



MineSafe

Western Australia



2007 Mines Safety
Roadshow information



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Cyanide poisoning - first aid and medical treatment .. page 23



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In this issue

The second issue of MineSafe for 2007 starts with the regular section by State Mining Engineer Martin Knee, who ponders what the future might hold for mining, particularly the development of automated and autonomous technology. There is also information about the National Mine Safety Framework, a national strategy to address mine safety.

There is a summary of the safety performance of the Western Australian mineral industry in 2005-06, based on the annual compilation released by Resources Safety.

Earlier this year, the Surface Mine Emergency Response Competition was held in Coolgardie. The team from Oxiana Golden Grove subsequently travelled east to tackle Victoria's surface competition. We report on the results of that venture.

This issue contains Part 3 of the themed section on road safety on mine sites. The contribution by a traffic engineering expert considers pedestrians on mining operations, covering the benefits to the workforce of walking but also what can be done to reduce risks and protect this vulnerable group of road users.

In the safety and health representatives section, we introduce you to Stephen Turner, who is a senior occupational hygienist with Resources Safety. Occupational health is followed up in a themed section with articles on workplace health, including physical activity, mental health education and fatigue management. We include some interesting results on work-life balance that were recorded during a recent survey by The Australasian Institute of Mining and Metallurgy.

The third annual Mines Safety Roadshow will be running in October — see the double-page advertisement for venues, dates, program and other information. The program responds to feedback from last year's roadshow and addresses current issues of concern to Resources Safety.

CSIRO is always active in research, and several safety innovations in the communications field are covered in this issue.

Each year the Chamber of Minerals and Energy of Western Australia (CMEWA) hosts a Safety and Innovation Award, with this year's award won by Consolidated Minerals and Swick Mining Services. We include information on entering for 2008. The CMEWA has been busy on a number of other fronts too, continuing its First Watch series and launching ResourcesNet — find out more about these projects in this issue.

From time to time, Resources Safety receives queries about the mine record book and we provided information here on the requirements. The medical bulletin on cyanide poisoning was updated recently and is reproduced in MineSafe, as well as being available in print-ready format online.

Specific safety advice is included in three significant incident reports — covering the explosion of flammable containers during hot work, use of dozers for tree clearing and the roll over of a front-end loader — and one safety bulletin on the importation of asbestos in gaskets.

Resources Safety has been and will be involved in many significant events this year, including the Varischetti rescue centenary celebrations, Mine Emergency Response Competitions, Mines Safety Roadshow and finalisation of new dangerous goods safety legislation, so the publication schedule for the 2007 series of MineSafe has been delayed. Given that the first magazine this year was a bumper issue, it has been decided that there will be three issues this year, and we will return to the normal quarterly format for 2008.

Readers are encouraged to regularly check the Resources Safety website at www.docep.wa.gov.au/ResourcesSafety to find out what's new — updates and new information are posted there first, including three draft codes of practice on consultation and mobile plant for which comment is sought.

Malcolm Russell

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New technology — crystal gazing

Remaining at the lower end of the cost curve is of prime importance if a company (or a country) is to remain viable as a mineral producer. The most effective way of doing this is to take whatever advantage may be available from the lower unit costs generally realisable from making the best use of innovative technology.

This has already been seen in what might be referred to as the mechanisation phase of mining innovation, where, by and large, only those operators who embraced the mechanised technology have remained in business (unless they happen to be mining an exceptional deposit by world standards or have some other off-setting factor in their favour such as a low-cost, highly skilled labour force). It is likely that the scenario will be repeated during the forthcoming 'automation phase', when we may expect that those companies who successfully implement automated mining techniques will gain a competitive advantage over less successful enterprises and take an increased market share.

Since the commencement of the mechanisation phase of mining innovation, the tendency has been to increase the size and power of machinery. This has been most evident in underground load-haul-dump vehicles (LHDs) and surface haul trucks, but also applies to drilling technology and other rockbreaking and mobile plant such as dozers. For a variety of reasons, such as practical engineering considerations and the need to critically review the viability and maintenance requirements of large underground openings at increasing depth, this approach may be reaching both its practical and economic limits. In future, it will be necessary for the industry to develop smarter, not just bigger, machines. We are at the start of the automated phase of mining technology and the dawning of the age of autonomous machines. As a half-way house, the industry has for some time been operating with remote control and tele-remote control equipment, which

has brought its own specific problems, particularly with respect to control signal integrity, man-machine interaction and recovery from breakdowns in hazardous areas.

It is likely that a multi-disciplinary approach involving the development of IT-based mine planning systems, machine intelligence, communications and data acquisition systems and mining method design will be required if autonomous mining is to be fully implemented. The problems involved are significant and include development of the following:

- a system to give machines a 'picture' of the environment in which they work, including the facility to change the picture whenever the mine geography is altered by blasting, the removal of ore or waste or closing off of old worked-out areas and the 'landscape' is changed by the repositioning of mobile or temporary structures (including people and other vehicles);
- a guidance system that will allow machines to steer through the continuously varying environment;
- a reliable and accurate system to fix the position in three-dimensional space of each machine in use and each person employed in the mine;
- a navigation system that will integrate the data from the first three systems in real time;
- a reliable and accurate force-position control system for ground-engagement tool interactions with the rock; and
- condition monitoring systems, hardware and software to ensure safe operation of autonomous machines and their safe interaction with personnel in the working environment.

In order to implement successfully the new automated and autonomous technology, changes to operational and organisational methods will be necessary. The effective management of such change will be a major issue requiring much

effort to ensure success. Among the changes that must be managed are:

- developing mine layouts that suit the special needs of the technology, including individual items such as design of curves and intersections, road width in surface operations, development width and height in underground mines, and loading and dumping arrangements;
- developing and implementing transitional strategies for existing operations;
- developing means of integrating the planning and scheduling functions — including such specifics as grade control — with the technology for maximum overall benefit; and
- consideration of the need for new maintenance systems and maintenance scheduling requirements to support the new technology.

We have already seen developments in the safety arena that have improved the lot of those working in the industry, such as:

- vastly improved communications including 'leaky feeder' and personal emergency device (PED) technology that enables information to be passed on almost immediately;
- geotechnical instrumentation arrays that measure and help to predict seismic activity at the mine scale;
- virtual reality systems used for training equipment operators and correcting 'bad habits' to increase the safety and efficiency of operations;
- electronic sensor arrays to detect and warn of a variety of parameters, including gas emissions and fire, in real time; and
- revolutionary applications of rock-breaking and handling technology, such as the use of continuous miners in the iron ore industry.

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Of equal importance will be the 'social' issues associated with the organisational changes that will be necessary. The need to manage smaller, more highly skilled and more mobile workforces whose abilities are in great demand will require different industrial relations strategies. The human resource management techniques necessary for the effective

management of such workforces are substantially different from those required to deal with groups composed of 'pick and shovel' manual labourers and those possessing only basic manipulative, operational and technical skills. Matters such as the value of new skills and 'devaluation' of superseded skills, along with the need to upgrade existing skills, must be properly dealt with by the whole of society and not just by the mining industry.

Finally, to put a human face on all of

this technological development, let's end with a quote from someone who really knew what he was talking about in the field of experience of new and revolutionary technology:

'It's a very sobering feeling to be up in space and realise that one's safety factor was determined by the lowest bidder on a government contract.'

Alan Shepard (1923–1998) was the second person and the first American to go into space.

Safety performance in the WA mineral industry 2005-06

The recently released *Safety performance in the Western Australian mineral industry – accident and injury statistics 05-06* reveals a ten per cent increase in the average workforce from the previous year.

There was an average workforce of 56,425 employees in 2005–06 who worked a total of 111.94 million hours.

Statistics from Resources Safety's AXTAT database for this period show a slight but continuing improvement in the overall safety performance in the industry.

There were 506 disabling injuries recorded for 2005–06, a decrease of 102 on the previous year, with the disabling injury incidence and frequency rates both improving at 9.0 and 4.5, respectively.

The statistics suggest that a renewed effort on the part of all stakeholders is required, and new approaches to the issue of accident prevention are necessary to continue to improve safety.

Five mining industry employees lost their lives during the year, three more than the previous year.

Fatal incidence rates by mineral mined over the five-year period from 2001–02 to 2005–06 show that the underground fatal incidence rate is more than four times higher than surface operations. This is reflected in the gold, nickel and base metal sectors where most of the State's underground mining occurs.

In this five-year period, there were

19 fatalities, with six underground and 13 at surface operations. The most common type of underground fatal accident was contact with electricity, which resulted in two fatalities, while on the surface vehicle or mobile equipment collision resulted in three fatalities, followed by rockfall and caught by or between operating machine accounting for two fatalities each.

Serious injuries

During 2005–06 there were 349 serious injuries reported in the mineral industry, up from 316 in the previous reporting period, and of these ten were in coal mines.

Over the five-year period from 2001–02 to 2005–06, the serious injury frequency rate decreased for underground operations, remained the same for surface metalliferous operations and decreased for the coal sector, resulting in a three per cent improvement overall during 2005–06.

In this five-year period, injuries to legs accounted for 26% of injuries in underground mines, followed by hand and neck injuries (17%) then back injuries (13%). Of the serious leg injuries, 93% were to knees and ankles.

The majority of serious injuries underground were in production and development areas (76%), followed by access and haulage ways (13%) and dumping areas (6%), and the most common accident type was slip or trip (17%), rockfall (13%) and then

stepping and over-exertion or strenuous movements both at 11%.

For surface operations, the largest proportion of serious injuries was to legs (24%), then backs (21%), followed by arms (19%). Of the serious leg injuries, 70% were to knees and ankles. For arm injuries, 72% were to shoulders and wrists.

The majority of serious injuries on the surface occurred in treatment plants (40%), followed by open pits (21%) and workshops (13%), with the most common accident types being over-exertion or strenuous movements (32%), slip or trip (13%) and struck by object (10%).

Lost time injuries (LTIs)

During 2005–06, days lost through occupational injuries on mines in Western Australia totalled 20,849, while in that period there were 462 LTIs. In addition to the initial injuries, there were 38 recurrences of previous injuries, resulting in 1,044 work days lost.

A total of 113 persons who were still off work from injuries received before July 2005 lost 10,495 work days in 2005–06.

Readers can access the full safety performance publication from the Resources Safety website at www.docep.wa.gov.au/resourcessafety — go to the industry performance section under the mining heading.

The information presented in this statistical analysis is prepared by Resources Safety from data submitted

DEFINITIONS



Lost time injury (LTI): A work injury that results in an absence from work for at least one full day or shift any time after the day or shift on which the injury occurred

Serious injury: A lost time injury that results in the injured person being disabled for a period of two weeks or more

Minor injury: A lost time injury that results in the injured person being disabled for a period of less than two weeks

Incidence rate: The number of lost time injuries per 1000 employees for a 12 month period

Fatal injury incidence rate: The number of fatal injuries per 1000 employees for a 12 month period

Lost time injury frequency rate (LTIFR): The number of lost time injuries per million hours worked

Serious injury frequency rate: The number of serious injuries per million hours worked

by mining operations throughout Western Australia as required by section 76 of the Mines Safety and Inspection Act 1994. Note that exploration data are not included. During the 12-month period covered, an average of 213 mines or groups of mines reported to the AXTAT system.

Statistical snapshot

- There were five fatal accidents during 2005–06 — two were underground at nickel mines, one was underground at a gold mine and two were on the surface at gold mines
- There were 462 LTIs during 2005–06, 37 more than the previous year (425 injuries in 2004–05)
- The overall LTI duration rate deteriorated slightly by 4% during 2005–06, rising from 19.4 to 20.2
- The overall LTIFR improved slightly by 2% during 2005–06, falling from 4.2 to 4.1
- The overall injury index deteriorated slightly by 1% during 2005–06, up from 82 to 83
- Serious injuries in the mining industry during 2005–06 totalled 349, which is 33 more than for 2004–05
- There was an average workforce of 56,425 employees in 2005–06, an increase of 10% over the previous year (51,207 employees in 2004–05)
- The overall serious injury frequency rate improved slightly by 3% during 2005–06, falling from 3.2 to 3.1
- The iron ore sector LTIFR deteriorated by 9% during 2005–06, rising from 2.2 to 2.4
- The bauxite and alumina sector LTIFR deteriorated by 20% during 2005–06, rising from 2.5 to 3.0
- The gold sector LTIFR deteriorated by 13% during 2005–06, rising from 3.9 to 4.4
- The nickel sector LTIFR improved by 16% during 2005–06, falling from 7.0 to 5.9

Fatal accidents

There were five fatal accidents in the WA mineral industry during 2005–06.

- A project manager died after becoming trapped between the trays of two haul trucks at a gold mine. One of the haul trucks had broken down and another haul truck was being manoeuvred into position to enable jumper cables to be connected to re-start the disabled haul truck. The manager was standing on the cab decking of the disabled haul truck directing the driver of the other haul truck who was watching the manager's hand signals in order to get as close as possible. The manager was looking down and as the gap between the vehicles narrowed his head was caught and crushed between the trays of the trucks.
- A drill jumbo operator died in an underground gold mine after a rock weighing about one tonne fell from the backs, striking his head, shoulders and back. He was assisting another drill jumbo operator during ground support operations and was in the process of placing a split set rock bolt onto a boom of the twin boom drill jumbo when the rock fell from behind an area of mesh that had not been pinned to the backs.
- An electrician was electrocuted while attempting to restore a dewatering pump to working condition in a pump chamber in an underground nickel mine. A supervisor found the deceased lying face up on the floor in front of the open pump starter box with a plastic termination shroud and a screwdriver nearby. A subsequent inspection of the pump starter box identified that the pump circuit was switched on at the time of the accident.
- A senior charge-up operator received fatal injuries when an explosion occurred while he was attempting to assemble an impact cannon adjacent to a hung up ore pass in an underground nickel mine. The deceased had intended to use the cannon to fire an explosive projectile into the ore pass. Evidence indicates that the projectile detonated in the barrel of the cannon.
- A blast hole drill operator received fatal injuries at night when the tray-back truck he was driving collided with the back of a truck parked near an open pit gold mine workshop. Two drill rods protruding from the tray of the parked truck speared through the operator's windscreen and struck him, causing massive injuries. The operator was treated at a hospital but succumbed to his injuries two days later.

Golden Grove emergency response team tackles the Vics

Oxiana Golden Grove's mine emergency response team headed over to Bendigo, Victoria, in August in an attempt to match their winning performance in 2001.

Golden Grove has sent a team over twice before, coming second in 2000 and first overall in 2001.

Team leader Mike Bowron said the event enables team members to take advantage of the extra training and competition days

'With our 8/6 roster, the team members only get up to ten days training in total a year, so this extra training is really good. It also gives us the chance to introduce the less experienced members of the mine rescue team to real life scenarios conducted under real life conditions, in a controlled environment,' he said.

Mike said exposing team members to the 'realities' of a rescue situation resulted in personal development and increased experience, skills and knowledge.

He said that positive outcomes include development of each individual's ability to contribute as an effective team member under pressure, further development of a high level of camaraderie and unity of purpose, and grooming ambassadors for safety.

'In sending a team from WA over to Victoria, it is also a reward for the team members selected to go, and while all competitions are a reward for effort, this is an extra bonus,' Mike said.

'Since the Oxiana head office is based in Melbourne, it also gave some of the managers and directors a chance to come and meet the team members, see what they do, and hopefully come to appreciate the effort that these people put in on a voluntary basis.'

One of the challenges for the team was the fact it is made up from members of two separate panels and they do not get the opportunity to train together.

'To overcome this we had four days together before we flew to Melbourne to train. The selected team members did a lot of extra theory, and fitness work in their own time. This included walking the 6 km from camp from work, while carrying a stretcher and wearing breathing apparatus,' he said.

The team comprised Ben Ingham (Captain), Hans Groesslinger (Vice Captain), Dave Stewart (Medic), Mike Bowron, Brenton Down, Daniel Rouse, John Morrison (Reserve) and Adam Seder (Manager).

The results were extremely pleasing, with the Golden Grove team coming third overall, gaining first place in five categories — Fire Fighting, Rope Rescue, Breathing Apparatus (BA) Skills, Safety and Best Captain. They received two second places, in Search and Rescue and Team Skills, and two third places, in First Aid and Theory. Congratulations to all involved.



Photos courtesy of Golden Grove

Road safety on mine sites Part 3

As part of our series on road safety within the mining industry, traffic engineering expert Damir Vagaja looks at the important and often forgotten topic of pedestrians - our most vulnerable road users.

Damir holds a BSc (Civil) degree, and is Mining and Resources Manager at ARRB Group (www.arrb.com.au;

formerly ARRB Transport Research). He is a member of Engineers Australia and the Australian Institute of Traffic Planning and Management, and worked in the Western Australia mining industry before moving into traffic engineering and safety. This is the first of a series of articles by Damir on aspects of road safety.

Pedestrians — our most vulnerable road users

Pedestrians and walking are part of every journey and have always been present on mining and resource processing sites. Walking is a very effective and practical transport mode but it also involves the most vulnerable road users.

Increasingly, the workforce is recognising the benefits associated with walking and uses every opportunity for engaging in this activity - in their workplace, commuting to and from work, and even as an alternative exercise.

Employers have also started regarding pedestrians as an intrinsic part of the overall transport system and numerous initiatives for promoting walking have been developed.

But it is still very common to consider walking as a chore, rather than a comfortable way to move around. The existing infrastructure has been poorly designed or is in a poor condition. As a result, the message conveyed by this situation is often not aligned with employers' aspirations. This is partly due to lack of understanding of the specific needs of pedestrians and hazards associated with walking.

The benefits of walking include those listed below.

- **Improved health and wellbeing of the workforce** — walking as a low intensity physical activity positively contributes to the quality and length of lives. Walking affects physical and mental wellbeing and reduces risks of various illnesses,

including obesity (which, in turn, is closely related to fatigue). The positive effects on social interaction should also be acknowledged.

- **Low cost** — walking does not require huge infrastructure investments and does not impose costs on other travellers or on the environment.
- **Practicality** — walking enables the most direct connection between most places, is readily available to everyone anytime and it requires limited resources.
- **Low risk** — pedestrian networks that are designed and managed appropriately provide a safe alternative for short to medium distance trips that do not involve carrying large or heavy loads.

As a result of recognition of these benefits, pedestrians are slowly becoming a more prominent road user in the main stream traffic.

However, pedestrians are also vulnerable and therefore interaction with vehicles or other road users should be managed thoroughly.

Risks associated with pedestrians include trip hazards, fixed objects located on footpaths, loose material, deposited dirt or slippery surfaces on footpaths and even damaged footpaths, environmental hazards and lack of appropriate protection from elements.

Other risks include interaction with other road users, no separation from vehicular traffic, pedestrian infrastructure that does not match

the desire lines (preferred pedestrian access routes based on convenience of travelling from one location to another), poor communication protocols, hazard delineation and access control for hazardous areas.

There is also the need for the provision of escape routes, and awareness of personal hazards, behavioural issues and risk taking, lack of education, inappropriate use of personal protective equipment (PPE) and health or fitness limitations.

In order to address the risks associated with pedestrians and to maximise the benefits associated with walking, a comprehensive pedestrian management strategy should be developed.

Consideration to pedestrian needs can be given at various stages of the project.

Addressing the pedestrian requirements during the design stage is always the preferred option as it increases the opportunities and negates the needs for more expensive retroactive measures in the future.

In order to provide a good pedestrian infrastructure network and promote walking, a pedestrian management strategy should follow the guidelines listed below.

- Develop corporate and/or operational policies for promotion and implementation of

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walking programs supported by educational and example setting initiatives

- Education – benefits and risks associated with walking together with preventative measures for reducing the risk (e.g. PPE, health and fitness consideration)
- Using a vehicle should be seen as a need not a privilege
- Management to, literally, 'walk the talk'
- Identify desire lines and provide adequate connectivity between all centres of activities
 - Define all centres of activities
 - Develop a logical footpath network
 - Re-assess the operation of pedestrian networks
- Provide good pedestrian infrastructure, as per applicable standards
 - Footpath design and construction standards
 - Appropriate pedestrian crossings
 - Provision of lighting
 - Signage and linemarking
 - Pedestrian islands, kerbed ramps
 - Protection from environmental conditions
 - Way finding (maps and signs)
- Lack of consideration for the needs of employees with disabilities
 - No connectivity
 - Physical barriers
- Develop a structured footpath auditing and maintenance program
 - Repair of damage
 - Cleaning and removing loose material or dirt
 - Hazard reporting systems
- Provide protection from vehicular traffic
 - Physical separation such as pedestrian guardrails, kerbing,

windrows and painted pedestrian routes.

- Provide infrastructure to support walking as an alternative exercise for physical wellbeing and mental relaxation
 - Appropriately landscaped footpaths around accommodation camps used for walking or jogging
 - Long distance footpaths connecting accommodation and work places
- Limit access for pedestrians into hazardous areas
 - Areas of high level of forklift activity
 - Implement access control and communication protocols
- Give priority to pedestrians
 - Develop 'shared zone' environments with low permitted vehicular speeds (i.e. 10 km/h)
 - Overall infrastructure design consideration

Although most of the standards and good practices relating to pedestrians have been developed for an urban environment, they can be applied for the specific requirements of industrial or mining environments.

Useful publications include Austroads' *Guide to Traffic Engineering, Part 13 AP-11.13/95 Pedestrians* (available from www.austroads.com.au) and various Australian Standards including:

- AS/NZS 1158 Set:2005 *Lighting for roads and public open spaces*
- AS 1428 Set:2003 *Design for access and mobility*
- AS 1742 Set *Manual of uniform traffic control devices.*

National strategy to address mine safety

The development of a national strategy to address mine safety was advanced by the State Government recently with forums held in Perth and Kalgoorlie.

Employment Protection Minister Michelle Roberts said forums involving industry representatives and members of the public were held across the country to develop a national strategy for safe working conditions in the mining industry.

Feedback from the forums will be taken into consideration in establishing a national mine safety regime.

'Safety is critical for the resources industry and a nationally coordinated approach has benefits for both the industry and government,' she said.

'Every injured worker is an injured worker too many.'

The National Mine Safety Framework (NMSF) is an initiative of the national Ministerial Council on Mineral and Petroleum Resources. NSMF aims to achieve improved outcomes, best-practice regulation, and consistency across Australia in mining health and safety regulations.

Agreement has been reached on several parts of the framework:

- overarching principles and key features of a consistent legislative framework across Australian mining safety jurisdictions;
- a proposed common date set for the collection of information on mining accidents and incidents to facilitate common remedial actions; and
- a consultation protocol.

'All Australians will benefit from a national framework so we can continue to provide safety and guidance to a prosperous industry,' Mrs Roberts said.

There is currently more than A\$80 billion worth of resources projects in the pipeline in Western Australia.

Australian Bureau of Statistics figures reveal that more than a third of the export dollars earned for the entire country are from Western Australia.

Safety and health representatives section

Ask an inspector

Over the past five years, occupational hygienist and mines inspector **Stephen Turner** has been providing specialist occupational hygiene advice to both government and industry in Western Australia.

His work sees him travel to mine sites across the state dealing with issues related to occupational exposure to contaminants, noise and radiation.

Over that time, Stephen has developed reporting tools for Resources Safety's contaminant monitoring (CONTAM) and health surveillance (MineHealth) database systems to provide information on the occupational exposures and health of mine workers.

He is well qualified for the job and has degrees in physics and environmental science. He spent some time involved with health physics (NORM – naturally occurring radioactive material) and contamination issues around Victoria.

He then undertook research for the Victorian State Chemistry Laboratory

where he compared methods for organophosphate residue analysis.

'I served my occupational hygiene "apprenticeship" at Advice, Measurement, Control – Occupational Health and Safety (AMCOSH), a business unit of the State Chemistry Laboratory in Victoria,' he said.

'Here I was doing typical hygiene consultancy work, sampling, analysing and monitoring occupational exposure to NATA standards.'

Stephen then moved to Western Australia where he worked at The University of Western Australia in the plant science areas, before commencing with Resources Safety in 2002 conducting inspections, audits and preparing reports on data provided to the CONTAM and MineHealth systems. He is Senior Scientific Officer.

His current focus is the important areas of asbestos, diesel

particulates and the revised radiation safety guidelines.

'My main interest is the data we are collecting on exposure to diesel particulates in underground mines.'

In terms of safety, Stephen maintains that when people are aware of the potential exposure hazards, they are more likely to ensure the controls are adequate and ensure that people are aware of the hazards.

'There are few industries that provide the same level of resources to exposure monitoring and occupational hygiene that are provided in mining operations. So the mining industry should be managing occupational exposures better than other industries generally.'



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Workplace health makes sense and cents

Health and wellness programs in the workplace are being developed throughout government and industry as a way to reduce stress levels, absenteeism and increase job satisfaction.

Innovative programs are being adopted to develop health and wellness programs for workers, including one initiative that allows 15 minutes off work if members of staff spend 15 minutes of their time undertaking physical activities – allowing for a 30 minute workout.

Healthy Active Workplaces is an initiative of the Department of Sport and Recreation in collaboration with the Premier's Physical Activity Taskforce.

The initiative aims to target the workplace as an opportunity to improve the health and wellbeing of Western Australians and includes the establishment of a network to share ideas.

It has identified a number of strategies that need to be developed to overcome barriers such as:

- time constraints on employees;
- other priorities considered more important;

- cost;
- lack of employee interest;
- lack of suitable on-site facilities;
- high staff turnover;
- limited managerial and organisational support; and
- lack of suitable service providers.

Critical to the mining industry is the evidence that inactive employees lead to increased levels of fatigue, inattention and accidents in the workplace, as well as decreased productivity and employee satisfaction. This results in increased levels of workers' compensation and short and long term disability payments.

On the positive side, health and wellness programs resulted in:

- an increase in physical activity;
- improved nutrition and decreased body fat levels;
- improved mental alertness, energy and motivation;
- increased quality of work and productivity; and
- decreased compensation and staff turnover.

Physical inactivity is associated with high blood cholesterol and high blood pressure and is a high risk factor in coronary heart disease, stroke, type 2 diabetes, colon and breast cancer, depression, excess weight, obesity, musculoskeletal disorders and atherosclerosis.

With nearly half of Australians not meeting the recommended level of at least 30 minutes, some suggest 60 minutes, of moderate intensity physical activity on most days of the week, it is important that the workplace encourages healthy practices.

Physical inactivity is the second most important risk factor after tobacco use that contributes to the burden of disease, morbidity and mortality in Australia, according to the 2002 report on Getting Australia active: towards better practice for the promotion of physical activity (available from www.nphp.gov.au — see publications section).

At a recent presentation on the benefits of activity programs in the workplace held in Perth, Graham Brimage from the Department of Sport and Recreation said that regardless of whether a work place was a mine site in Telfer or a farm in the south west, they were changing.

'Whether the agenda is about productivity or quality of life and balancing lifestyles,

Starting a workplace health program

A workplace health and physical activity program should aim to influence organisational culture and priorities, the workplace environment, employee knowledge and awareness and promote opportunities for healthy behaviour.

There are four main steps to consider when beginning such a program.

Plan: Gain managerial support, find out what employees want in the program; develop goals and objectives; integrate program into existing organisational goals, plans and roles; and establish a project team of employees with a range of experience and knowledge.

Design: Tailor your program and activities to employee needs, maximise flexibility to allow participation, and link with external activities and events.

Implement: Use incentives where possible, encourage participation, use mentors within existing staff, and access existing resources and expertise of service providers.

Evaluate: Seek feedback from employees, revisit goals and objectives, measure health behavioural changes and identify improvements to the organisation as a result of the program.

According to the Department of Sport and Recreation, research and practice shows these programs will positively impact on your employees and your organisation. Implementing a comprehensive workplace health and physical activity program can mean happier, healthier and more productive employees.

Working on health

There has been an alarming increase in the number of lifestyle diseases and obesity and people are often not sure what to do about it, according to Sport and Recreation Director General Ron Alexander.

Opening *Workplace Health Makes Cents* on 14 June 2007, the first of a series of information and awareness seminars on workplace health, Mr Alexander said that in the 1930s, 40s and 50s, work was actually physical — 'not parking your car under the building'.

'Unfortunately, while many people are working less physically, they are still eating the same amount, impacting on stress, weight and relationships,' Mr Alexander said.

'We can't afford not to spend money

Occupational health news

the genie is out of the bottle and the workplace is changing, and keeping our workers healthy makes sense.'

If you want to keep updated on events, new resources and new opportunities as part of the Healthy Active Workplaces, visit the services section of the Sport and Recreation website at www.dsr.wa.gov.au or for more information on physical activity visit www.beactive.wa.gov.au



Robyn McGrath, Department of Environment and Conservation, and Sophie Rowell, WorkCover, presented recently on the benefits of activity programs in the workplace

on our work colleagues in terms of health.'

In terms of his workplace, he said the Department of Sport and Recreation wanted people to enjoy working there, with a more relaxed culture producing positive attitudes around the place.

'We want people to enjoy working in our department. This is an investment in yourself, not your next house or shares – we invest in each other and a workplace activity program helps in many ways.'

Information on healthy active workplace seminars and workshops run by the Department of Sport and Recreation is available at www.dsr.wa.gov.au in the services section – see 'healthy active workplaces'.

Delivering mental health education to the workplace



Surveys indicate that more than 90 per cent of employees agree that their mental health and personal problems spill over into their professional lives, and have a direct impact on their job performance.

Mental health conditions account for the second highest causes of absenteeism, and one in five Australians will experience a common mental health problem in any one year.

The use of mental health services in the workplace is a growing trend. Psychiatrists and psychologists may be used to gauge people's suitability for jobs, solve workplace conflicts and provide confidential counselling services.

Another approach is to bring mental health education to the workplace. With greater understanding of the issues associated with mental health, it is more likely that people will recognise if they have a problem, seek help, get support, locate a treatment and recover.

The two-day Mental Health First Aid (MHFA) course, developed in 2000 by the Centre for Mental Health Research at the Australian National University, can assist someone experiencing a mental health problem before professional help is sought. It covers crisis situations such as suicidal behaviour and thoughts, acute stress reaction, panic attacks, acute psychotic behaviour and problems such as depression, anxiety, schizophrenia and bipolar disorder.

Participants learn the signs and symptoms of mental health problems and where and how to get assistance. They gain an understanding of the sort of help that has been shown by research to be effective.

Since April 2005, the MHFA program has operated under the auspices of the ORYGEN Research Centre at the University of Melbourne (see www.mhfa.com.au for more information). Over 50,000 participants have completed the MHFA course throughout Australia.

Brain Ambulance is one of the service providers offering the MHFA course by accredited instructors (www.brainambulance.com.au). It works to promote a better understanding and increased knowledge of mental health issues, to reduce absenteeism, boost productivity and improve work quality.

Deb Reveley, the 'principal driver' of Brain Ambulance, said that the most common and disabling mental health problems are depression, anxiety disorders, substance use disorder and psychotic disorders.

'Many people suffer a mental illness for a long time before they seek help, and alcohol and other drug problems frequently occur in unison with these disorders,' she said.

'The Mental Health First Aid course approaches the difficult subject of mental health in a realistic, practical and evidenced based manner. It provides mental health education with the aim of ripping the blinkers from stigma, myths and misconceptions,' Deb said.

Deb is a qualified Master Mental Health First Aid Instructor, Mental Health Educator and Wellness Coordinator. She is an experienced teacher who has worked in many government and private sector settings, and her presentations are based on real and personal experience. She has delivered the course in many regional areas of Western Australia over the past two years, including Bunbury, Broome, Port Hedland, Karratha, Derby, Esperance, Geraldton and Kalgoorlie, and has presented the course to many emergency medical officers from mine sites.

Brain Ambulance also offers a one-day course – *Flick the switch: shedding the light on anxiety and depression* – that was developed from the Mental Health First Aid course. Other short presentations include *Keeping sane in busy workplaces*, *Workplace wellness planning* and *Reducing stigma: opening our eyes to mental health problems*.

Occupational health news

Miners told to have a nap on the job

Sleeping on the job is normally one way of being shown the door, but innovative mining companies are looking at allowing this to prevent problems associated with fatigue.

Miners are being encouraged to take power naps on the job to counteract fatigue according to a BHP Billiton Mitsubishi Alliance (BMA) internal document reviewed by Queensland's *The Sunday Mail*, which was reporting on documents tendered in a court case to demonstrate company policy on fatigue.

The company's 'minimum standard for fatigue management plans' document has revealed that miners are being encouraged to cope with 14-hour shifts by taking 20-minute naps on the job.

A spokesman for BMA said the 14-hour working shifts referred to the total time spent on site and the time working on shifts was normally 12 hours.

Miners must ask for permission to snooze and employees are also warned that the recommended length of a nap is no more than 20 minutes. After grabbing 40 winks, workers must 'walk around to ensure full alertness prior to recommencing work'.

The report shows that BMA is also using radio programs to stop workers driving heavy trucks from nodding off, advising that all surface mobile equipment should be fitted with AM/FM commercial radios.

Further information on this initiative is provided in BHP Billiton's Sustainability Report 2005 (available at hsecreport.bhpbilliton.com/2005/), which refers to two overnight radio programs that are helping shift workers at BMA's coal mines in central Queensland to combat fatigue and keep safety in focus.

Following employee suggestions, BMA Saraji mine approached a local commercial radio broadcaster with a sponsorship concept that

resulted in 'BMA Miner's Overnite'. The live program presented from midnight to 6.00 am reminds workers about mine safety; and shift workers and their families and friends can request songs and send in messages to be broadcast. Other BMA mines soon joined in, with each mine allocated a month in which they specify a theme based on their own safety concerns.

Shift workers in the Moranbah community can listen to the program or tune into their own 'BMA Nite Show' on a community radio station. The pre-recorded program also presents safety messages but with a twist — volunteer DJs include employees from BMA mines.

Meanwhile, a new study of fatigue at Xstrata Coal's Ravensworth mine in New South Wales, also reported in *The Sunday Mail* article, has shown some workers are working with an impairment comparable to being drunk.

In a bid to determine the extent of fatigue in the industry, Xstrata surveyed all 110 workers and each was given a diary to record their sleep patterns.

Fifteen workers were identified in a high risk category for fatigue and were given sleep coaches and advice on fatigue management and sleep improvement.

The company has also encouraged every worker to take short 'power naps' during breaks to reduce fatigue.

The preliminary data show that many workers had so little sleep their fatigue impairment during a night shift would have been comparable to a blood alcohol content of 0.05%.

Similar statistics for the effects of insufficient or poor quality sleep are presented in the article on driver fatigue in the December 2006 issue of *MineSafe* (vol. 15, no. 4).

Work-life balance most important job option

Despite increases in wages, a recent survey by The Australian Institute of Mining and Metallurgy (AusIMM) revealed most workers indicated that the work-life balance was the most important factor when considering job options.

Only 3.9 per cent of respondents said that remuneration was the most important factor.

Some 2000 professionals in the minerals sector were surveyed. The results indicated an average wage growth in the minerals industry of 18 per cent since 2005, and an increase in starting salaries.

The AusIMM survey said that while workers in the mining industry are working shorter hours than two years ago and getting paid more, they are still worried about training and the pressure of the skills shortage.

Accordingly, the proportion of respondents working more than 50 hours a week decreased from 64 per cent in 2005 and there has been an increase in traditional Monday to Friday working hours, with a 7.4 per cent reduction in the percentage of respondents who said their work was putting pressure on personal relationships.

Some 66 per cent of respondents agreed that people at their workplace were under more pressure because of the skills shortage, which was a surprising decrease from 75 per cent in 2005.

The survey also found that only 48 per cent of respondents agreed that their employer provided sufficient workplace training, a decrease of 8.4 per cent from the 2005 results.

With large numbers of inexperienced staff being recruited and high levels of mobility, an insufficient focus on training and mentoring could have a negative impact, the survey concluded.

The *AusIMM Remuneration and Employment Survey 2007* is available online from www.shop.ausimm.com.au/index_shop.php, with results summarised in an AusIMM media release dated 22 June 2007 (available at www.ausimm.com.au).

CSIRO innovation in safety and health

The mining and minerals section of CSIRO's website (www.csiro.au/science/MiningMinerals.html) contains a wealth of information about how this national scientific research agency is helping Australia's exploration, mining and minerals processing industries to remain sustainable and competitive in a global environment.

Some of CSIRO's mining research projects have a safety focus, with one such project described at www.csiro.au/science/ps15i.html and another at www.csiro.au/news/MineSiteTechnologies.html — information about these projects is reproduced below.

Radio technology to help save lives

Earlier this year, CSIRO signed a licensing deal to develop a commercial version of the world's first effective two-way radio that will allow coal miners trapped deep underground to contact the world above.

Existing underground communication systems either depend on cables that can be cut by cave-ins or are one-way systems only allowing the ground to call the miner.

In 2000, radio physicists and electronic engineers at the CSIRO's Wireless Technologies Laboratory completed initial work on a far more sophisticated two-way radio. The technology is based on magnetic fields generated by AM radio-like antennas operating at audio frequencies that can easily penetrate rock. A prototype tested 200 metres down a coalmine worked well.

To the dismay of the researchers, no-one rushed to adopt the technology, but that changed with a push by the United States to improve coalmine safety in the wake of last year's tragedy that killed 12 miners in Sago, West Virginia.

US safety administrators visited the laboratory to find out how the technology allows communication with miners underground. Calculations indicate the equipment will operate 500 metres below ground, alerting rescuers that miners are alive.

Both power and communications are typically lost as a result of

collapses or explosions, but decisions taken in the initial stages of a rescue can have a major bearing on a successful rescue.

A global mine communications company, Mine Site Technologies, has been licensed to complete the commercial development of the device, the size of a mobile phone or smaller. CSIRO will share licence fees on sales with the Australian Coal Association Research Program, sponsor of the research.

'Miners are increasingly wearing PEDs [personal emergency devices] that allow one-way communication from the surface to the miner,' said Dr Jay Guo of the CSIRO ICT Centre.

'By utilising CSIRO's research, Mine Site Technologies will develop a bi-directional PED that, for the first time, will allow miners across the world to communicate from underground in the event

of a mine disaster,' says Dr Guo.

Gary Zamel, Chairman and founder of Mine Site Technologies, said that Australia is a leader in mine safety, and this product will set an industry benchmark for safe mine operations.

'The benefits of instant communications with miners involved in an incident such as a collapse are immeasurable. Rescuers will be much better informed about conditions underground and will be able to direct operations to provide unprecedented efficiencies in mine rescue operations,' said Mr Zamel.

The technology is tipped to earn Australia A\$100 million in the next decade.

Further information on this Australian safety innovation is available from www.csiro.au/news/MineSiteTechnologies.html and www.minesite.com.au



Photo courtesy of CSIRO

Underground comms system improves mine safety

In the interests of mine safety and productivity, it is vital that operators are continuously aware of underground conditions and risk profiles. They must be able to locate and communicate with mine workers at all times — particularly in the event of fires, roof falls or other life-threatening situations.

It is equally critical that these communication systems stay active during power outages, fan stoppages or gas accumulations.

CSIRO, in collaboration with the Japan Coal Energy Centre (JCOAL), has developed underground communications equipment and software systems that provide an integrated, continuous, real-time risk profile of a mine.

To assist in the development of the system, a CSIRO team visited more than eight underground coal mines to discuss the types of issues confronting surface control room operators. Common issues were identified, including:

- the large variety of diverse and proprietary communication systems that were in use at each site;
- large numbers of system-generated false and misleading alarms;
- time delays in locating and contacting individuals;
- a cumbersome manual statutory reporting system; and
- extreme workloads in emergency situations.

The Nexsys™ Real-Time Risk Management System for underground mines provides a continual live 3D-graphical view of the whole mine, enabling users to view person and vehicle location, gas, ventilation and strata conditions, environmental conditions and equipment status.

The system comprises:

- Nexsys™ software package;
- electronic report-capturing system; and
- suite of Ethernet-based, fibre optic and intrinsically safe (IECEX.ia) communications devices suitable for use in potentially explosive atmospheres.

Nexsys™ can source information directly from existing proprietary systems to connect directly to a variety of sensor networks. It then integrates and interprets the data according to a pre-determined set of rules, and can autonomously initiate a response to breaches of the rules.

Information and real-time risk profiles are continuously displayed in two-, three-, and four-dimensional formats anywhere on the mine's network, including underground stations and via handheld wireless units such as pocket personal digital assistants (PDAs).

The supporting IECEX.ia devices allow, for the first time in underground mines, some of the advantages surface-based industries have enjoyed for years — having broadband, integrated, Ethernet-based communication systems.

Using optical fibre and wireless

access points, Nexsys™ takes the internet underground with all the interconnectivity, data sharing, video streaming and multiple-user advantages of this technology.

An Ethernet-based two-way paging and locating system is being developed to allow the Nexsys™ system to autonomously locate and send text messages to personnel underground in response to a change in 'normal' circumstances.

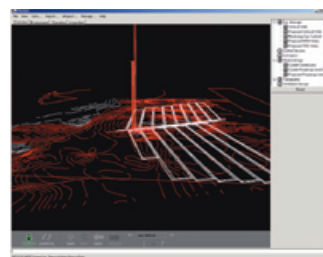
The recipients will then be able to send text messages in response. The system has an interface similar to the familiar e-mail systems in use today and has similar functionality.

The Nexsys™ software system is currently undergoing field trials in Anglo Coal's Grasstree mine in Central Queensland and Xstrata's Beltana mine in New South Wales, and has undergone trials at the Kushiro coal mine in Japan.

The IECEX.ia Ethernet devices are currently undergoing certification with Simtars (Queensland-based safety in mines testing and research station).

Further information on this underground communications system is available at www.csiro.au/science/ps15i.html or from CSIRO's Director Mining Research, Mr Greg Rowan (email Greg.Rowan@csiro.au, phone 07 3327 4179).

Note: Greg Rowan is a guest speaker in the safety culture session at the 2007 Mines Safety Roadshow.



Safety and health awards

Robotic arm reduces manual handling drilling incidents

Consolidated Minerals and Swick Mining Services have won this year's Chamber of Minerals and Energy's Safety and Health Innovation Award for safety and health improvements to a drill rig rod handling system and manual work procedures.

The companies developed a robotic arm to handle drilling rods at the Woodie Woodie mine in the East Pilbara.

The Consolidated Minerals exploration team identified that work on drill rigs historically involved repetitive heavy

manual labour, exposing the driller and offsider to many risks including noise, dust, hot equipment, poor ergonomics and fatigue.

Working closely with the company's major drilling contractor, Swick Mining Services, over the past two years, a purpose-built rig was designed and constructed to address these safety and health issues.

This has reduced manual handling drilling incidents by about 60 per cent, and more rigs are being built to use

the arm. The prototype also won the People's Choice Award and has been designed to be quieter and give the user more visibility around the rig.

Alcoa World Alumina Australia received the highly commended and commended awards for a hammerless drain valve and system for rotating haul truck tyres.

The Chamber's chief executive Tim Shanahan said the awards showed people were identifying risks and developing ways to eliminate them.

2008 CME Safety and Health Innovation Awards

Entries to the 2008 CME Safety and Health Innovation Awards are now being accepted. These awards recognise individuals, teams and companies for their creativity and ingenuity in improving the workplace, and aim to promote the application of their innovations across the Western Australian minerals and resources industry.

Entry is open to all Western Australian minerals and resource companies or

sites (metalliferous, coal, quarries, exploration, oil and gas), including contractors associated with the Western Australian resources industry.

Western Australian entries receiving awards or commendations are eligible to enter the 2008 National Mining Industry Safety and Health Innovation Awards conducted by the Minerals Council of Australia.

Entries close Friday 7 December 2007 and awards will be presented at the 2008 Safety and Health Conference Dinner.

Further information and the entry form are available at www.cmewa.com or by contacting Kae Lim Choo, Project Officer – Safety and Health, The Chamber of Minerals and Energy of Western Australia (ph. 9220 8511, fax 9221 3701, email kchoo@cmewa.com).

Look out for Chamber's First Watch

The Chamber of Minerals and Energy of Western Australia produces a publication series called *First Watch*. It aims to promote and circulate information about positive safety activities and initiatives occurring throughout the industry so that others may use this to assist in the improvement of health and safety in their workplace.

Issue 07 featured an employee suggestion scheme initiative implemented by Alcoa across its Western Australian operations. One suggestion

arising from this initiative was the 'Wheel Spinner' innovation, which was highly commended in the 2007 CME Safety and Health Innovation Awards. It was also nominated as a suggestion of the month for Alcoa's Western Australian mine operations.

The recently released Issue 08 features BHP Billiton Nickel West's 'Layered Audits' initiative implemented across its Western Australian operations. The cornerstone of the process involves two or more layers

of management working together to carry out routine audits, and has resulted in a more productive and safer workplace.

If you are interested in receiving a copy of *First Watch*, please contact Kae Lim Choo, Project Officer – Safety and Health, The Chamber of Minerals and Energy of Western Australia (ph. 9220 8511, email kchoo@cmewa.com) to be added to the circulation list.

The complete collection of case studies featured in *First Watch* is also available on the Chamber's website at www.cmewa.com

Mines Safety roadshow



Anyone with an interest in mines safety is encouraged to attend the third Mines Safety Roadshow presented by Resources Safety. The program should appeal to safety and health representatives, staff responsible for managing occupational health and safety on site, supervisors, managers and employers from mining and exploration companies and service providers, as well as occupational health and safety professionals.

program

TOPIC	Bunbury, Kalgoorlie, Port Hedland & Tom Price	Perth
Safety culture	9.00am - 9.45am	9.00am - 11.00am
Road safety on mine sites	9.45am - 11.00am	Not applicable
MORNING TEA	11.00am - 11.20am	
Machinery safety	11.20am - 12.20pm	
Dangerous goods safety	12.20pm - 12.45pm	
LUNCH	12.45pm - 1.45pm	
Occupational health	1.45pm - 3.45pm	
Publications and resources	3.45pm - 4.00pm	

presenters

RESOURCES SAFETY STAFF AND INVITED SPEAKERS GREG ROWAN (CSIRO), ALBERT BOQUET* (EMBRY-RIDDLE AERONAUTICAL UNIVERSITY) AND DAMIR VAGAJA (ARRB GROUP)

Safety culture panel - Perth roadshow

Martin Knee (Mining Industry Advisory Committee member, State Mining Engineer), industry representative TBA, Greg Rowan (CSIRO), Albert Boquet (Embry-Riddle Aeronautical University), Gary Wood (MIAC member, UnionsWA)

registration

Registration fee is \$66 per person (including GST) covers morning tea, lunch and resources pack. Early registration is recommended to secure your place.

Registration brochures are available online from www.docep.wa.gov.au/ResourcesSafety or phone 9358 8154

* Late replacement for Scott Shappell (Clemson University)

DATES

BUNBURY Tuesday, 9 October

KALGOORLIE Thursday, 11 October

session details

Safety culture [Perth roadshow, overviewed at regional roadshows]

- **Creating a safety culture at work - presented by Albert Boquet**
We all talk about 'safety culture' from time to time, and it is one of the buzz words that have crept into the discussion of safety in all industries. But what is it and what are the common elements across industrial sectors? This talk sets the scene for a session that starts broadly, looking at human factors that influence safety cultures in any industry, and then focuses on what safety culture might mean for mining in Australia and considers some practical approaches.
- **What does it all mean for the mining industry? - presented by Martin Knee (also regional presenter)**
It is a common experience of the mines inspectorate that serious and major accidents can be traced to failures in safety management systems. Critical issues for industry, particularly in the current climate of rapid expansion, staff mobility and relative inexperience among many employees, are the loss of corporate knowledge coupled with and compounded by the failure to learn from accidents and incidents. This presentation looks at what a safety culture might mean for the mining industry.
- **Safety cultures in practice in Australian mining - presented by Greg Rowan**
The final presentation in this session examines some of the issues that face the Australian mining industry in terms of building safety cultures in the workplace, and what it means in practical terms.

Road safety on mine sites [regional roadshows]

- **Introduction to road safety issues on WA mine sites - presented by Jim Boucaut / Peter O'Loughlin**
Despite the best intentions of the workforce and management, and the implementation of a variety of controls to address road safety issues on mine sites and in the field, some people are ignoring workplace safety requirements or forgetting hard-learned lessons. This presentation covers some of the incident types that appear regularly in Resources Safety's incident database, their causes and some strategies adopted by industry to address these issues.
- **Developing traffic management strategies to reduce risks - presented by Damir Vagaja**
Mining and processing operations entail complex interactions between various transport infrastructure users, such as light vehicles, heavy vehicles and pedestrians. Learn about practical solutions, backed by research and experience, for developing management strategies at various levels to reduce the risks associated with traffic.

Machinery safety [all venues]

- **Classified plant - presented by Brett Boneham**
The mines inspectorate receives many enquiries regarding the definition of classified plant and the registration process. This talk presents information on these topics, as well as other requirements related to classified plant and machinery safety in general.
- **Licensing of high risk work - presented by Melina Newnan**
From October 2007, the new National Standard for Licensing Persons Performing High Risk Work will take effect in Western Australia under the *Occupational Safety and Health Regulations 1996*. It will affect scaffolders, doggers, riggers and operators of most forklifts, cranes, hoists and pressure equipment. The Mines Safety and Inspection Regulations 1995 are also being amended to align with the new requirements. This 'hot topic' talk provides an update on the introduction of the licences for the mining industry.

Dangerous Goods Safety [all venues]

- **Implications of dangerous goods safety legislative and licensing changes for the mining industry - presented by Rhonda Jogia**
When enacted, the *Dangerous Goods Safety Act 2004* and associated regulations will introduce a performance-based risk management approach. The new legislation will also implement a Council of Australian Governments (COAG) national agreement designed to improve counter-terrorism controls through tighter security management of ammonium nitrate and explosives. This 'hot topic' talk provides an update on the likely implications of the new legislation for the mining industry.

Occupational health [all venues]

- **Biological monitoring – assessing exposures to hazardous substances - presented by Lindy Nield**
Mining industry employers are required under legislation to establish and maintain a health surveillance system for employees. Such a system requires the recognition and assessment of exposure to contaminants and its effects. It involves monitoring airborne concentrations in the workplace in conjunction with measuring the amount absorbed by the body (biological monitoring) and assessing the effects of exposure (recognising disease). The assessment processes are outlined in this presentation.
- **Occupational noise in the WA mining industry - presented by Stephen Turner / Jerry Wilczewski**
Hearing loss from exposure to high noise levels can occur very slowly over a number of years, with changes not noticed from day to day. Unfortunately, any damage is irreversible. This presentation will address the issues of noise exposure levels recorded on a mining operation, the results of noise over-exposure and consequent hearing losses. It also explains the basic rules for working with noise, and how to minimise exposure to noise using appropriately selected and fitted hearing protectors.
- **Ventilation issues in mining – diesel exhaust emissions - presented by Terry Siefken / Stephen Turner**
Mine ventilation is about providing safe and healthy air for a mine. To maintain workers' health, the air must be breathable, sufficiently cool to avoid overheating and free of contaminants. Ventilation must also reduce the hazards associated with spontaneous combustion, gas outbursts, and provide a means of refuge or egress for workers in the event of a fire or other unplanned event. This presentation focuses on diesel particulate matter (DPM), which is emitted by diesel exhausts and is carcinogenic.

Resources Safety publications and other resources [all venues]

- **Public comment sought for codes of practice - presented by Susan Ho / Anita Rudeforth**
Drafts of the following codes of practice have been released for public comment:
 - *Consultation at Work*
 - *Design of Mobile Plant for Use on Mines*
 - *Operation of Mobile Plant on Mines*Information is given on what the codes cover and how to respond with comments.
- **Educational resources available from Resources Safety - presented by Susan Ho**
This is a quick tour of what Resources Safety has and where to find it – codes of practice, guidelines, posters, brochures, toolbox presentations, information sheets, FAQs and much more.

The program and list of presenters are correct at the time of printing, but may be subject to change.

Comment sought on draft codes

Three draft codes of practice have been released for public comment by Resources Safety on behalf of the Mining Industry Advisory Committee (MIAC):

- Consultation at work;
- Design of mobile plant for use on mines; and
- Operation of mobile plant on mines.

One of the fundamental objectives of the *Mines Safety and Inspection Act 1994* is to foster cooperation and consultation between employers and employees. These are essential to providing and maintaining a safe and healthy workplace. The draft code of practice on consultation at work aims to provide a 'how to' guide on consultation that is useful for all workplaces, particularly those without formally elected safety and health representatives

and committees. The importance of training for employees and management as a vital step in facilitating effective workplace consultation is also emphasised.

In the May 2007 edition of *MineSafe*, the State Mining Engineer issued a reminder that designers, manufacturers, importers and suppliers must ensure that the design and construction of plant in a mine is, so far as is practicable, safe to install and use.

The draft mobile plant codes are intended to assist those involved in designing and operating mobile plant on mines to meet the requirements of the Act and Mines Safety and Inspection Regulations 1995.

All comments on the draft codes will be considered by MIAC, a statutory tripartite body that advises government and the Commission for Occupational Safety and Health on occupational safety and health

matters in the mining industry.

The draft codes are available from the Resources Safety website at www.docep.wa.gov.au

MIAC invites your feedback on the draft codes. Comments must be submitted in writing to:

**Executive Officer, MIAC
Resources Safety, DOCEP
Locked Bag 14
Cloisters Square WA 6850**

**Fax:
08 9358 8188**

**Email:
ResourcesSafety@docep.wa.gov.au**

All public comment must be received by 5 pm Western Standard Time, Monday 14 January 2008.

Please indicate in your submission which code or codes you are commenting on, and identify the key issues being raised.

Mine record book

As stated in section 23 of the *Mines Safety and Inspection Act 1994*, a record book (defined in section 4 of the Act) has to be approved by the State Mining Engineer. At present, any bound, hard-covered book, generally A4 or foolscap, with ruled pages and each page numbered is accepted as a mine record book.

The record book at an operating mine is to be kept by the registered manager at the mine site.

For exploration operations not at an operating mine, the record book should be maintained at the principal office in Western Australia of the exploration manager (refer to Mines Safety and Inspection Regulations 1995, regulation 3.2).

Some of the information that needs to be entered in the record book is listed below.

- Details and result of an inspection

by an inspector (section 23). Also note that the record book should be open at all reasonable times to inspectors, employees and anyone authorised by the State Mining Engineer.

- Copies of improvement, prohibition and provisional improvement notices (sections 31AT, 31 AU, 31AV, 31AW and 31BO).
- Statutory appointments and rosters (section 38A and regulation 3.16A); management appointments (section 44); and other appointments including surveyor (regulation 3.46), electrical supervisor (regulation 5.10), high voltage operator (regulation 5.19), magazine in-charge (regulation 8.6) and hoist driver (regulation 11.11).
- Details of occurrences (section 78), misfires (regulation 8.46), withdrawal of employees (regulation 10.12), ventilation defects (regulation 9.27) and radiation hazards (regulation 16.10).

- Registration or approval of diesel equipment (regulation 10.50).

All entries should be made in ink, and dated and signed, with the name of the person making the entry clearly identified.

The manager must ensure that the book is kept safely in good order and condition.

The principal employer for the mine is responsible for all record and log books (e.g. see *MineSafe*, vol. 15, no. 1 for information on the accident log book) that have been kept under the Act in respect of the mine. Such books should be maintained as long as the mine operates and six years after suspension or abandonment of the mine as per section 89 of the Act. If the principal employer appears likely to go into liquidation or receivership then steps must be taken to ensure that such books are kept safely for that period.

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Miners with laptops or personal digital assistant (PDA, such as a Blackberry) visiting the so-called resources quarter of the Perth CBD can now read their edition of *MineSafe* online for free thanks to the Chamber of Minerals and Energy of Western Australia's new ResourcesNet project.

Anyone in the CBD for business or pleasure and needing short-term access to the Internet, including full time or short-term workers, overseas and interstate visitors, shoppers and students, can log onto the internet at no cost to themselves.

The free Wi-Fi internet service, which is generally available 24 hours a day,

seven days a week, covers a district becoming known as the resources quarter because of the number of resources industry companies with offices there. It includes St George's Terrace and Hay and Murray Streets west from William Street, up to the Barracks Arch near Parliament House.

Using a laptop or PDA, anyone in this precinct can send and receive email, conduct research or browse the web, download material, watch videos, take part in webcam, and even use voice-over-internet protocol (VOIP) to talk anywhere in the world.

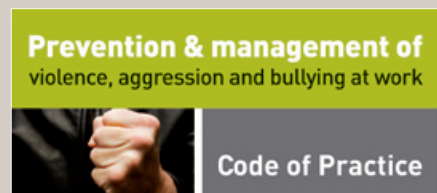
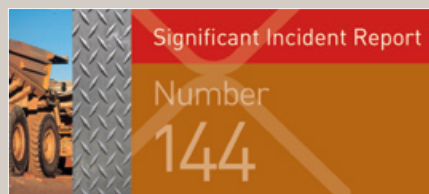
ResourcesNet is sponsored by Rio

Tinto, BHP Billiton and Woodside and managed by the Chamber on behalf of the Western Australia resources sector. The aim is to make Perth a more attractive, creative and inspiring city in which to live, work and demonstrate the sector's support and commitment to applying the latest technology to benefit the community.

More information on the project and how to use ResourcesNet for the first time is available from the Chamber's website at www.cmewa.com (note that your computer must be configured to accept open Wi-Fi connections).

what's NEW on the web

To find out what's new on the Resources Safety website, add www.docep.wa.gov.au/ResourcesSafety to your list of favourites and keep an eye on the billboards at the right-hand side of the homepage. The billboards link directly to significant new material and are a quick guide to what's been added recently. If you experience problems using the site or have any ideas to improve its navigability or content, please contact **9358 8154** or ResourcesSafety@docep.wa.gov.au — your input is welcome.



www.docep.wa.gov.au/ResourcesSafety



Significant incident reports and safety bulletin

All significant incident reports and bulletins are available online at www.docep.wa.gov.au/ResourcesSafety in the mining section

Significant Incident Report No. 142
Released 29 May 2007

Explosion of empty flammable containers during hot work at demolition site

Incident

While cutting up scrap steel using oxy-propane cutting equipment at a demolition site, a labourer suffered serious burns to the head, chest and arms when hot material slag and spatter ignited an old 20 litre flammable liquid drum through a small hole in the side wall.

The drum that exploded was found to have contained epoxy thinners and was still partly filled.

Causes

- Due to lengthy exposure to the elements, the labels and markings on flammable liquid and oil drums at the site had become illegible over time. Therefore the contents of the drums were unknown in some cases.
- A waste oil contractor emptied the oil from the oil drums but refused to remove the material from the flammable liquid drums.
- Old drums had been moved from a dedicated sign-posted drum storage compound to the demolition area for disposal. Large-scale hot work was being carried out in the same area.

There was no procedure for drum storage.

- No signage was displayed to warn of the danger or restrict access to the area where the drums were located within the demolition area.
- Employees who were trained in hot work procedures failed to realise the danger posed by the partly filled flammable liquid drums stored in the demolition area and therefore no arrangements were made for their removal.

Legal requirements

Under Section 9(e)(ii) of the *Mines Safety and Inspection Act 1994* (MSIA), each employer must make arrangements for the safe use, handling, processing, storage, transportation and disposal of all substances at the mine.

The handling and disposal of old drums and containers containing residual material of a flammable or explosive nature pose a significant threat of injury to employees if not carried out with appropriate precaution.

Under Regulation 4.3 of the *Mines Safety and Inspection Regulations 1995* (MSIR), the manager and each employer must ensure that personnel do not use welding oxy-acetylene cutting equipment or other hot work equipment where there is a risk of personal injury.

Regulation 7.23 requires each responsible person at a mine to ensure, so far as is practicable, a safe means of disposal is provided for empty or surplus hazardous substance containers.

Regulation 7.24 further requires each responsible person to ensure that all hazardous substance containers have an appropriate label attached to the containers at all times.

Recommendations

In light of these requirements, the Registered Manager, principal employer and every employer at each mine should therefore review and/or establish procedures for the site for the inspection, labelling, storage and safe disposal of old hazardous substance and flammable containers at the mine. With this in mind, the following recommendations are made:

- A risk assessment or JSA should be conducted prior to commencing welding cutting or other hot work in areas other than designated workshops or other areas designed and arranged for such activity.
- Old hazardous substance and flammable drums and containers need to be segregated from work areas to avoid accidental ignition or explosion occurring. Segregation distances should be similar to the distances allocated for full hazardous substance containers where practicable.
- Warning signage needs to be displayed in container storage areas with respect to any hazards associated with the old drums to ensure that no ignition sources or other potential sources of danger are introduced into the storage areas prior to disposal.
- Daily workplace inspections should be undertaken to ensure hazards are identified and appropriately managed or removed.
- All personnel undertaking hot work at a mine should be appropriately trained and informed of the dangers associated with containers containing vapours or residual amounts of hazardous or flammable substances.



Significant Incident Report No. 143
Released 25 July 2007

Use of dozers for tree clearing operations

Incident

In June 2007 the operator of a D11 dozer experienced a near miss when a 20 metre high jarrah tree fell onto the dozer during tree clearing operations at a mine site in the South West of Western Australia.

Significant Incident Report No. 116, released in July 2002, identified the potential for timber limbs to penetrate through safety glass windows on earthmoving scrapers at mine sites in Western Australia, and recommended that guards, mesh or grids be fitted to cab windows to protect the operator.

Causes

- The jarrah tree being felled was hollow, due to fire damage, and parts of the timber had rotted.
- Potentially dangerous trees had not been identified prior to tree clearing commencing.
- A risk assessment of the task had not been conducted.
- The job safety analysis (JSA) undertaken was inadequate.
- No safe work procedures or work instructions had been developed.
- There was inadequate contractor management.
- An inadequate induction was given to the contractor conducting the tree clearing.
- An inappropriately sized dozer was used for the task.
- The dozer had rollover protective and falling object protective structures (ROPS/FOPS). However, it was not fitted out for tree clearing operations, had no tree-pushing arm, tree canopy cover nor windows made of armoured glass or covered by steel mesh.

Recommendations

- Ensure that the area to be cleared of trees is inspected by a competent person to identify and clearly mark dead and dangerous trees, such as those that are hollow, rotted, burnt out, wedged or entangled with other trees and those with damaged root systems.
- Develop a plan to deal with dangerous trees, such as the use of explosives.
- Conduct a full risk assessment of tree clearing with plant such as the use of explosives.
- Conduct a full risk assessment of tree clearing with plant such as dozers. Consideration should also be given to the environmental conditions, such as ground wetness, the steepness of the terrain, and wind speed and direction.
- Ensure that the dozer operator is competent to perform tree clearing operations and has a certificate of competency for operating dozers.

Significant Incident Report No. 144
Released 2 August 2007

Roll over of front-end loader

Incident

In June 2007, the operator of a loader in the South West of Western Australia sustained minor injuries when the loader he was operating slid sideways over the edge of a 15 metre sand face and rolled over to the base of the sand pit, coming to rest on its side. The operator was attempting to clear top soil along the top of the face when the incident occurred.

The operator had only recently completed training in the use of front-end loaders. The loader was in good condition and the operator was

wearing the seat belt at the time of the incident, which undoubtedly prevented serious injury.

Previous incidents of a similar nature have occurred in Western Australian mines, and these are highlighted in Mines Safety Significant Incident Report No. 26 *Truck toppled over edge of stockpile*, which was released in October 1991. Mines Safety Bulletin No. 63 *Dozer safety in open cut operations*, published in October 2001, and Mines Safety Bulletin No. 26 *Death of dozer driver – Coronial Finding*, from June 2003, also outline the dangers associated with plant going over the edge of a pit.

Causes

- There were unclear instructions given, and miscommunication between the supervisor and the employees working on site, regarding the work to be undertaken.
- The employees on site were inexperienced at operating loaders.
- The loader operator was working too close to the edge of the face.
- There were no windrows, barriers, demarcation or warning signs at the edge of the face.
- There was inadequate supervision of the employees on site.
- The use of a loader was inappropriate for the task.
- A risk assessment or job safety analysis (JSA) had not been conducted.
- No safe work procedures or work instructions had been developed for the task.
- There were no radio communication systems in the loaders on site.
- There were no emergency procedures or first aid equipment available.



- No daily inspections by a competent person had been carried out.

Recommendations

Section 9 of the *Mines Safety and Inspection Act 1994* prescribes that the employer at a mine must provide and maintain workplaces, plant and systems of work such that employees are not exposed to hazards. The following points indicate what would constitute a safe system of work for loader operations.

- Ensure clear instructions are given to operators and that they understand the instructions.
- Ensure operators are told where not to work (restricted or dangerous areas) and why they are not to work in these areas.
- Ensure that loader operators are trained and competent.
- Ensure that new and inexperienced operators are appropriately inducted and closely supervised.
- Ensure loader operators are trained on what is the best course of action to take when plant is becoming uncontrollable and sliding towards a precipitous edge.
- Ensure that loader operators do not work near the edge of a steep face without edge protection or barriers such as windrows and bunds (also refer to r. 13.7, *Mines Safety and Inspection Regulations 1995*).
- Consideration should be given to the use of safety signs to identify the presence of a steep face or embankment.
- Ensure that the appropriate plant type is used for the task, such as a dozer in this case.
- Conduct appropriate risk assessments and job safety analyses (JSAs) for loader operations.
- Develop safe work procedures or work instructions for loader operations.
- Ensure manufacturers operating instructions and operating limitations are adhered to.
- Ensure that the loader is provided with rollover protective and falling object protective structures (ROPS/FOPS) to Australian Standard AS 2294:1197 and that seat belts are worn.
- Ensure that there are adequate means of communication between operators on site.
- Develop emergency procedures for all sites.
- Ensure adequate first aid equipment is on site and first aid trained persons are available.
- Ensure daily or shift inspections are conducted by a competent person.

Mines Safety Bulletin No. 80
Released 7 September 2007

Asbestos — gaskets containing asbestos imported into Western Australia

Hazard

Asbestos gaskets were recently discovered on imported pipe-work at a construction site on a mine in Western Australia. The gaskets were used to protect the pipe-work during transit.

The asbestos gaskets were sent into Australia from overseas in contravention of the existing bans on the importation of asbestos materials. The asbestos was only identified by an employee who had worked on another site where the same hazard was discovered.

Contributory factors

- Some countries do not have the same bans on asbestos as Australia.
- A lot of construction material is being sourced overseas, in countries that still employ asbestos for a variety of uses.
- The contents of packaging material are not always specified by the purchase, and information on the packaging is commonly not provided by the supplier.
- People do not expect to come into contact with asbestos on new products, due to the asbestos ban.
- Asbestos is entering the country unannounced.

Recommendations

- All mine sites should have a stated 'no asbestos' policy.
- This policy should be referred to in all purchasing specifications, which should include the materials to be used in packaging.
- Sites should have a program or plan, consistent with the National Standard, for managing suspected asbestos-containing materials that may be discovered at the site.
- Any asbestos removal and disposal that may be undertaken should comply with relevant codes and regulations.
- Employees should be informed of any asbestos found at the site and advised of the measures put in place to protect their health.
- A register of any asbestos on site should be maintained and this should be amended to include any new or casual discoveries, such as that reported here.



Medical Bulletin No. 5

Revised August 2007

Cyanide poisoning - first aid and medical treatment

Properties

Cyanide is a rapidly acting and extremely toxic chemical that exists in various forms. Depending on temperature, it can be a colourless gas or liquid (e.g. hydrogen cyanide – HCN, cyanogen) or a solid (e.g. sodium or potassium cyanide). Cyanide is described as having a bitter almond odour at concentrations greater than 1 ppm, but not everyone can detect this.

Routes of absorption

The primary route of occupational exposure is through inhalation, which results in rapid absorption into the systemic circulation. A less common route in the occupational setting is through ingestion. Cyanide can also be absorbed through the eyes or intact skin.

Mechanism of action

Cyanide inhibits cytochrome oxidase at the cellular level, preventing cells from using oxygen. This impairs the function of vital organs.

Cyanide poisoning

The onset of symptoms following cyanide exposure depends on:

- the form of cyanide;
- the mode of entry into the body; and
- the dose.

Acute

Mild poisoning - This may manifest as anxiety, headache, nausea and vomiting, mucous membrane irritation, metallic taste, shortness of breath and dizziness.

Progression of poisoning - Signs of deterioration include increasing shortness of breath, falling blood pressure, cardiac arrhythmia, periods

of cyanosis and a deteriorating level of consciousness.

Moderate and severe poisoning -

Exposure to cyanide gas produces the most rapid onset of symptoms. High concentrations of inhaled cyanide result in rapid loss of consciousness with seizures, difficulty breathing and cardiac arrest, with death occurring within a few minutes. Survivors may suffer brain injury due to either a direct toxic effect or anoxia (lack of oxygen).

Eyes - Direct contact with cyanide in caustic solutions is irritating to the eyes. Cyanide can also be absorbed into the body through the eyes.

Skin - Cyanide in caustic solution is corrosive to the skin and can also be fairly rapidly absorbed through the skin.

Chronic

Chronic exposure may result in symptoms of headache, eye irritation, fatigue, chest symptoms and nose bleeds. This is uncommon as cyanide is broken down to thiocyanate in the body and excreted.

Rescue and first aid

The first priority is to remove the casualty from further exposure – ideally move to a source of fresh air.

The trained rescuer should have donned appropriate respiratory and dermal personal protective equipment (PPE), especially gloves, goggles and an appropriate respirator if hydrogen cyanide or liquid cyanide is involved.

Airway - Clear and insert oral airway if casualty is unconscious and not breathing. If breathing, place in coma position.

Breathing - Mouth-to-mouth resuscitation should be avoided due to the risk of contamination to the rescuer.

If not breathing, use a resuscitation bag and mask. Provide 100% oxygen by mask with a non-return valve if available.

Circulation - Check for pulse. Commence external cardiac massage if absent.

Oxygen

Oxygen (100%) is considered the most useful treatment for early cyanide poisoning and should be administered to all persons considered exposed to cyanide, whether conscious or unconscious, breathing or not breathing.

Each site needs to undertake a **risk assessment** to determine the appropriate quantity and location of oxygen that should be available on site, taking into consideration the numbers of potentially exposed personnel and the duration to reach a tertiary care facility.

Decontamination

Remove any contaminated clothing and ensure these items are placed in a sealed collection bag. Wash down the casualty with copious amounts of fresh water.

Treatment should not be delayed by decontamination procedures and should be started immediately.

Transfer

Arrange urgent transfer to the nearest hospital or, if remote, nearest doctor. The casualty should be accompanied by someone trained in cardiopulmonary resuscitation (CPR) and able to continue resuscitation. The cyanide antidote kit should accompany the person.

Ingestion

There is little evidence to support the benefit of emesis (vomiting), gastric lavage or charcoal administration, especially when more than 2 hours have lapsed since ingestion. This form of treatment should only be used on the advice of an emergency physician or toxicologist.

Eye contamination

This should be managed with copious irrigation using water or normal saline for at least 5 minutes.

Cyanide antidotes

The use of antidotes is **not as immediately critical** as the administration of effective first aid and life support measures.

The selected cyanide antidote should be stored in a sealed tagged container in an accessible area with the cyanide protocol enclosed. The contents of the container and the expiry date should be regularly checked. Intravenous fluids and cannulae and blood tubes should be available. The kit should be transported with the casualty to the hospital or doctor.

Mild poisoning

Rest and oxygen may be all that is needed.

Progression

If there is evidence of deterioration, despite 100% oxygen administration, and there is a convincing history of exposure, amyl nitrite may be used.

The advantage of amyl nitrite is that, unlike the other antidotes, it does not require intravenous administration and therefore may be given by a person untrained in intravenous line insertion.

The dosage is 0.2-0.4 ml via Ambu bag, or on gauze held under the casualty's nose. Oxygen should continue to be administered.

Warning: Amyl nitrite may produce a severe drop in blood pressure. Monitor blood pressure and stop the casualty from standing and walking.

Moderate and severe poisoning

Continue administration of 100% oxygen.

Advanced life support may be required if the casualty is in shock or having seizures, with due caution to the protection of the care giver.

Preferably insert two intravenous lines.

Monitor heart and blood pressure, and pulse oximetry if available.

Monitor level of consciousness using the Glasgow Coma Scale (GCS).

Take 10 ml blood in a sodium heparin or sodium fluoride tube for blood cyanide levels to confirm the diagnosis. The sample should be chilled but not frozen and transferred to a laboratory capable of undertaking cyanide measurements.

Treatment should not be delayed while awaiting test results. Note that as most cyanide is in the red blood cells, the levels in the blood may not accurately reflect the true level of free cyanide and symptoms should therefore guide treatment.

Intravenous administration of an antidote

- **Hydroxycobalamin** was recently approved by the U.S. Food and Drug Administration for treatment of cyanide poisoning, and is available through the Therapeutic Goods Administration Special Access Scheme. It reacts with cyanide to form cyanocobalamin, which is excreted by the kidneys.

Dose: Administer 5-15 g hydroxycobalamin intravenously (Cyanokit® contains two 2.5 g bottles) over 30 minutes or faster if the casualty's condition is deteriorating.

- **Sodium thiosulphate** is a slower acting agent but may be useful as an adjunct to hydroxycobalamin. It reacts with cyanide to form thiocyanate.

Dose: Administer 12.5 g sodium thiosulphate (50 ml of 25% solution) over 10-20 minutes through a separate intravenous line. This may be repeated at half the initial dose 30 minutes later.

- **Kelocyanor (dicobalt edetate)** is no longer a preferred antidote.

Monitoring in hospital

- **Arterial blood gases (ABGs).** Severe metabolic acidosis requires correction.
- **Fluid and electrolyte balance.**
- **Neurological, respiratory and cardiovascular status.** Watch for the development of pulmonary oedema and aspiration pneumonia in comatose patients. Seizures will require treatment with intravenous or rectal benzodiazepines.
- Further antidote administration may be required, particularly if there is a persisting metabolic acidosis.

Oxygen therapy will be determined by the response to the antidote.

- Close monitoring should continue for a minimum 24-48 hour period following exposure if an antidote has been required as delayed effects may occur.
- Following skin exposure, a period of 6 hours of monitoring is required to ensure there are no delayed effects.
- Re-assessment of eye splashes is required within 24 hours, and ophthalmologic assessment is recommended.

Cyanide management plan

Each site should develop a medical management plan, including the identification of the nearest medical facility capable of treating a victim of cyanide poisoning and discussion with an experienced doctor.

References

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Micromedex® Healthcare series - Cyanide.

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