXAMPLE

Appendix 5

Example of a risk matrix and an approach to risk management

Approach to health risk assessment developed by Xstrata Coal[♀♀,‡‡]

The information presented below is taken directly from, or heavily based on, parts of a report on an Xstrata Coal health risk assessment workshop conducted in 2005. Note that the information presented here is designed to illustrate the overall approach rather than to provide the entire risk assessment documented in the report. For this reason, only some of the report is presented here. The original report was prepared by Carmel Bofinger (Minerals Industry Safety and Health Centre, The University of Queensland) and is presented here with permission of Xstrata Coal.

The risk assessment process commenced by identifying two aspects of each risk. One aspect considered the worst feasible outcome of exposure to the hazard – the "Maximum Reasonable Consequence". The second aspect was the likelihood, or "Probability", that exposure to the hazard would occur. Each aspect was given a ranking out of five (numbers 1 to 5 for the Maximum Reasonable Consequence; letters A to E for the Probability). This produced 25 possible combinations of Maximum Reasonable Consequence and Probability. Each combination was allocated a number one to 25. These numbers provided a guide as to the overall level of the risk arising from a particular hazard. Low numbers represented high risk problems. High numbers represented lower risk problems. The numbers were stratified into three groups – High Risk, Medium Risk and Low Risk. Using this approach, each hazard can be classified and the relevant control approach prioritised based on the risk classification.

♀♀ The NSW Mining Industry Health Working Party thanks Xstrata Coal for allowing their risk management information to be reproduced here in modified form.

‡‡ Note: This is an example only and other approaches may be taken. The New South Wales Government does not guarantee that the information is complete, current or correct and accepts no responsibility for unsuitable or inaccurate material that may be encountered. Users should always verify historical material by making and relying upon their own separate inquiries prior to making any important decisions or taking any action on the basis of this information.

ARCHIVED

Maximum Reasonable Consequences

1. catastrophic impact – major permanent negative health impacts on a large number of people
2. severe negative impact – severe irreversible disability or impairment
3. major negative impact – severe health impacts on a number of people
4. negative impact – major impact on health of several people
5. minor negative impact - slight negative impact on individual health

Probability

A. **almost certain to happen** (everyday/weekly event)
>100% of OEL

B. **likely to happen at some point** (typically once a month)
50-100% of OEL

C. **moderate: possible** (typically once a year)
25 – 50% of OEL

D. **unlikely** (typically one every five years)
10 - 25% of OEL

E. **rare** (typically once every twenty five years,
<10% of OEL

Risk Classification

1 – 10	**High Risk**	(Red)
11 –19	**Medium Risk**	(Yellow)
20 –25	**Low Risk**	(Green)

Table 2 demonstrates the risk analysis matrix used.

Table 2 Risk analysis matrix

Maximum Reasonable Consequences	Probability				
	A	B	C	D	E
1	**1**	**2**	**4**	**7**	**11**
2	**3**	**5**	**8**	**12**	**16**
3	**6**	**9**	**13**	**17**	**20**
4	**10**	**14**	**18**	**21**	**23**
5	**15**	**19**	**22**	**24**	**25**

EXEMPLAR

The risk assessment process began with the identification of the hazards that needed to be considered (Table 3). Note that lifestyle health issues were considered in the risk assessment.

The risks associated with these hazards were assessed separately for both underground and surface operations and a risk ranking determined.

This ranking is summarised in Table 4 for all the identified hazards that had high or medium risks. Examples of the full risk assessment for a selection of hazards are shown in Table 5.

Control mechanisms and monitoring requirements for the high risk issues were then identified and suggested controls and monitoring for the higher ranked risks were developed. Examples of the identified controls and monitoring options for a selection of hazards are shown in Tables 6 and 7. These demonstrate the application of the hierarchy of control.

EXAMPLE

Table 3. **Health issues at Xstrata Coal identified at the workshop.**

Category of Health Hazard	Specific Health Hazard
Physical	Dust
	Noise
	Vibration
	Working on uneven ground/foot problems
Temperature	Heat/dehydration
	Cold
Radiation	Laser
	UV
	EMF
Hazardous substances	Chemicals
	Mine gases
	Diesel fumes
	Welding fumes
	Asbestos
	PCBs
Biological hazards	Untreated water
	Personal hygiene
	Tinea and fungal infections
	Bird and vermin
Ergonomics/manual tasks	Manual handling
	Workplace design/access and egress
	Static seating
Fitness for duty	Fatigue
	Stress management
	Aging workforce
Health and fitness	Back care
	Healthy lifestyle/bodies
	Vaccination/immunisations
	Foot care
	Vision screening
	Employee assistance program

UNCONTROLLED

Table 4 **High and medium health risks at Xstrata Coal as identified at the workshop.**

Health Hazard	Ranking	
	Surface operations	Underground operations
Physical		
Dust	14	1
Noise	3	3
Vibration	3	3
Working on uneven ground/foot problems	18	9
Radiation		
UV	3	9
Hazardous substances		
Chemicals		
- Red	5	8
- Orange	9	13
- Green	19	19
Mine gases	21	15
Diesel fumes	8	5
Welding fumes	8	8
Asbestos	12	12
PCBs	12	12
Biological hazards		
Untreated water	21	10
Tinea and fungus	14	14
Bird and vermin	18	18
Infectious Diseases	17	17
Ergonomics/manual tasks		
Manual handling	5	5
Workplace design / Access and egress	5	5
Static seating/ postures	6	5
Repetitive tasks	9	5
Fitness for duty		
Fatigue (time of day, hours of work, shift work)	9	9
Stress	5	5
Ageing workforce	9	9
Lifestyle/ lack of physical fitness	9	9

Table 5 **Ratings and risks for selected health hazards at Xstrata Coal as identified at the workshop.**

Health Hazard	Maximum reasonable consequence		Probability of exposure		Ranking	
	Surface operations	Underground operations	Surface operations	Underground operations	Surface operations	Underground operations
Physical						
Dust	4	1	B	A	14	1
Noise	2	2	A	A	3	3
Vibration	2	2	A	A	3	3
Working on uneven ground/foot problems	4	3	C	B	18	9
Temperature						
Heat/ dehydration	4	5	C	D	18	24
Cold	5	4	D	D	24	21
Radiation						
UV	2	3	A	B	3	9
Hazardous substances						
Diesel fumes	2	2	C	B	8	5
Biological hazards						
Tinea and fungal infections	4	4	B	B	14	14
Ergonomics/manual tasks						
Manual handling	2	2	B	B	5	5
Workplace design / Access and egress	2	2	B	B	5	5
Static seating/ postures	3	2	A	B	6	5
Repetitive tasks	3	2	B	B	9	5
Fitness for duty						
Fatigue (time of day, hours of work, shift work)	3	3	B	B	9	9
Stress	2	2	B	B	5	5
Ageing workforce	3	3	B	B	9	9
Lifestyle/ lack of physical fitness	3	3	B	B	9	9

Table 6 **Possible controls and monitoring approaches for selected high risk health hazards at Xstrata Coal as identified at the workshop.**

Health Hazard	Monitoring	Controls					
		Elimination	Substitution	Engineer out	Safe work procedures	Training and Administration	PPE
Physical							
Vibrations	• Baseline survey – equipment • No legal requirement • Personal health monitoring –	• Design criteria • Remote controlled equipment		• Road maintenance • Equipment, seat and suspension design • Gel seats • Adjustable seating • Rubber floor matting	• Driving to conditions • Equipment and workplace inspections	• Reporting. • Inspections and maintenance • Adjustable seating • Task rotation • Tool selection • Risk Assessments	• Gel seats and cushions • Seat adjustment • Anti-vibration gloves
Hazardous substances							
Diesel fumes	• Testing of machines • Particulate emissions – personal monitoring now possible		• Alternative fuels/ motors • Non flameproof diesels	• Scrubbers and filters • Electronic injection systems • Engine technology • Ventilation design	• Emissions limits • Clean out scrubbers • Limitation of vehicle numbers	• Diesel fleet management program	• Compliance of use of diesel particulate masks
Ergonomics/manual tasks							
Manual handling	• Risk Assessments • Incident report • Accident and injury information. • Functional Assessments	• Design criteria • Lifting and manual handling aids • Manual handling pods Workplace design	• Lighter items/ Packaging • Load design • Aluminium instead of steel	• Storage practices • Equipment design • New technology	• Equipment and workplace inspections • Manual handling standards • Recommend use of PERFORM tool	• Manual handling training • Team lifting with communication • Risk Assessments • Weights identification • Task rotation • Job design • Match person to the task	• Gloves • Back braces • Aprons • All PPE compliant with relevant Australian Standards
Fitness for Duty							
Fatigue (time of day, hours of work, shift work)	• Monitoring of hours of work and overtime • Monitoring of absenteeism • Information from Employee Assistance Program				• Fatigue management procedure with defined hours of work and break periods • Physical and mental task requirements considered in procedures	• Education and awareness program for shiftwork (particularly new workers) • Task rotation • Fatigue considered during roster design • Training for supervisors on recognition of fatigue	

Table 7 Possible controls and monitoring approaches for selected medium risk health hazards at Xstrata Coal as identified at the workshop.

Health Hazard	Monitoring	Controls					
		Elimination	Substitution	Engineer out	Safe work procedures	Training and Administration	PPE
Hazardous substances							
Asbestos	• Asbestos register to identify materials and constructions containing asbestos			• Ensure maintenance of constructions containing asbestos to ensure integrity of materials	• No work to be done on asbestos containing materials without approvals	• Education on location of materials and constructions containing materials • Asbestos removal to be undertaken by licensed asbestos removalist	• PPE compliant with requirements for handling asbestos
Biological hazards							
Tinea and fungal infections	• Reports to health centre			• Appropriate flooring to ensure drainage	• Policy/procedures for cleaning of bath house	• Education • Bath house cleaning • Importance of clean socks • General personal hygiene	• Alternate boots • Thongs in bath house
Infectious diseases	• Recording of immunisations including Hepatitis and Flu • Monitoring of absenteeism				• Policy and procedures on immunisations	• Information on infectious diseases • Immunisations for first-aid personnel • Infection control measures • Good personal hygiene	• Disposable gloves • Sharps containers

EXAMPLE

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